

08:15:18 1

IN THE UNITED STATES DISTRICT COURT

2

FOR THE DISTRICT OF DELAWARE

3

OSSEO IMAGING, LLC,)
) VOLUME 4
 Plaintiff,)
) C.A. No. 17-1386(JFB)
 v.)
) ROUGH DRAFT
 PLANMECA USA, INC.,)
)
 Defendant.)

8

9

Thursday, August 25, 2022
 8:30 a.m.
 Jury Trial

10

11

844 King Street
 Wilmington, Delaware

12

13

BEFORE: THE HONORABLE JOSEPH F. BATAILLON
 United States District Court Judge

14

15

16

APPEARANCES:

17

18

BAYARD, P.A.
 BY: RONALD GOLDEN, ESQ.

19

-and-

20

21

MEISTER SEELIG & FEIN, LLP
 BY: SETH H. OSTROW, ESQ.
 BY: THOMAS M. CASSONE, ESQ.
 BY: JEFFREY P. WEINGART, ESQ.
 BY: ROBERT P. FEINLAND, ESQ.

22

23

24

Counsel for the Plaintiff

25

1
2
3
4
5
6
7
8
9
10
11
08:34:51
08:34:51
09:00:51
09:01:03
09:01:14
09:01:14
09:01:24
09:01:31
09:01:32
09:01:32
09:01:42
09:01:42
09:01:42
09:01:42
09:01:52

APPEARANCES CONTINUED:

MORRIS NICHOLS ARSHT & TUNNELL LLP
BY: MICHAEL J. FLYNN, ESQ.

-and-

JACKSON WALKER LLP
BY: WASIF QURESHI, ESQ.
BY: LEISA T. PESCHEL, ESQ.
BY: CHRISTOPHER CRAVEY, ESQ.
BY: BLAKE DIETRICH, ESQ.

Counsel for the Defendant

COURT CLERK: All rise.

(Jury entering the courtroom at 9:00 a.m.)

THE COURT: Please be seated, ladies and gentlemen.

Will our previous witness please come back to the stand.

Sir, I will remind you that you are still under oath.

THE WITNESS: Yes, that's correct.

THE COURT: You may proceed, counsel.

CROSS-EXAMINATION

BY MR. WEINGART:

Q. Good morning, Mr. Pienkowski.

09:01:52 1

A. Good morning.

09:01:53 2

Q. Mr. Pienkowski, before we begin, I only have a few

09:01:56 3

more questions, but did you speak to your attorneys last

09:01:59 4

night concerning any of your testimony yesterday?

09:02:02 5

A. No, it was a very lonely night.

09:02:04 6

Q. I'm sorry about that.

09:02:09 7

Q. Mr. Pienkowski, your attorneys yesterday were asking

09:02:13 8

you what's been marked as PX-37 which was a letter from

09:02:19 9

Osseo's attorney sent in October of 2009. Do you remember

09:02:24 10

that?

09:02:24 11

A. Yes, I do.

09:02:25 12

Q. And if you need to look at the letter to refresh on

09:02:29 13

that, it's behind Tab 1 in the blue binder that your

09:02:35 14

attorneys provided to you yesterday. Do you remember that

09:02:41 15

letter?

09:02:47 16

A. Yes, I do.

09:02:51 17

Q. And after that letter was received, you said that you

09:02:54 18

had sent it over to Mr. Tawast at Planmeca OY, correct?

09:03:01 19

A. That's correct.

09:03:01 20

Q. And after you received that letter, did you on behalf

09:03:02 21

of Planmeca USA seek or receive a written non-infringement

09:03:10 22

or invalidity?

09:03:20 23

MR. DIETRICH: Objection, Your Honor. May we approach?

09:03:22 24

09:03:23 25

THE COURT: Yes, you may.

09:10:49 1

(Sidebar discussion:)

09:10:49 2

THE COURT: All right. So what's the objection?

09:10:49 3

MR. DIETRICH: He's about to ask whether or not

09:10:49 4

we obtained an opinion of counsel and we haven't offered an

09:10:49 5

opinion of counsel and black letter Third Circuit law there

09:10:49 6

should be not an adverse inference of whether or not we

09:10:49 7

sought opinion of counsel so he shouldn't be able to ask the

09:10:49 8

question, that question, it's prejudicial.

09:10:49 9

THE COURT: Your position?

09:10:49 10

MR. WEINGART: My motion is I'm going to ask the

09:10:49 11

question --

09:10:49 12

THE COURT: Ask the question whether they sought

09:10:49 13

counsel?

09:10:49 14

MR. WEINGART: Whether they sought or received a

09:10:49 15

written opinion on --

09:10:49 16

MR. CASSONE: Expert opinion.

09:10:49 17

MR. WEINGART: Well, no, an opinion from

09:10:49 18

counsel.

09:10:49 19

MR. CASSONE: On infringement.

09:10:49 20

THE COURT: Okay. And your position is he can't

09:10:49 21

even can ask that question?

09:10:49 22

MR. DIETRICH: He can't even ask that because it

09:10:49 23

goes to adverse -- the Berms case, Your Honor, that there

09:10:49 24

should not be an adverse inference for not seeking opinion

09:10:49 25

of counsel, that the jury should take that into

09:10:49 1 consideration and Federal Circuit says that's a problem.

09:10:49 2 THE COURT: And do you have any law that says
09:10:49 3 that it's proper?

09:10:49 4 MR. WEINGART: Well, the thing -- I don't have a
09:10:49 5 case for you, Your Honor, but what I will say is that
09:10:49 6 obviously you know, if they've produced an opinion to us, it
09:10:49 7 would be part of the case. They haven't produced an
09:10:49 8 opinion. And all I want to know is whether they sought or
09:10:49 9 received one.

09:10:49 10 THE COURT: I assume some interrogatories went
09:10:49 11 out asking whether they did or didn't, so you should know
09:10:49 12 the answer to this question and the answer to this question
09:10:49 13 is what, do you know.

09:10:49 14 MR. WEINGART: I believe the answer is no.

09:10:49 15 THE COURT: And your position is he doesn't need
09:10:49 16 to?

09:10:49 17 MR. DIETRICH: Whether we sought or did not seek
09:10:49 18 is privileged inquiry as far as what they did or did not do
09:10:49 19 in response to these letters with respect to counsel.

09:10:49 20 THE COURT: Doesn't that go straight to
09:10:49 21 willfulness? How does it not go to willfulness.

09:10:49 22 MR. DIETRICH: Your Honor, Federal Circuit,
09:10:49 23 Knorr-Bemse, K-N-O-R-R, case, the jury should not be
09:10:49 24 instructed, there should not be adverse inference for not
09:10:49 25 seeking opinion of counsel.

Pienkowski - cross

09:10:49 1 THE COURT: Do you have any law to the contrary?

09:10:49 2 MR. WEINGART: I don't have law to the contrary
09:10:49 3 right there on the tip of my tongue, but I mean we can
09:10:49 4 always agree on some kind of jury instruction to cover you
09:10:49 5 on that.

09:10:49 6 MR. DIETRICH: I can tell you we're not going to
09:10:49 7 agree on the a jury instruction, it's black letter law that
09:10:49 8 this jury should not be instructed on opinions of counsel,
09:10:49 9 one that was introduced into the case, that is black letter
09:10:49 10 Federal Circuit law it's been that way for the last
09:10:49 11 twenty years.

09:10:49 12 MR. WEINGART: The alternative is for me to ask
09:10:49 13 him questions what his questions were with Mr.^.
09:10:49 14 Mr. ^/WAFPLT was the only attorney he spoke to, whether he
09:10:49 15 had any authority to go ahead and seek an opinion or what
09:10:49 16 the instructions were from Planmeca Oy.

09:10:49 17 MR. DIETRICH: That isn't the only option, the
09:10:49 18 option is His Honor sustains my objection and we don't go
09:10:49 19 into opinion.

09:10:49 20 MR. FLYNN: Your Honor, if I may, in all
09:10:49 21 Delaware cases, an opinion of counsel has to be produced if
09:10:49 22 you're relying on a defense of willfulness.

09:10:49 23 THE COURT: I have never had a case where
09:10:49 24 somebody didn't ask for a lawyer's opinion, period, the end.
09:10:49 25 Okay. And I'm sure that occurs. If you don't ask for an

Pienkowski - cross

09:10:49 1 opinion of the lawyer, oh, man, okay. But I can't -- if you
09:10:49 2 don't have some law to dispute what counsel has said about
09:10:49 3 Knorr-Bemse.

09:10:49 4 MR. CASSONE: We haven't read the case either.

09:10:49 5 THE COURT: Say what?

09:10:49 6 MR. CASSONE: I'm sure Mr. Cravey is
09:10:49 7 representing -- I haven't read the whole case. I don't know
09:10:49 8 that it actually stands for that proposition or if it's --

09:10:49 9 THE COURT: Show me some law to the contrary.

09:10:50 10 MR. CASSONE: Fair enough.

09:10:50 11 MR. DIETRICH: I can tell you that I have read
09:10:50 12 the case and it absolutely stands for that proposition.

09:10:50 13 THE COURT: Okay. Well, you know, on the issue
09:10:50 14 of willfulness I'm going to have to sustain the objection
09:10:50 15 unless you see some law to the contrary.

09:10:50 16 MR. WEINGART: Your Honor, I would like to have
09:10:50 17 an opportunity maybe to go ahead and give you that
09:10:50 18 authority, bring them back at another time to continue the
09:10:50 19 cross.

09:10:50 20 THE COURT: He'll be here to do that.

09:10:50 21 MR. WEINGART: If we could just continue that
09:10:50 22 cross at a later time today.

09:10:50 23 THE COURT: However you want to proceed. I
09:10:50 24 mean, when you're ready, let me know, we'll have a
09:10:50 25 discussion and then we'll decide whether he comes back for

Pienkowski - cross

09:10:50 1 this issue or not. And then if you send me a copy of the
09:10:50 2 Bemse case that would be helpful.

09:10:50 3 MR. DIETRICH: Your Honor, understanding this is
09:10:50 4 your court, we won't object to recalling Mr. Pienkowski
09:10:50 5 after he's come and gotten done, they've had their
09:10:50 6 opportunity to ask their questions.

09:10:50 7 THE COURT: I have no doubt about that, but the
09:10:50 8 question is whether this is an appropriate area for inquiry
09:10:50 9 and if it is, I'll let him ask the questions. But if it's
09:10:50 10 not, and you're correct, then he won't be able to ask any
09:10:50 11 questions on this issue.

09:10:50 12 MR. DIETRICH: Very well.

09:10:50 13 MR. WEINGART: Just for the record, we agree
09:10:50 14 with you, Your Honor, it goes directly to willfulness. I
09:10:50 15 have one other small area to ask him about with a few
09:10:50 16 questions, I can either wait and do it all at the same time.

09:10:50 17 THE COURT: You better get it over, whatever
09:10:50 18 you're going to do you can square up now, because based on
09:10:50 19 the impression I have right now, unless you can come up with
09:10:50 20 some law there is not going to be any inquiry about whether
09:10:50 21 he obtained a letter from counsel because I think that
09:10:50 22 defense counsel has given me the correct law because in the
09:10:50 23 back of my head I remember some issues about this, but like
09:10:50 24 I said, I have never had a case where a company didn't at
09:10:50 25 least ask for a review from counsel, which is, I have no

09:10:50 1 problem with that. But we'll cross that bridge when I see
09:10:50 2 the law from both sides. For the time being I'm sustaining
09:10:50 3 the objection.

09:10:50 4 (End of side-bar.)

09:10:50 5 THE COURT: You may continue, counsel.

09:10:50 6 MR. WEINGART: Thank you, Your Honor.

09:10:50 7 BY MR. WEINGART:

09:10:50 8 Q. Mr. Pienkowski, during your tenure at Planmeca USA,
09:10:50 9 did Planmeca ever sell the Romexis software in the U.S. on
09:10:50 10 its own without selling the physical hardware units with
09:10:50 11 Romexis installed that makeup the accused ProMax models in
09:10:50 12 question?

09:10:50 13 A. If I'm understanding your question, you're asking me
09:10:50 14 if we sold the product separately for another competitor
09:10:50 15 product.

09:10:50 16 Q. Did you sell it to customers that didn't --
09:10:50 17 separately from the overall ProMax line of products?

09:10:50 18 A. I do not recall.

09:10:50 19 Q. You don't recall whether you offered Romexis licenses
09:10:50 20 to third parties that had not purchased the ProMax family of
09:11:00 21 products?

09:11:00 22 A. That's correct, I don't recall ever doing that.

09:11:00 23 Q. What's that?

09:11:00 24 A. I said I don't recall.

09:11:00 25 Q. Well, if you look at your deposition testimony,

09:11:14 1 please. And I'll direct you to page 106 of your testimony
09:11:26 2 which is tab -- behind tab S in the book I gave you
09:11:31 3 yesterday, sir.

09:11:33 4 A. Is that the blue one or the white one?

09:11:36 5 Q. Excuse me. The white one.

09:11:50 6 And do you see on page 106, line 5 through 10
09:11:58 7 where you were asked "and does Planmeca USA ever sell the
09:12:05 8 Romexis software on its own without selling physical
09:12:09 9 hardware units?" Do you see that?

09:12:12 10 A. Correct.

09:12:12 11 Q. And your answer at that time was, "to the best of my
09:12:16 12 knowledge, not in the United States."

09:12:19 13 Do you see that?

09:12:19 14 A. Yes, I do.

09:12:20 15 Q. Does that refresh your recollection about whether
09:12:24 16 Planmeca USA sold or licensed the Romexis software on its
09:12:30 17 own without selling physical hardware units comprising the
09:12:34 18 ProMax accused systems?

09:12:37 19 A. That's correct, to the best of my knowledge, not in
09:12:40 20 the United States.

09:12:42 21 Q. Not in the United States, correct?

09:12:43 22 A. Yes.

09:12:43 23 Q. And the software, the Romexis software updates that
09:12:47 24 you testified about yesterday, Planmeca USA doesn't offer or
09:12:52 25 license or sell those Romexis software updates or upgrades

Pienkowski - redirect

09:13:04 1 to any parties that don't already have -- haven't already
09:13:08 2 purchased the ProMax systems, correct?

09:13:12 3 A. To the best of my knowledge, correct.

09:13:15 4 Q. So they're only offered to existing customers that
09:13:18 5 have already purchased the ProMax systems, correct?

09:13:20 6 A. To the best of my knowledge, correct.

09:13:30 7 MR. WEINGART: Your Honor, that concludes my
09:13:32 8 cross-examination now, subject to what we discussed on the
09:13:35 9 side-bar.

09:13:36 10 THE COURT: All right. Redirect, counsel.

09:13:40 11 MR. DIETRICH: Yes, Your Honor. I just have a
09:13:42 12 couple of points that I would like to clarify for the jury,
09:13:45 13 if I may.

09:13:46 14 THE COURT: You may

09:13:47 15 REDIRECT EXAMINATION

09:13:48 16 BY MR. DIETRICH:

09:13:51 17 Q. Mr. Pienkowski, you were asked if you spoke to any
09:13:54 18 attorneys over the break last night, is that right?

09:14:00 19 A. That's correct.

09:14:01 20 Q. And you answered that you did not?

09:14:02 21 A. That's correct.

09:14:04 22 Q. And that would include me, is that right?

09:14:06 23 A. I didn't talk to anybody.

09:14:10 24 Q. Okay. Let's open your deposition to page 156, if we
09:14:12 25 can. I just want to hold that page for a moment if I may.

09:14:25 1 Do you have 156 there?

09:14:26 2 A. Yes, I do.

09:14:27 3 Q. Thank you.

09:14:28 4 So yesterday when I questioned you, you said
09:14:31 5 that dentists specializing in implants, in dental implants
09:14:35 6 generally tend to purchase ProMax 3D that shows smaller
09:14:41 7 image volume, do you remember that?

09:14:43 8 A. Yes, I do.

09:14:44 9 Q. And I think you said that the implant specialists
09:14:46 10 will typically purchase a ProMax 3D/S or a 3D classic, do
09:14:51 11 you remember that?

09:14:53 12 A. Yes, I do.

09:14:54 13 Q. During cross-examination, Osseo's attorney asked you
09:14:57 14 about your deposition testimony on that topic. Do you
09:15:00 15 remember that?

09:15:00 16 A. Yes, I do.

09:15:02 17 Q. Can I get you to look at page 156 of your deposition.
09:15:08 18 And yesterday Osseo's attorney did not give you an
09:15:13 19 opportunity to read lines 9 through 14 from page 156. Can
09:15:17 20 you do that now?

09:15:22 21 A. Yes.

09:15:22 22 Q. So let me be clear, can you read that out loud
09:15:32 23 please?

09:15:32 24 A. I didn't know I was supposed to read it out loud. I
09:15:35 25 thought we would put it on the screen.

09:15:37 1 If you're looking at larger volume screen you're
09:15:42 2 looking at it from orthopedic or oral surgeons. If your
09:15:44 3 looking to anything from a mid to a classic, you're looking
09:15:47 4 more of a GP. If you're looking to a small volume machine
09:15:50 5 it would be more endo and implants.

09:15:52 6 Q. If you're looking to a small volume machine that
09:15:55 7 would be more endo and implants, is that what you said?

09:15:58 8 A. That's correct.

09:15:59 9 Q. Is that consistent with your deposition testimony
09:16:02 10 yesterday?

09:16:02 11 A. That's correct.

09:16:02 12 Q. I'm sorry, with your trial testimony yesterday?

09:16:05 13 A. That would be correct.

09:16:06 14 Q. Can I get you to turn to page 170 of your deposition.

09:16:20 15 A. I'm there.

09:16:21 16 Q. And yesterday Osseo's attorney did not ask you about
09:16:24 17 page 170 of your deposition; is that right?

09:16:27 18 A. From what I recall, correct.

09:16:29 19 Q. And can I get you to read out loud lines 17
09:16:32 20 through 24?

09:16:32 21 A. "Well for the dentist they get their field of view
09:16:32 22 okay, field of view. They can purchase the best field of
09:16:42 23 view for their office to optimize their return on
09:16:42 24 investment.

09:16:42 25 Q. And the next, so in other words?

09:16:49 1 A. So in other words, if you're going to do an implant
09:16:52 2 and you're only going to do the root canal, you don't need
09:16:56 3 the biggest volume in the world you get your best return on
09:17:00 4 your investment because we have different fields of view.

09:17:03 5 Q. Is that consistent with your trial testimony
09:17:06 6 yesterday?

09:17:06 7 A. Yes, it is.

09:17:07 8 Q. So I want to give you the last word on this issue if
09:17:10 9 I can. If Osseo later argues in this case that Bob
09:17:14 10 Pienkowski says that dental implant specialist generally
09:17:20 11 purchase large volume imaging machines, would you disagree
09:17:24 12 with that statement?

09:17:25 13 A. Yes, I would. Because the smallest view is purchased
09:17:32 14 by dentist and the classic is also purchased by some implant
09:17:37 15 people, which is a larger view than the S, but it's not the
09:17:42 16 largest, largest view, there are three more machines larger
09:17:47 17 than that.

09:17:47 18 Q. I understand that a dentist can obviously purchase
09:17:51 19 whatever ProMax 3D imaging machine that they want to
09:17:54 20 purchase, however during your time at Planmeca between 2011
09:17:57 21 and 2020, did you gain an understanding of the ProMax 3D
09:18:03 22 models, typically purchased by dental implant specialists?

09:18:03 23 A. Could you repeat that question, please?

09:18:10 24 Q. During your time at Planmeca from 2011 to the 2020,
09:18:17 25 did you gain an understanding of the volume size of ProMax

09:18:23 1 3D systems that were typically purchased by implant
09:18:25 2 specialists?

09:18:28 3 A. Yes. I don't have a statistical detail, but through
09:18:33 4 our sales force, most of them are S's and classics.

09:18:37 5 Q. Thank you.

09:18:37 6 I would like to focus on one other thing that
09:18:40 7 was discussed yesterday during your testimony. Mr. Herndon,
09:18:45 8 can we get PX-55. Can you blow up that table, please?

09:18:55 9 Yesterday you were asked about this document.

09:18:57 10 Do you remember that?

09:18:58 11 A. Yes, I do.

09:19:00 12 Q. All right. Can you go to the next page, Mr. Herndon.
09:19:07 13 And blow up the bottom, the margin shown. And Osseo's
09:19:15 14 attorney spent some time talking about this data that's
09:19:19 15 shown on the bottom of the page. Do you remember that?

09:19:22 16 A. Yes, I do.

09:19:23 17 Q. Now, I want to be really clear. What we're looking
09:19:26 18 at here, is this a plan or is this actual sales data?

09:19:37 19 A. That, I don't know.

09:19:39 20 Q. Okay. Let me come at this from a different angle,
09:19:52 21 then. Does Planmeca require when it sells ProMax 3D systems
09:20:00 22 that it receives a 25 percent profit margin?

09:20:04 23 A. No, there is no requirement.

09:20:05 24 Q. And so every time Planmeca sells a ProMax 3D system,
09:20:09 25 does it get a 25 percent gross profit margin?

09:20:14 1 A. No, that would be incorrect.

09:20:15 2 Q. What kind of things would go into whether or not
09:20:19 3 Planmeca receives, what profit margin Planmeca receives when
09:20:22 4 it sells its ProMax 3D systems?

09:20:24 5 A. There is quite a few circumstances. One we do some
09:20:31 6 charity things with our products called MOM, it's an
09:20:36 7 abbreviation for Missions of Mercy, what we do is set these
09:20:42 8 machines up in some major cities, it might be five machines,
09:20:46 9 four machines, and local dentists come and they take digital
09:20:51 10 images on people and they view the images and do whatever
09:20:54 11 dental work they can do under the environment. Well those
09:21:00 12 machines are now used, so we have to refurbish them and sell
09:21:02 13 them at a discount. We also throughout the year we have
09:21:05 14 promotions at dental shows where we discount our products to
09:21:09 15 try to increase sales to makeup for the cost of the trade
09:21:13 16 show. In the past we've also, we've put rebates together
09:21:18 17 for our distribution which means that they hit certain sales
09:21:23 18 targets then we provide rebates to them, sometimes we have
09:21:26 19 paid it in product, we send them product which probably had
09:21:29 20 a 0 balance.

09:21:32 21 And promotions for orthodontists if there is a
09:21:35 22 meeting. It's just sometimes there are these -- the new
09:21:40 23 category that's going on in the market is these large
09:21:42 24 corporate businesses where they'll come to Planmeca and say
09:21:52 25 look, we have 400 or 500 operators throughout the United

Pienkowski - redirect

09:21:57 1 States or offices, we would be interested in purchasing a
09:22:00 2 hundred of your 2D machines or 3D machines over the next two
09:22:05 3 years, so that's a big negotiation. In those circumstances,
09:22:09 4 we're pretty lucky if we get 16 or 17 percent. So there is
09:22:14 5 a lot of circumstances that with different times during the
09:22:19 6 year, during the -- that we would not be able to get our
09:22:23 7 targeted hopefully 25 percent.

09:22:25 8 Q. All right. I appreciate that explanation. Let me
09:22:28 9 see if I can summarize it. So the actual profit margins
09:22:32 10 that Planmeca receives for any sale of a ProMax 3D system is
09:22:37 11 based on a negotiation with a customer; is that fair?

09:22:42 12 A. Yes, that is.

09:22:43 13 Q. And how would you go about determining what
09:22:47 14 percentage profit margin Planmeca made on any sale, would
09:22:51 15 you have to look at the actual sales data?

09:22:53 16 A. Yeah, it would be -- you would have to look at what
09:23:00 17 we purchased the product for, the Planmeca, and then you
09:23:03 18 have to look at what we sold the product for to our
09:23:07 19 distributor and that way is the only way you can come up
09:23:10 20 with a fair profit margin.

09:23:13 21 Q. This is another one, Mr. Pienkowski that I want to
09:23:16 22 give you the last word on. So if later in this case or
09:23:19 23 during closing Osseo argues that Mr. Pienkowski told you,
09:23:22 24 ladies and gentlemen, that Planmeca receives a 25 percent
09:23:25 25 profit margin on the sales of ProMax 3D, would you disagree

09:23:30 1 with that statement?

09:23:31 2 A. Yes, we don't always get that, there is a lot of
09:23:35 3 circumstances, and why not.

09:23:38 4 MR. DIETRICH: Thank you. No further questions,
09:23:39 5 Your Honor.

09:23:40 6 THE COURT: Recross, counsel.

09:23:46 7 RE-CROSS-EXAMINATION

09:23:49 8 BY MR. WEINGART:

09:24:04 9 Q. Mr. Pienkowski, may I direct your attention to
09:24:04 10 page 85 of your deposition transcript, please. Do you have
09:24:25 11 that?

09:24:25 12 A. Yes, I do.

09:24:27 13 Q. Do you recall at your deposition that you were being
09:24:30 14 asked about Planmeca USA's profit margins in connection with
09:24:36 15 sales of the promotions systems?

09:24:38 16 A. Yes, I was asked, correct.

09:24:41 17 Q. All right. And do you recall that when -- that you
09:24:45 18 were discussing those margins and you were specifically
09:24:50 19 discussing the larger volume machines on page 85; correct?

09:24:54 20 A. Yes, that's correct.

09:25:00 21 Q. And you were asked about the wholesale price on
09:25:07 22 page 85 of the large machines, of the large volume machines;
09:25:10 23 correct?

09:25:14 24 A. I don't see any pricing on that page.

09:25:16 25 Q. At lines 6 and 7, you were being asked about the

- 09:25:21 1 wholesale price. Correct?
- 09:25:23 2 A. That's correct.
- 09:25:24 3 Q. All right. And you responded as follows "there is
- 09:25:32 4 not as many competitors in the market with that volume size
- 09:25:33 5 so somebody that wants a larger machine, you can get a
- 09:25:38 6 little bit more margin for it. Do you see that?
- 09:25:42 7 A. Yes, that's correct.
- 09:25:42 8 Q. And when you were saying a little bit more margin,
- 09:25:47 9 you were saying that that was a margin that was over the
- 09:25:50 10 25 percent level, correct?
- 09:25:52 11 A. I can't recall what margin we started with, but we
- 09:25:55 12 never sold that many promotions manuals.
- 09:25:58 13 Q. Yesterday we saw that your largest ProMax machine was
- 09:26:04 14 approximately 38 percent correct yesterday?
- 09:26:06 15 A. Did you see how many we sold.
- 09:26:10 16 Q. I'm asking you, that in that document we looked at
- 09:26:14 17 yesterday the testimony indicated that the margin with the
- 09:26:18 18 largest volume unit was 38 percent, correct?
- 09:26:21 19 A. For that particular sell. We didn't sell many.
- 09:26:22 20 MR. WEINGART: Thank you, Your Honor, we would
- 09:26:27 21 like to have a side-bar about the topic we talked about a
- 09:26:30 22 few minutes ago, please.
- 09:26:32 23 THE COURT: Sure. Let's do that.
- 09:26:32 24 (Side-bar discussion:)
- 09:29:32 25 THE COURT: All right.

09:29:31 1 MR. CASSONE: Your Honor, I think contrary to
09:29:31 2 what Mr. Cravey told you, well, I will just read it, it
09:29:31 3 says --

09:29:31 4 THE COURT: Where are you reading from?

09:29:31 5 MR. CASSONE: I'm reading from -- what am I
09:29:31 6 reading from.

09:29:31 7 MR. GOLDEN: It's right in Matthews Patent
09:29:31 8 Digest.

09:29:31 9 THE COURT: From the patent --

09:29:31 10 MR. GOLDEN: The leading authority on Federal
09:29:31 11 Circuit, et cetera.

09:29:31 12 MR. CASSONE: It says in Knorr the Federal
09:29:31 13 Circuit declined to address whether a jury or a fact finder
09:29:31 14 should even be told whether an accused infringer did or did
09:29:31 15 not consult counsel. Hence the question remains open on
09:29:31 16 whether the consultation of counsel should be part of the
09:29:31 17 willfulness determination an accused infringer relied on
09:29:31 18 attorney/client privilege and not disclose its opinions
09:29:31 19 before.

09:29:31 20 THE COURT: Okay. So right now, right now the
09:29:31 21 evidence would be they were contacted and there is no
09:29:31 22 evidence that they ever contacted a lawyer, other than their
09:29:31 23 in-house counsel about whether they should -- whether they
09:29:31 24 were infringing.

09:29:31 25 MR. CASSONE: We think that's what the evidence

09:29:31 1

will show.

09:29:31 2

THE COURT: That's what the evidence shows so

09:29:31 3

far, that's all we have gotten. They're saying that's

09:29:31 4

enough under the law. So you pulled it up.

09:29:31 5

MR. DIETRICH: I'm saying under 35 U.S.C. 298

09:29:31 6

they codified, that's 35 U.S.C. --

09:29:31 7

THE COURT: I think you're right. All right.

09:29:31 8

I'm standing by it. Good luck, guys.

09:29:31 9

MR. CASSONE: Thank you, Your Honor.

09:29:31 10

(End of sidebar.)

09:29:31 11

MR. WEINGART: No further questions.

09:29:31 12

THE COURT: Any follow-up?

09:29:31 13

MR. DIETRICH: Nothing from Planmeca, Your

09:29:31 14

Honor.

09:29:31 15

THE COURT: You may step down, sir. Just be

09:29:31 16

careful. You got to watch out for old guys like me. You

09:29:31 17

don't want to fall. Young guys can fall down.

09:29:31 18

THE WITNESS: I'll grab the side, thank you,

09:29:31 19

Your Honor.

09:29:31 20

Do I take these or leave them?

09:29:31 21

COURT CLERK: You can leave them.

09:29:31 22

THE COURT: Defendant may call its next witness.

09:29:31 23

MS. PESCHEL: Your Honor, next for defendant

09:29:31 24

Planmeca, Planmeca calls Dr. Norbert Pelc.

09:29:31 25

THE COURT: Doctor, if you just come to the

Pelc - direct

09:29:34 1 front here and in front of my courtroom deputy, we're going
09:29:36 2 to ask you a couple of questions and then swear you in.

09:29:39 3 COURT CLERK: Can you please state and spell
09:29:41 4 your name for the record.

09:29:42 5 THE WITNESS: Norbert Pelc. N-O-R-B-E-R-T.
09:29:46 6 P-E-L-C.

09:29:48 7 NORBERT PELC, having been duly sworn, was
09:29:53 8 examined and testified as follows:

09:30:16 9 THE COURT: You may proceed.

09:30:18 10 MS. PESCHEL: Thank you, Your Honor.

09:30:20 11 DIRECT EXAMINATION

09:30:20 12 BY MS. PESCHEL:

09:30:21 13 Q. Dr. Pelc, can you introduce yourself to the jury.

09:30:25 14 A. Yes, I'm Norbert Pelc. I live with my wife of
09:30:29 15 48 years in Aptos, California. We have two children, a son
09:30:33 16 who is 38 and a daughter who is 36. Will be 36 in October.
09:30:41 17 And we have two grandchildren and our -- and they all live
09:30:47 18 in the Silicon Valley, very close to our house and that's
09:30:51 19 quite nice.

09:30:51 20 Q. Where did you grow up?

09:30:52 21 A. I was born in Bueno Aires, Argentina. And my family
09:30:56 22 moved to the United States in 1964 to Wisconsin, south
09:31:00 23 eastern Wisconsin and I grew up there.

09:31:00 24 Q. Why did your family move from Argentina?

09:31:12 25 A. Well, there is, you may hear about a fair amount of

Pelc - direct

09:31:15 1 political strife and violence in Argentina. And we were a
09:31:20 2 working class family and the economic opportunities my
09:31:26 3 parents felt that their children would have was what
09:31:30 4 motivated them.

09:31:31 5 Q. Why are you here today?

09:31:34 6 A. I was hired by the firm representing Planmeca to
09:31:39 7 provide opinions on the patents-in-suit.

09:31:43 8 Q. And are your opinions in this case your own
09:31:47 9 independent opinions?

09:31:48 10 A. Yes, they are.

09:31:49 11 Q. Does your compensation in this case depend on the
09:31:52 12 outcome at all?

09:31:53 13 A. No.

09:31:54 14 MS. PESCHEL: Your Honor, may I approach with
09:31:57 15 witness binders?

09:31:58 16 THE COURT: Yes, you may.

09:32:17 17 BY MS. PESCHEL:

09:32:43 18 Q. Dr. Pelc, can you turn to tab A behind Tab 1 of the
09:32:48 19 first binder.

09:32:52 20 A. I have it.

09:32:52 21 Q. What is that document?

09:32:57 22 A. It's my first report, the opening report.

09:33:02 23 Q. Oh, I'm sorry, tab A behind Tab 1.

09:33:12 24 A. Oh, I see. The front page, actually it says
09:33:12 25 Exhibit 1. I get it now. It's my curriculum vitae.

Pelc - direct

09:33:20 1 Q. And can you just look at that and make sure that it's
09:33:24 2 a full copy of your curriculum vitae. And maybe can you
09:33:33 3 explain for the jury what that means.

09:33:35 4 A. Sure. This is a copy of my curriculum vitae as of
09:33:39 5 2019 when I turned it on in and the curriculum vitae list my
09:33:47 6 education, where I have worked, fellowships and teaching and
09:33:53 7 honors that I have received. And then also service to the
09:34:01 8 government and various scientific societies. And then there
09:34:06 9 are many pages of publications of papers, invited lectures,
09:34:15 10 issued U.S. patents. And then at the very end there is a
09:34:21 11 list of my previous testimony in other cases.

09:34:25 12 Q. Is it fair to say, Dr. Pelc, that that is sort of an
09:34:31 13 expanded resume of your work?

09:34:32 14 A. Yes, quite detailed.

09:34:33 15 Q. On the first page is it marked DX-150?

09:34:36 16 A. Yes.

09:34:37 17 MS. PESCHEL: Your Honor at this time I would
09:34:38 18 like to offer into evidence Defendant's Exhibit 150 and
09:34:41 19 publish it to the jury.

09:34:42 20 THE COURT: Any objection?

09:34:43 21 MR. OSTROW: No objection.

09:34:44 22 THE COURT: 150 is received.

09:34:45 23 (DX Exhibit No. 150 was admitted into evidence.)

09:34:52 24 BY MS. PESCHEL:

09:34:53 25 Q. Now, as you mentioned, Dr. Pelc, this particular

Pelc - direct

09:35:02 1 document, which will now go back to the jury is a little bit
09:35:07 2 lengthy. Have you prepared a set of slides today to assist
09:35:11 3 in your testimony?

09:35:12 4 A. Yes I did.

09:35:13 5 Q. Did those slides at least in the beginning summarize
09:35:16 6 some of the information that's in here?

09:35:19 7 A. Yes.

09:35:20 8 Q. I think it may be easier to use those.

09:35:29 9 Mr. Herndon, can we go to Dr. Pelc's slides?

09:35:40 10 Dr. Pelc, are these the slides that you prepared
09:35:42 11 to assist in your testimony today?

09:35:44 12 A. They look like it, yes.

09:35:48 13 Q. Can you tell us a little bit about your educational
09:35:51 14 background?

09:35:52 15 A. Yes. I obtained a Bachelor of Science degree from
09:35:54 16 the University of Wisconsin in Madison, in mathematics,
09:36:00 17 engineering and physics. Then I got Masters of Science,
09:36:05 18 Doctorate of Science from Harvard in '76 and '79,
09:36:11 19 concentrating on medical radiology physics.

09:36:15 20 Q. You mentioned that you were from a working class
09:36:18 21 family. How did you pay for college?

09:36:20 22 A. Well, this was -- since I was a resident of Wisconsin
09:36:25 23 it's a state school, and especially back in the day, tuition
09:36:30 24 was quite reasonable. And my parents both worked hard and
09:36:32 25 were frugal and they helped with some costs and I worked and

09:36:42 1 paid for the rest. The graduate school I had fellowships.

09:36:47 2 Q. And after graduate school, where did you work?

09:36:50 3 A. I got a job with General Electric Medical Systems as
09:36:56 4 a senior physicist in the R & D group called the Applied
09:37:02 5 Sciences Lab and for a while managed that group.

09:37:05 6 Q. And then on slide 3 you also list Stanford
09:37:08 7 University. What did you do there?

09:37:10 8 A. I decided to work in academics and move from industry
09:37:15 9 to academics and got a job at Stanford in primarily in the
09:37:25 10 Radiology Department.

09:37:25 11 Q. It also list the Department of Bioengineering. Were
09:37:26 12 you also involved in that department?

09:37:28 13 A. Yes. I helped create that department and then became
09:37:31 14 a faculty member in it and chaired it for five years.

09:37:35 15 Q. Have you been involved in any imaging research?

09:37:42 16 A. My whole year really has been in imaging research. I
09:37:47 17 did some research very much related to the topic of this
09:37:53 18 litigation as an undergraduate. And we can talk more about
09:38:00 19 that. And then all of my graduate research was in imaging,
09:38:04 20 and specifically in tomography.

09:38:07 21 Q. You mentioned that you had some relevant experience
09:38:10 22 as an under graduate. Can you expand on that a little bit?

09:38:14 23 A. Yes. I was interested in finding a field that would
09:38:19 24 combine my interests in mathematics and physics and
09:38:23 25 engineering and medicine. And I heard about a professor by

Pelc - direct

09:38:27 1 the name of John Cameron and went in and visited him. He
09:38:33 2 was quite kind. And he told me about medical physics, and
09:38:37 3 then introduced me to and helped me get a job in the bone
09:38:41 4 mineral laboratory which was directed by Richard Mazess and
09:38:46 5 I got a job for the last two years of my under graduate
09:38:52 6 training and both earned money and earned experience in bone
09:38:57 7 densitometry.

09:38:58 8 Q. And then on DDX-4.4 you list the bullet points with
09:39:05 9 respect to your graduate research, like tomography, computed
09:39:09 10 tomography and tomosynthesis, are you going to explain those
09:39:15 11 later to the jury?

09:39:16 12 A. Yes, I will.

09:39:17 13 Q. You mentioned you worked at GE medical systems. What
09:39:20 14 types of things did you work on there?

09:39:21 15 A. I worked in computed tomography during the early days
09:39:25 16 of CT, and helped develop a number of new methods and
09:39:31 17 improvements to the GE CT product line. Especially worked
09:39:38 18 that led to a product called the GE 9800. A lot of the
09:39:45 19 things that I did was related to new calibration and
09:39:48 20 reconstruction software that both improved the performance
09:39:52 21 of the machine, allowed it to do higher resolution imaging,
09:39:56 22 and make the machine more reliable.

09:40:00 23 I also worked on a project to build a dual
09:40:04 24 energy system, x-ray imaging system which led to my first
09:40:12 25 patent, I guess on an x-ray source for dual energy

Pelc - direct

09:40:17 1 measurements. And that system was used for a number of
09:40:21 2 research studies including in bone densitometry. And then
09:40:27 3 later half of my tenure at GE I worked at magnetic resonance
09:40:34 4 imaging developing techniques in MRI.

09:40:36 5 Q. Do you have an example of what those techniques would
09:40:39 6 be?

09:40:39 7 A. Well, a lot of the work that I did was just to
09:40:43 8 improve the machine, but things that people might be
09:40:48 9 interested in is I developed techniques for imaging blood
09:40:52 10 vessels and to image the beating heart without any
09:40:56 11 intervention, invasion of the person, noninvasive.

09:41:01 12 Q. And then looking at slide 6 it appears you have
09:41:05 13 summarized your work at Stanford. Can you at a high level
09:41:09 14 describe what types of research projects you have been
09:41:12 15 involved in?

09:41:12 16 A. Initially I continued my research in MRI, but then
09:41:17 17 switched back to my interest in x-ray imaging and CT. And
09:41:21 18 we developed methods for circular tomosynthesis that was
09:41:26 19 used in a type of orthopedic imaging, and for the last
09:41:30 20 decade or so we have been working on new kinds of machines
09:41:34 21 and methods to reduce the radiation dose from computed
09:41:40 22 tomography.

09:41:42 23 Q. Dr. Pelc, do you have any patents?

09:41:43 24 A. Yes. I am the inventor in ninety-five issued U.S.
09:41:48 25 patents.

Pelc - direct

09:41:49 1 Q. Can you turn in your binder to Tab 10?

09:41:59 2 A. Book one?

09:41:59 3 Q. Ten?

09:42:00 4 A. Yes, I have it.

09:42:02 5 Q. What is that?

09:42:03 6 A. That is a copy of one of my patents, the '080 patent.

09:42:10 7 Q. And what generally is the patent related to?

09:42:14 8 A. It's related to a CT system for imaging say a bone
09:42:24 9 inside of a the body when the bone is smaller than the body
09:42:28 10 in its entirety.

09:42:31 11 MS. PESCHEL: At this time Your Honor we would
09:42:33 12 like to offer into evidence Defense Exhibit 4.

09:42:36 13 THE COURT: Any objection?

09:42:37 14 MR. OSTROW: No objection.

09:42:38 15 THE COURT: Four is received.

09:42:40 16 (DX Exhibit No. 4 was admitted into evidence.)
09:42:41 17 May I publish, Your Honor?

09:42:47 18 THE COURT: Yes, you may.

09:42:49 19 BY MS. PESCHEL:

09:42:50 20 Q. Dr. Pelc, I just wanted the jury an opportunity to
09:42:52 21 look at what you were talking about.

09:42:52 22 In this particular patent it says the assignee
09:43:00 23 is Lunar corporation. What is that?

09:43:02 24 A. Yes. During my time at Stanford I did some outside
09:43:12 25 consulting including Lunar. We will talk a little bit more

Pelc - direct

09:43:13 1 about Lunar later, and through that work, this patent came
09:43:20 2 out of that consulting work and since they had hired me as a
09:43:23 3 consultant, the rights to the invention are assigned to
09:43:26 4 them.

09:43:27 5 Q. And when was this particular patent filed?

09:43:30 6 A. It was filed on May 8th of 1995.

09:43:35 7 Q. When did it issue?

09:43:36 8 A. July 2nd, 1996.

09:43:47 9 Q. Dr. Pelc, I would like to briefly summarize your
09:43:51 10 experiences, publications and teachings. Can you give the
09:44:01 11 jury at a high level what that has been over your 40-year
09:44:04 12 career?

09:44:07 13 A. Sure, I am an author of 220 peer reviewed journal
09:44:11 14 articles and 360 research papers presented at conferences.
09:44:14 15 I have taught a number of courses on a variety of topics
09:44:20 16 related to diagnostic imaging. And much of the teaching
09:44:24 17 that I do is one on one with my doctoral students.

09:44:31 18 Q. And then I see here you have a resident radiologic
09:44:34 19 physics course, what was that?

09:44:37 20 A. The residents are people who are training to be
09:44:41 21 radiologist and they need to learn about radiological
09:44:44 22 physics because it's important for their knowledge and
09:44:48 23 practice, and I taught them x-ray physics for a number of
09:44:51 24 years and many classes of are radiologists.

09:44:54 25 Q. And I think I had jumped ahead in my questioning a

Pelc - direct

09:45:02 1 little bit earlier. But going back to your patent which
09:45:05 2 I'll refer to if it's okay with you as the '080 patent by
09:45:10 3 the last three numbers. Can you give an overview of how
09:45:13 4 that might be relevant in this case?

09:45:15 5 A. Yes, the '080 patent as I said is intended to allow
09:45:21 6 the imaging of a small bony region inside of a large object.
09:45:26 7 And because it's -- if you can do that because it's smaller
09:45:30 8 you can make the scan faster, you can reduce radiation dose
09:45:35 9 and have a number of advantages. And the way this worked is
09:45:39 10 by using the dual energy technique to separate soft tissue
09:45:45 11 from bone, once you get rid of the soft tissue and you have
09:45:48 12 only bone you now have, are looking only at the small
09:45:52 13 structure and can have those advantages. As an aside, also
09:45:56 14 the reconstruction will be only of bone and will be
09:46:00 15 quantitative bone densitometry.

09:46:02 16 Q. Did you have any other patents related to
09:46:05 17 densitometry and computed tomography?

09:46:08 18 A. Many patents related to computed tomography and I
09:46:12 19 mentioned the dual energy x-ray source patent.

09:46:22 20 Q. Dr. Pelc, I'm showing you on slide 11, a figure from
09:46:27 21 your '080 patent K you describe the equipment that was
09:46:31 22 involved in that patent?

09:46:33 23 A. Yes. You can also get a flavor for it from the
09:46:37 24 figure on the front of the patent. There is an x-ray
09:46:41 25 source, there is a detector, so the gantry has to go around

Pelc - direct

09:46:46 1 in circles so there is a gantry motor controller. There is
09:46:50 2 a computer that coordinates all those activities and
09:46:54 3 controls the x-ray source. A data acquisition system that
09:46:59 4 includes an analog to digital converter. There is a table
09:47:03 5 motor because the patient is moved in and out of the scanner
09:47:07 6 on the table and there is a table motor controller that is
09:47:15 7 in turn controlled by the computer. A console that of
09:47:19 8 course has a keyboard and input devices and mass storage and
09:47:24 9 a display that's in the console.

09:47:31 10 Q. Dr. Pelc during the course of your career have you
09:47:31 11 received any awards and recognitions?

09:47:33 12 A. Yes, an abbreviated list of awards. I was elected to
09:47:38 13 the national academy of engineering which I view as quite an
09:47:44 14 honor because it only elects less than 100 people from all
09:47:48 15 of engineering every year. I received two awards for
09:47:54 16 lifetime achievement, one from the American association of
09:47:59 17 physicists in medicine and one from the radiological society
09:48:03 18 of North America that was talked about a couple of times
09:48:06 19 already in this trial. And I also was granted an honorary
09:48:12 20 doctorate of medicine from the Frederick Alexander
09:48:16 21 University in Nuremberg.

09:48:20 22 Q. I see on slide 12 you have a list of fellows? What is
09:48:26 23 a fellow.

09:48:27 24 A. Scientific societies generally recognize meritorious
09:48:31 25 members by naming them fellows. So I am a fellow of the

Pelc - direct

09:48:37 1 American association of physicists in medicine, the
09:48:40 2 international society for magnetic resonance in medicine,
09:48:44 3 the institute for medical and biological engineering, SPIE,
09:48:48 4 which is a society devoted to optics, and the American Heart
09:48:54 5 Association.

09:48:54 6 MS. PESCHEL: Your Honor at this time I would
09:48:54 7 like to tender Dr. Pelc as an expert in the field of the
09:48:58 8 infringed patent including digital imaging tomography and
09:49:02 9 densitometry.

09:49:02 10 MR. OSTROW: I'm sorry, I couldn't hear.

09:49:06 11 MS. PESCHEL: I would like too tender Dr. Pelc
09:49:08 12 as an expert in the field of the asserted patents including
09:49:11 13 digital imaging, tomography and densitometry.

09:49:15 14 MR. OSTROW: We object.

09:49:16 15 THE COURT: You object?

09:49:18 16 MR. OSTROW: Yes, Your Honor.

09:49:21 17 THE COURT: Overruled. You may proceed,
09:49:24 18 counsel.

09:49:25 19 MS. PESCHEL: Thank you, Your Honor.

09:49:28 20 BY MS. PESCHEL:

09:49:29 21 Q. Dr. Pelc, what materials did you review in this case?

09:49:32 22 A. I reviewed the patents and their prosecution history,
09:49:34 23 legal briefs, deposition testimony, expert reports, trial
09:49:41 24 exhibits, a few Planmeca confidential documents and a lot of
09:49:44 25 prior art materials.

Pelc - direct

09:49:49 1 Q. With respect to the Planmeca technical materials,
09:49:53 2 what kind of things did you consider?

09:49:55 3 A. Technical documents that describe the machines so
09:49:58 4 that I would have a good understanding of them. And also
09:50:02 5 Planmeca's responses to discovery, deposition transcripts of
09:50:09 6 Planmeca witnesses. A few of Planmeca Oy patents. And I
09:50:15 7 had conversations with Planmeca employees, especially Timo
09:50:21 8 Muller.

09:50:24 9 Q. And what were you asked to do in this case?

09:50:26 10 A. I was asked to respond to Dr. Kia's infringement
09:50:31 11 report and in it present my opinions as to whether the
09:50:36 12 ProMax 3D systems infringe any asserted claim. And to
09:50:41 13 analyze and present opinions related to whether the claims
09:50:46 14 of the Osseo patents are valid or invalid. And provide
09:50:51 15 technical expertise relevant to the damages expert.

09:50:57 16 Q. Dr. Pelc, can we discuss a little bit about the
09:51:01 17 technology that we've heard about in this case?

09:51:02 18 A. Sure, I would be glad to. X-rays were discovered by
09:51:07 19 Wilhelm Rontgen in 1895. He was doing research on other
09:51:12 20 things and noticed this strange phenomenon and was smart
09:51:17 21 enough to realize that was more important than whatever else
09:51:22 22 he was trying to do with the equipment and started pursuing
09:51:27 23 that. And he realized that there was rays, nobody knew
09:51:32 24 about radiation at that time or not much, and there with
09:51:37 25 were rays coming from his device that carried energy and he

Pelc - direct

09:51:38 1 didn't know what they were so he called them X-rays because
09:51:41 2 he didn't know what they were. But explained a number of
09:51:48 3 things about X-rays, and for his work was given the Nobel
09:51:52 4 prize in physics, the first Nobel prize ever in physics in
09:51:59 5 1901 and soon after his discovery, he realized that his
09:52:04 6 x-rays were penetrating things but some things were
09:52:09 7 penetrated more easily than others. And so he thought that
09:52:12 8 they might be useful for making images of the inside of
09:52:18 9 people, something that hadn't been done before. And took
09:52:19 10 this image of his wife's hand and as far as we know, this is
09:52:24 11 the first -- well a reproduction obviously of the first
09:52:29 12 x-ray ever taken.

09:52:32 13 Q. Dr. Pelc, we've also heard a lot about densitometry
09:52:36 14 in this case. Are there common ways to do densitometry in
09:52:41 15 the scientific field?

09:52:44 16 A. Yes. A couple of them are called absorptiometry
09:52:51 17 which means measuring the absorption of x-rays. I mentioned
09:52:54 18 John Cameron earlier, he was the professor that I went to
09:52:57 19 visit. And he was responsible for a number of innovations.
09:53:01 20 You see there a picture from a system that he built and was
09:53:04 21 using in 1967 to measure the bone mineral in the forearm of
09:53:10 22 a person. You talked about this machine earlier in the
09:53:13 23 trial, this is the one that requires the arm to be sub
09:53:16 24 merged in water. It's called single energy absorptiometry.
09:53:20 25 The second picture that you see there is Richard Mazess who

Pelc - direct

09:53:28 1 was my under graduate research advisor, he founded Lunar in
09:53:33 2 1973 to commercialize a technic called dual energy x-ray
09:53:38 3 absorptiometry and the benefit of dual energy is the person
09:53:44 4 doesn't have to be submerged in water. You see a picture
09:53:50 5 there are of a Lunar bone densitometer, the person would lay
09:53:53 6 on the table and the machine would scan the person and
09:53:57 7 measure their bone mineral content.

09:54:03 8 Q. Is that the same Lunar that your patent is assigned
09:54:03 9 to?

09:54:03 10 A. That's right.

09:54:04 11 Q. Something else that has come up in this trial is
09:54:08 12 something called computed tomography. What are you showing
09:54:10 13 on slide 19?

09:54:11 14 A. The scanner that you see there is a photograph of the
09:54:14 15 first scanner to take an image of a human being. It was
09:54:16 16 developed by a company called EMI, and the first image of a
09:54:21 17 patient was performed October 1st, 1971, a little more than
09:54:24 18 50 years ago. And the image that you see on the right is
09:54:31 19 not of the first person, but one of the early ones. And
09:54:40 20 that actually is a tumor. And it just startled people that
09:54:42 21 this could be done.

09:54:42 22 Q. And then on slide 20 which is also labeled computed
09:54:50 23 tomography, what are you showing?

09:54:52 24 A. That machine that I showed you a development was led
09:54:55 25 by Godfrey Hounsfield who worked for EMI. And he and

Pelc - direct

09:55:05 1 another physicist named Alan Cormack shared the Nobel prize
09:55:11 2 in physiology and medicine for the development of computed
09:55:15 3 tomography. An award was given in 1979. Cormack had done
09:55:19 4 independent work, actually prior to Hounsfield and was
09:55:23 5 credited for innovation as well.

09:55:29 6 Q. Is there a way to use computed tomography to do
09:55:31 7 densitometry?

09:55:31 8 A. Yes, there is. A person on the left is Harry Genant,
09:55:38 9 he is a bone radiologist, was, he's passed away, was a bone
09:55:43 10 radiologist at the University of California San Francisco
09:55:47 11 and he led efforts at UCSF to develop quantitative bone
09:55:51 12 densitometry using computed tomography. The image in the
09:55:58 13 middle and the highlighted person there is Chris Cann who
09:56:02 14 was one of the pioneers in QCT. And the image on the right
09:56:07 15 is from one of their publications from 1980 showing the
09:56:11 16 technique that they came up with, they realized that CT
09:56:15 17 alone was not able to quantitatively measure or compute bone
09:56:21 18 density by itself.

09:56:25 19 A. But if you put known standards and I have them
09:56:29 20 showing there and scan the known standards at the same time
09:56:32 21 as you scan the person, you can compare the reconstructed
09:56:37 22 values of the known standards to those in the bone and from
09:56:42 23 that, since you know the standards, from that, infer the
09:56:46 24 bone content of the bone, the bone mineral content of the
09:56:50 25 bone.

Pelc - direct

09:56:50 1 Q. Dr. Pelc, can you turn to Tab 11 in your binder,
09:56:56 2 please?

09:56:56 3 A. Yes.

09:57:06 4 Q. What is that document?

09:57:06 5 A. That is the paper from which those figures are taken.

09:57:08 6 Q. Is that called precise measurement?

09:57:13 7 A. Measurement, precise measurement of vertebral mineral
09:57:17 8 content using computed tomography, and it was published in
09:57:24 9 1980.

09:57:24 10 Q. And at the bottom is it joint Exhibit 5?

09:57:25 11 A. Yes, that's correct.

09:57:26 12 MS. PESCHEL: Your Honor, I would like to offer
09:57:28 13 into evidence joint Exhibit 5.

09:57:29 14 THE COURT: Any objection?

09:57:31 15 MR. OSTROW: No, Your Honor.

09:57:32 16 THE COURT: JX-5 will be received.

09:57:34 17 (JX Exhibit No. 5 was admitted into evidence.)

09:57:36 18 MS. PESCHEL: May I publish it to the jury, Your
09:57:39 19 Honor?

09:57:39 20 THE COURT: Yes, you may.

09:57:40 21 BY MS. PESCHEL:

09:57:41 22 Q. Is this the article that you were describing?

09:57:42 23 A. Yes.

09:57:45 24 Q. And you talked a little bit about Chris Cann and
09:57:50 25 Harry Genant, they are the authors of this article?

Pelc - direct

09:57:53 1

A. Yes, that's right.

09:57:58 2

Q. And then I believe you said it was published in 1980?

09:57:58 3

A. Yes.

09:58:07 4

Q. I believe, Dr. Pelc, you have some excerpts, possibly

09:58:10 5

on the next slide. Can you explain what you're showing

09:58:13 6

here?

09:58:13 7

A. Yes, so you see the title of the paper there. I

09:58:17 8

think this shows that the first bone densitometry conducted

09:58:22 9

with CT was no later than 1980, obviously they had been

09:58:26 10

working on it for a while. The measured CT numbers in

09:58:31 11

Hounsfield units are converted to bone mineral density by

09:58:36 12

comparing them to those standards. They also compared one

09:58:41 13

tomographic model to the other. On the bottom right you see

09:58:46 14

five images of vertebral bodies of the spine. Each -- those

09:58:51 15

are 2 of 3 levels that were scanned through the lumbar

09:58:56 16

spine, of lumbar spine elements. And they were scanned

09:59:01 17

three different times. You see there the dates, November,

09:59:06 18

1977, June 1978, and December 1978. And in this table which

09:59:11 19

is from that paper, you see the CT numbers in Hounsfield

09:59:16 20

units from each of the vertebrae in each much the scans and

09:59:21 21

then the X bar means the average.

09:59:26 22

And then those were converted to bone mineral

09:59:31 23

content in milligrams per milliliter, and it's comparing

09:59:36 24

those.

09:59:41 25

Q. So, Dr. Pelc, when you said, you were talking about

Pelc - direct

09:59:42 1 this table and you were saying mineral content in milligrams
09:59:46 2 per milliliter. Is that a determination of bone density?

09:59:49 3 A. That's right, it's a determination of a bone, the
09:59:53 4 density of bone mineral in milligrams per milliliter.

09:59:57 5 Q. Dr. Pelc, were you in the courtroom when Dr. Massie
10:00:00 6 testified?

10:00:00 7 A. Yes.

10:00:01 8 Q. What did you understand Dr. Massie to claim his
10:00:05 9 improvement over the preexisting technology was?

10:00:08 10 A. He claimed that what he did is take techniques like
10:00:13 11 these and like the Lunar detection bone machine and bring
10:00:18 12 them into dentistry.

10:00:21 13 Q. Do you agree with Dr. Massie that that was new?

10:00:25 14 A. No. No, he may not have been aware, but it was not
10:00:29 15 new.

10:00:30 16 Q. Dr. Pelc, can you turn to Tab 12 in your binder.

10:00:31 17 A. Yes.

10:00:33 18 Q. What is this document?

10:00:41 19 A. This is a copy of a paper by Devlin and Horner
10:00:47 20 entitled measurement of mandibular bone mineral content
10:00:52 21 using the dental panoramic tomogram. It was published in
10:00:57 22 1991.

10:00:57 23 Q. Is this an example of dental densitometry using
10:01:01 24 tomography before 1999?

10:01:03 25 A. Yes.

Pelc - direct

10:01:05 1 MS. PESCHEL: Your Honor I would like to move
10:01:06 2 into evidence PX-98, plaintiff's Exhibit 98.

10:01:10 3 THE COURT: Any objection?

10:01:11 4 MR. OSTROW: No objection.

10:01:12 5 THE COURT: PX-98 is received.

10:01:14 6 (PX Exhibit No. 98 was admitted into evidence.)

10:01:15 7 MS. PESCHEL: May I publish it to the jury, Your
10:01:17 8 Honor?

10:01:17 9 THE COURT: Yes, you may.

10:01:19 10 BY MS. PESCHEL:

10:01:20 11 Q. And Dr. Pelc, this was the article that you were just
10:01:22 12 talking about, right?

10:01:23 13 A. Yes, yes. That's the first page of the article.

10:01:25 14 Q. And up at the top it says J.DENT, what is that?

10:01:31 15 A. It's the journal of dentistry, I guess, I don't know
10:01:40 16 exactly what the abbreviation stands for. But that's the
10:01:42 17 name, the abbreviation of the name of the journal.

10:01:45 18 Q. I think we're going to talk about several scientific
10:01:48 19 articles today. Is it okay if you refer to them by either
10:01:52 20 the first author or some other name or way to refer to them?

10:01:52 21 A. Yes, we often refer to it by the last name of the
10:01:52 22 first author and the year.

10:02:00 23 Q. So for instance this one we could refer to as Devlin
10:02:04 24 1991?

10:02:04 25 A. That's right.

Pelc - direct

10:02:06 1 Q. Dr. Pelc can you turn to Tab 13 in your binder?

10:02:09 2 A. Yes.

10:02:12 3 Q. What is this document?

10:02:13 4 A. This is an article entitled trabecular bone mineral
10:02:19 5 density of mandible and alveolar height in postmenopausal
10:02:25 6 women. It was published in the Scandinavian journal of
10:02:33 7 dental research in 1993. And the first author name is
10:02:34 8 Klemetti.

10:02:35 9 Q. Is this another example of dental densitometry using
10:02:39 10 tomography before 1999?

10:02:40 11 A. Yes.

10:02:41 12 MS. PESCHEL: Your Honor, I would like to move
10:02:43 13 into evidence plaintiff's Exhibit 100.

10:02:45 14 THE COURT: Any objection.

10:02:46 15 MR. OSTROW: No, Your Honor.

10:02:47 16 THE COURT: 100 is received.

10:02:51 17 (PX Exhibit No. 100 was admitted into evidence.)

10:02:54 18 MS. PESCHEL: May I publish it to the jury, Your
10:02:54 19 Honor?

10:02:54 20 THE COURT: Yes, you may.

10:02:54 21 BY MS. PESCHEL:

10:03:04 22 Q. Dr. Pelc, when it says bone mineral density, what
10:03:04 23 does that mean?

10:03:04 24 A. That's the bone mineral density calculated in
10:03:07 25 milligrams per milliliter.

Pelc - direct

10:03:09 1 Q. And then it says bone mineral density of mandible
10:03:15 2 what is that?

10:03:15 3 A. We heard that before, it's one of the bones of the
10:03:18 4 jaw.

10:03:24 5 Q. Dr. Pelc, what are you showing on slide 23?

10:03:33 6 A. On the left is a repeat of that first page of the
10:03:36 7 Devlin article that we talked about already. And on the
10:03:40 8 right is both the first page of the Klemetti paper and also
10:03:46 9 two images from that paper. And those images were taken
10:03:51 10 with a commercial Siemens scanner. The first was, shows you
10:03:54 11 the patient as seen from the side. The lower images is of
10:04:04 12 the jaw, the bone of the jaw is clearly visible there. But
10:04:10 13 not seen on that image is the fact that at the same time
10:04:14 14 that they scanned the jaw, they also scanned standards of
10:04:19 15 known mineral content or equivalent mineral content. And
10:04:23 16 they used the technique of Cann and Genant to convert the
10:04:31 17 Hounsfield Unit values that were produced by the Siemens
10:04:34 18 machine in that jaw to mineral content in milligrams per
10:04:41 19 milliliter through calculations related to the measured CT
10:04:42 20 numbers of the standards.

10:04:42 21 Q. Now, I want to switch gears just a little bit,
10:04:52 22 Dr. Pelc. What type of computed tomography was used in the
10:05:02 23 ProMax 3D systems?

10:05:02 24 A. Cone beam computed tomography.

10:05:02 25 Q. Was cone beam computed tomography known before 1999?

Pelc - direct

10:05:05 1

A. Yes.

10:05:05 2

Q. And if you will turn in your binder to Tab 14.

10:05:14 3

A. Yes.

10:05:16 4

Q. What is at Tab 14?

10:05:23 5

A. It's a copy of a paper published in European

10:05:24 6

radiology in 1998. The first author's name is Mozzo.

10:05:30 7

Q. At the bottom does it have a label DX-93?

10:05:34 8

A. It's at the top, yes, DX-93.

10:05:37 9

MS. PESCHEL: Your Honor, at this time I would

10:05:39 10

like to move into defendant Defense Exhibit 93.

10:05:42 11

THE COURT: Any objection?

10:05:42 12

MR. OSTROW: No objection.

10:05:43 13

THE COURT: 93 is received.

10:05:45 14

(DX Exhibit No. 93 was admitted into evidence.)

10:05:50 15

BY MS. PESCHEL:

10:05:52 16

Q. At a high level, Dr. Pelc, what is this Mozzo article about?

10:05:56 17

10:05:59 18

A. Well cone beam computed tomography was known even

10:06:03 19

before this. It goes back to the mid 1980's. And what

10:06:09 20

Mozzo and his colleagues did is build a CT machine,

10:06:14 21

volumetric CT machine for dental imaging based on the cone

10:06:19 22

beam technique and this paper presents at a high level what

10:06:24 23

the machine was like and presents preliminary results with

10:06:29 24

that machine.

10:06:34 25

Q. Mr. Herndon, can we go back to DDX-4, slide 24,

10:06:35 1 please. What are you showing here, Dr. Pelc?

10:06:44 2 A. On the left is again the front page of the article.
10:06:51 3 The text in the box is actually, you can see behind it and
10:06:56 4 slightly to the left where it came from in the paper, it's
10:07:00 5 on the second column of the first page. And Mozzo there
10:07:04 6 says the new machine presented in the paper is the first
10:07:08 7 commercial CBCT system devoted to dentomaxillofacial
10:07:15 8 imaging. And in the middle you see a picture or a drawing
10:07:21 9 of the geometry of the machine it has an x-ray source at
10:07:24 10 the top, a cone beam, the patient or the subject shown as a
10:07:31 11 cylinder and the x-ray beam lands on a large area detector.
10:07:34 12 And on the right are volume renderings from images produced
10:07:43 13 by that machine.

10:07:44 14 Q. And are those images in the Mozzo article?

10:07:46 15 A. Yes, these are both at Figure 1 and Figure 6 from
10:07:54 16 that article.

10:07:57 17 Q. Let's dive a little bit deeper into the technology we
10:08:01 18 just discussed. Can you explain to the jury how an x-ray is
10:08:05 19 generally made?

10:08:05 20 A. Yes, x-rays are produced in an x-ray tube and they --
10:08:10 21 if you just had an x-ray tube here, it would shine x-rays in
10:08:14 22 all directions, we don't want that. So we put it in a
10:08:18 23 shielded box and in front we put a device that can further
10:08:22 24 limit in a controlled way, the direction of the x-rays. And
10:08:25 25 the collimator only passes x-rays that are headed toward

Pelc - direct

10:08:30 1 what you want the image, and the x-rays pass through the
10:08:34 2 patient and then land on the receptor to produce an image
10:08:40 3 like the image that Roentgen made of his wife's hand.

10:08:43 4 Q. I'm going to move to slide 26. Are there any
10:08:48 5 specific issues with projection radiography?

10:08:50 6 A. Yes, one that was recognized really early on is that
10:08:53 7 if you have an object, if you imagine the collection of four
10:08:58 8 geometric objects there, they can be one in front of the
10:09:02 9 other. So the image that you see in P which we call a
10:09:06 10 projection, has super imposition of objects that happen to
10:09:10 11 be in line with each other when the x-rays were penetrating.
10:09:15 12 And in a single projection like that, you can't tell what
10:09:20 13 was in front of what or anything, you just see the
10:09:24 14 projection of all of them.

10:09:25 15 And the reason I'm trying to show you that in
10:09:29 16 the graphic on the bottom, if you have x-rays shining on
10:09:33 17 that orange cube, some fraction will be transmitted by that
10:09:37 18 cube and that fraction depends on a property of the material
10:09:41 19 in the cube and the thickness and the property we call the
10:09:45 20 linear attenuation coefficient, and those two together
10:09:49 21 determine the intensity of the x-rays that come out of the
10:09:53 22 orange cube.

10:09:54 23 Now, if you now were to shine the remaining
10:09:58 24 intensity on another box -- thank you, Mr. Herndon -- this
10:10:02 25 blue box, even fewer x-rays would come out.

Pelc - direct

10:10:08 1 The thing you may find interesting is that if
10:10:11 2 you reverse the order and put the blue box first and then
10:10:14 3 the orange box, the intermediate intensity which you can't
10:10:18 4 see because that's not where your receptor is, is different
10:10:23 5 between the two but the final intensity is independent of
10:10:26 6 which one was in front of which. And that's fundamental to
10:10:30 7 x-rays.

10:10:30 8 So objects that are in the same path are
10:10:33 9 superimposed in the projection image.

10:10:36 10 Q. Dr. Pelc, what is tomography, how does that differ
10:10:40 11 from what you just described?

10:10:41 12 A. So because of that, people in the x-ray imaging field
10:10:45 13 in the early part of the 20th century developed the first
10:10:54 14 techniques for tomography. And tomography comes from the
10:10:54 15 Greek, it just means imaging a layer. And if we were to
10:10:57 16 make perfect ideal slice images through that object with
10:11:03 17 geometry, geometric objects in it, slice two would only
10:11:07 18 contain the two in the front and slice one would contain the
10:11:10 19 two in the back. And you might ask yourself, well how did
10:11:14 20 we do this with x-rays if we have this superimposition
10:11:18 21 problem. And we have depth perception with our eyes because
10:11:22 22 we have two of them. And tomography uses the same idea.
10:11:28 23 You image the object from many directions and you use the
10:11:34 24 changes in the images from various directions to try to say
10:11:38 25 something about what is in front of what.

10:11:41 1 Q. What type of tomography are there?

10:11:44 2 A. Tomography is a very generic term that means, you
10:11:48 3 know, anything that's imaging layers. And here you see
10:11:54 4 three groupings inside that venn diagram of tomography.
10:12:02 5 There are panoramic images that we heard about in this case,
10:12:06 6 and the interesting thing about panoramic images is that the
10:12:10 7 focal plane is curved. Tomosynthesis, the focal layers
10:12:16 8 usually are flat, but in fact now we're starting to see the
10:12:20 9 overlap of those two circles in the venn diagram. And in
10:12:25 10 fact the SmartPan method that we heard about yesterday is
10:12:29 11 actually at the inter section of those two. And I also show
10:12:33 12 computed tomography, all of these rely on imaging the object
10:12:38 13 from many directions by somehow moving the source. All the
10:12:44 14 modern methods use computers to calculate these tomographic
10:12:49 15 images and they can produce them for multiple planes or
10:12:53 16 objects from a single scan. And the differences among them
10:13:01 17 has to do with the details of what those focal planes look
10:13:01 18 like. In particular, computed tomography is better able to
10:13:07 19 separate layers than the other methods.

10:13:11 20 Q. I'm going to turn to your slide 29. Can you explain
10:13:14 21 to the jury how computed tomography works?

10:13:17 22 A. Yes. So as I said, we have to look at the object
10:13:20 23 from many directions so we have an x-ray tube, collimator,
10:13:24 24 detector and electronics to measure the transmitted
10:13:25 25 intensity and those rotate around the object. And in

Pelc - direct

10:13:33 1 computed tomography we have to rotate at least halfway
10:13:38 2 around.

10:13:39 3 Q. What are you showing here?

10:13:40 4 A. So, the next problem you have is each of those
10:13:44 5 measurements has superimposition, has information about
10:13:48 6 everything that was in the path. And so the array of
10:13:52 7 projection data, all of them together are given to something
10:13:57 8 called a reconstruction program and the job of the
10:14:00 9 reconstruction program is to undo all of that
10:14:04 10 superimposition. I think Dr. Kia described it as solving a
10:14:10 11 giant set of simultaneous equations and that actually is a
10:14:15 12 good description for it. And from it, you end up with an
10:14:19 13 image in which in each voxel, we have a calculation of the
10:14:24 14 linear attenuation coefficient going back to what I said,
10:14:29 15 the linear attenuation coefficient was, which is it
10:14:33 16 describes how easy it is for radiation to penetrate that
10:14:37 17 particular material. And they can be converted to
10:14:41 18 Hounsfield units if you like or just left as linear
10:14:45 19 attenuation coefficient.

10:14:53 20 Q. And I think we've already heard testimony on this,
10:14:57 21 Dr. Pelc, but Hounsfield units were named after Sir Godfrey
10:15:01 22 Hounsfield?

10:15:04 23 A. That's correct.

10:15:08 24 Q. Dr. Pelc, does any Osseo patent teach three
10:15:12 25 dimensional cone beam computed tomography?

Pelc - direct

- 10:15:16 1 A. No.
- 10:15:16 2 Q. Does any Osseo patent teach computed tomography?
- 10:15:23 3 A. No.
- 10:15:25 4 Q. Let's turn to your non-infringement opinion. Were
- 10:15:28 5 you in the courtroom when Dr. Kia testified on
- 10:15:31 6 non-infringement?
- 10:15:32 7 A. Yes.
- 10:15:33 8 Q. I mean on infringement, I apologize?
- 10:15:35 9 A. Yes.
- 10:15:35 10 Q. Did you review Dr. Kia's reports on infringement?
- 10:15:38 11 A. No. I'm sorry, can you repeat the question.
- 10:15:41 12 Q. Did you review Dr. Kia's reports on infringement?
- 10:15:44 13 A. Yes, I did.
- 10:15:45 14 Q. So you heard his testimony and you have read his
- 10:15:49 15 reports in do you agree with Dr. Kia's opinion?
- 10:15:51 16 A. Not on this point, no.
- 10:15:51 17 Q. What is your opinion about how Osseo is interpreting
- 10:15:59 18 densitometry in its infringement theory?
- 10:16:01 19 A. Osseo's view is that mere calculation of Hounsfield
- 10:16:12 20 units or linear attenuation in Hounsfield units is
- 10:16:12 21 quantitatively calculated bone density and that is simply
- 10:16:12 22 not true.
- 10:16:12 23 Q. And you're referring to quantitatively calculated
- 10:16:21 24 bone density, is that because that is how the court
- 10:16:25 25 construed bone densitometry?

Pelc - direct

10:16:27 1 A. That's correct.

10:16:28 2 Q. I think there are some variations of the language
10:16:31 3 used, I think one used yesterday is relative bone density is
10:16:35 4 enough to meet the Court's construction, what is your
10:16:38 5 opinion?

10:16:40 6 A. Yes, I listened carefully to the testimony and when
10:16:44 7 describing the values and the meaning of Hounsfield units,
10:16:56 8 Osseo and the witnesses were using words like Hounsfield
10:16:57 9 units to represent bone density, or their bone density
10:17:01 10 values calibrated to Hounsfield units or includes bone
10:17:05 11 density and the one we heard yesterday repeatedly was
10:17:10 12 relative bone density. These do not meet the Court's
10:17:15 13 construction of quantitatively calculated bone density. In
10:17:21 14 particular, when the court issued that claim construction,
10:17:27 15 it also explained the rationale for it. And in that
10:17:31 16 rationale, the court said quantitative bone density is not
10:17:37 17 enough, grayscale is not enough, and relative measurements
10:17:41 18 of bone density are not enough. So quantitatively
10:17:51 19 calculated bone density is very specific and Hounsfield
10:17:52 20 units don't meet that.

10:17:52 21 Q. Dr. Pelc, I want to turn to your slide 33 and ask
10:17:52 22 you, we also heard an interpretation with respect to Osseo's
10:18:00 23 theory of infringement of the model term. Do you agree with
10:18:00 24 that?

10:18:00 25 A. No, I don't agree with Osseo's interpretation of the

10:18:10 1 model term.

10:18:11 2 Q. Why not?

10:18:12 3 A. Well, it's very long phrase there, but the model is
10:18:21 4 supposed -- and various terms are used in different claims.
10:18:25 5 But they mean merging information from multiple tomographic
10:18:30 6 scans, and I underlined that because that's really
10:18:34 7 important, of an object to produce a representation of the
10:18:39 8 subject/said representation depicting quantitative density
10:18:45 9 differences of the object scanned, and again I highlighted
10:18:49 10 that because it's important, which is created by the
10:18:53 11 microprocessor using densitometry, and there I want you to
10:18:57 12 combine created using densitometry. So it has to be created
10:19:01 13 using quantitatively calculated bone density. And it has to
10:19:05 14 be created by merging information from multiple tomographic
10:19:13 15 scans. Multiple tomographic scans.

10:19:18 16 And what the Planmeca machine does is a single
10:19:23 17 scan. To meet the infringement requirement, Osseo is
10:19:30 18 misinterpreting the projections of the CT scan and calling
10:19:37 19 each of them a tomographic scan. Well a single projection
10:19:42 20 is not a tomographic scan. And it also is treating the
10:19:47 21 reconstruction algorithm as merging. I don't agree with
10:19:53 22 either of those. The reconstruction algorithm is not
10:19:58 23 merging information from multiple tomographic scans. It's
10:20:00 24 reconstructing an image from multiple projections.

10:20:05 25 Q. Are the projections tomographic?

Pelc - direct

10:20:07 1 A. No, each projection is not tomographic. Each
10:20:10 2 projection has the superimposition problems that we talked
10:20:15 3 about.

10:20:20 4 Q. Let's talk at a high level -- I apologize, I am not
10:20:22 5 on the right slide?

10:20:24 6 A. Just related to that, I'm sorry, individual views are
10:20:28 7 not scans, they're projections or views. Reconstruction
10:20:31 8 does not merge views in the way taught by the patents. And
10:20:35 9 these are just not the way we use the words merged and
10:20:40 10 scanned in the field. And if you listen carefully to
10:20:43 11 Dr. Kia's testimony, the only time he called projections
10:20:46 12 tomographic scans was when he was trying -- was using claim
10:20:50 13 charts to try to show infringement. At other times he
10:20:53 14 called them views or frames or projections which are the
10:21:00 15 words we normally use.

10:21:04 16 Q. What are you showing on slide 34?

10:21:10 17 A. Well, further reasons why I disagreed with this claim
10:21:14 18 interpretation is that the claims also call for the computer
10:21:19 19 or controller to be comparing models. And the comparison
10:21:23 20 that you were shown was not the computer comparing models,
10:21:26 21 it was the operator comparing models and that just does not
10:21:30 22 meet the claim limitation.

10:21:33 23 So you could ask yourself why is Osseo using
10:21:40 24 this erroneous claim interpretation or why does it matter.
10:21:43 25 And it matters because with this claim interpretation these

10:21:50 1 claim elements now read on the prior art.

10:21:53 2 Q. Do you have an example of that?

10:21:55 3 A. Sure. So any reconstruction algorithm will be
10:21:58 4 merging information from multiple tomographic scans because
10:22:02 5 they all --

10:22:03 6 Q. I apologize, I didn't mean to interrupt you. Under
10:22:07 7 their interpretation?

10:22:08 8 A. Under their interpretation. Any reconstruction
10:22:11 9 algorithm would meet that limitation. Here is one machine
10:22:15 10 that would meet that limitation as well as the densitometry
10:22:20 11 limitation, and that is this machine that I showed you from
10:22:25 12 the Mozzo article which was commercialized under the name
10:22:31 13 NewTom 9000, so that's a picture of the machine and the
10:22:37 14 images that I showed you earlier. And similarly on the next
10:22:41 15 slide, the Klemetti system would meet those claim
10:22:48 16 limitations because the Siemens scanner reconstructed CT
10:22:54 17 images, merging information from multiple tomographic scans,
10:22:58 18 and produced images in Hounsfield units.

10:23:01 19 Now, I want you to keep in mind that while I
10:23:08 20 think that those are -- don't meet the claim limitation and
10:23:14 21 are not -- Hounsfield units are not densitometry or in the
10:23:20 22 way it's used in the claims, the authors of the Klemetti
10:23:26 23 paper went on to, in fact, convert their measurements to
10:23:32 24 quantitatively calculated bone density. So they actually
10:23:38 25 did densitometry.

Pelc - direct

10:23:35 1 Q. Dr. Pelc, can you summarize any disagreements that
10:23:37 2 you have with Dr. Kia's analysis?

10:23:39 3 A. Yes. I believe he misunderstands the Osseo patents.
10:23:43 4 He misunderstands the ProMax 3D systems. He errs in
10:23:52 5 equating Hounsfield units to densitometry and I don't
10:23:53 6 believe that they are quantitatively calculated bone
10:24:00 7 density. He errs in calling each of the two images 2D
10:24:05 8 images in the projection scan. And he errs in saying that
10:24:10 9 the computer is, or that the system meets the claim
10:24:17 10 limitation because the examples he showed rely on the user
10:24:23 11 doing the comparing, not the computer.

10:24:26 12 Q. What is --

10:24:27 13 THE COURT: Are you about finished because it's
10:24:28 14 about time for a break.

10:24:30 15 MS. PESCHEL: This would be a great time, Your
10:24:32 16 Honor.

10:24:32 17 THE COURT: Okay. So ladies and gentlemen,
10:24:33 18 let's take a morning break. Let's take fifteen minutes.

10:24:37 19 COURT CLERK: All rise.

10:24:39 20 (Jury leaving the courtroom at 10:24 a.m.)

10:24:57 21 THE COURT: Please be seated, ladies and
10:25:02 22 gentlemen. I probably should have visited with you this
10:25:07 23 morning early, but I read the signals wrong.

10:25:12 24 So at any rate, how are we on jury instructions?
10:25:15 25 Can someone just briefly tell me where we are.

Pelc - direct

10:25:18 1 MR. OSTROW: I'll start, Your Honor. So the
10:25:20 2 parties did exchange some revisions to what the Court had
10:25:26 3 put out as jury instructions. Partially to make them
10:25:27 4 consistent with how we ended up with the preliminary
10:25:30 5 instructions, there were some changes there to be carried
10:25:33 6 over, partially to update the information based on how the
10:25:37 7 case is going. At the moment are some minor disputes, we
10:25:41 8 may be able to resolve them ourselves, I think we're still
10:25:45 9 working on it, if the Court wants to know what they are.

10:25:47 10 THE COURT: No, I just need a progress report.

10:25:49 11 MR. OSTROW: The other thing is, the Court
10:25:52 12 expressed an interest in maybe shortening them. There are
10:25:55 13 sections that are somewhat repetitive --

10:25:57 14 THE COURT: Absolutely repeated instructions.

10:26:01 15 MR. OSTROW: Take those out because they are in
10:26:03 16 the book. If they make sense, take them out, there is no
10:26:07 17 reason to read them twice. I think we're going to be up
10:26:10 18 against the time deadline and just me reading them takes
10:26:13 19 time. But if you think that they need to be -- in order to
10:26:17 20 make sense that I need to repeat them, I understand that,
10:26:21 21 too.

10:26:22 22 MR. OSTROW: We'll consult on that.

10:26:24 23 MR. DIETRICH: I think what the Court was also
10:26:27 24 after was logistics. I think we can get a copy of one
10:26:30 25 document to the Court sometime after lunch, mid afternoon so

Pelc - direct

10:26:33 1 that we can discuss it.

10:26:34 2 THE COURT: All right. So just a heads up, if
10:26:37 3 we do come up with -- I mean, once I do come up with
10:26:42 4 instructions, I'm going to ask the defendants to reproduce
10:26:46 5 them all for everybody because I asked the plaintiff to do
10:26:48 6 the initial instructions. Is that okay?

10:26:50 7 MR. DIETRICH: That's fine.

10:26:51 8 THE COURT: I just want to be fair. So we'll
10:26:54 9 take a recess. Is there one other thing?

10:26:57 10 MR. QURESHI: Yes, Your Honor, you had asked us
10:26:59 11 to think about the issue of the videos and report back to
10:27:02 12 you.

10:27:02 13 THE COURT: Yes.

10:27:02 14 MR. QURESHI: So we would request that the full
10:27:05 15 videos, I think it's 438 and 485 be sent back to the jury
10:27:09 16 room.

10:27:10 17 THE COURT: So you want those -- they're already
10:27:13 18 marked as exhibits, you want to present the full video as an
10:27:16 19 exhibit to the jury.

10:27:17 20 MR. QURESHI: Right now, they're marked as
10:27:20 21 438(A) and 485(A).

10:27:22 22 THE COURT: Do you have any objection to the
10:27:25 23 whole video?

10:27:26 24 MR. OSTROW: No, Your Honor.

10:27:27 25 THE COURT: Tell me the numbers again.

Pelc - direct

10:27:29 1 MR. QURESHI: Somebody check me, I think 438 and
10:27:34 2 485.

10:27:35 3 THE COURT: Just a second, 438 and 485.

10:27:45 4 COURT CLERK: PTX-438 and PTX-485.

10:27:50 5 MR. OSTROW: The only thing, Your Honor, would
10:27:51 6 be if there is some way to isolate to the jury what part
10:27:54 7 they've actually saw.

10:27:55 8 THE COURT: I'm giving them both so they'll get
10:27:57 9 the snippet and they'll get the whole video.

10:28:00 10 MR. QURESHI: Will you inform the jury?

10:28:01 11 THE COURT: Yes. So PX-438 and PX-485 is
10:28:10 12 received, that's what my courtroom deputy is saying.

10:28:14 13 MR. QURESHI: Yes, Your Honor.

10:28:15 14 THE COURT: Thank you. Let's take our break.

10:28:17 15 COURT CLERK: All rise.

10:28:19 16 (A brief recess was taken.)

10:40:50 17 COURT CLERK: All rise.

10:40:53 18 (Jury entering the courtroom at 10:40 a.m.)

10:40:59 19 THE COURT: Please be seated, ladies and
10:41:02 20 gentlemen.

10:41:02 21 Ladies and gentlemen of the jury, before we
10:41:05 22 continue with the testimony of Dr. Pelc, the lawyers and I
10:41:12 23 have come to an agreement on some exhibits. So if, as
10:41:16 24 you'll recall some video clips of instructional videos were
10:41:20 25 played yesterday. And for completeness, we were going to

Pelc - direct

10:41:26 1 give you not only those small clips but also the whole
10:41:30 2 training video, there will be both exhibits. The IT
10:41:34 3 department here at the court will set up a computer and
10:41:37 4 monitor so that you can play them in advance, turn back and
10:41:41 5 play them as many times as you want when you go back to the
10:41:44 6 jury room. So those are exhibits number PX-438 and PX-485.
10:41:51 7 So those will be admitted into evidence and you'll have them
10:41:54 8 to review during your deliberations.

10:41:56 9 All right. Ms. Peschel, you may continue your
10:42:01 10 examination of the witness.

10:42:04 11 MS. PESCHEL: Thank you, Your Honor.

10:42:24 12 BY MS. PESCHEL:

10:42:37 13 Q. Dr. Pelc, what is your opinion as to whether the
10:42:41 14 ProMax 3D systems infringe any of Osseo patent claims?

10:42:44 15 A. In my opinion, the ProMax 3D systems do not infringe
10:42:49 16 any of the asserted claims because they did not do
10:42:54 17 densitometry, they did not merge multiple tomographic scans
10:42:58 18 to create the claimed models, and the ProMax 3D system did
10:43:04 19 not compare claimed models.

10:43:07 20 Q. And slide 38 is summary of the particular reasons why
10:43:13 21 the promotions systems do not infringe that you're going to
10:43:18 22 present today?

10:43:18 23 A. Yes, that's right.

10:43:19 24 Q. Dr. Pelc, do you have an understanding of legally
10:43:22 25 what is required to prove infringement?

Pelc - direct

10:43:25 1 A. I think so.

10:43:26 2 Q. What is that understanding?

10:43:28 3 A. That in order to prove infringement, you have to
10:43:31 4 prove that Planmeca made, used or sold, or offered to sell
10:43:35 5 or imported what is covered by the asserted claims of the
10:43:41 6 Osseo patents without permission.

10:43:42 7 And that infringement analysis is a two-step
10:43:47 8 process. First, the claims are construed by the court. And
10:43:53 9 then we apply that construed claim meaning and compare
10:43:58 10 element by element to the accused system, the ProMax 3D
10:44:03 11 systems and see if they match.

10:44:06 12 And a patent claim is only infringed if each and
10:44:13 13 every one of the claim elements is practiced or included in
10:44:17 14 the ProMax 3D systems.

10:44:23 15 Q. Dr. Pelc, you provided at least three reasons why the
10:44:27 16 ProMax 3D systems did not infringe. What does that mean in
10:44:31 17 terms of the claim language for the asserted claim?

10:44:34 18 A. So those reasons map on to the highlighted sections
10:44:38 19 here -- let me back up. What you see on the left are the --
10:44:43 20 is claim one and claim seven of the '301 patent, and claim
10:44:47 21 one of the '262 patent, and claim one and claim six of the
10:44:51 22 '374 patent.

10:44:53 23 And the things that are highlighted are not met
10:44:57 24 by the accused system. And the ones that have two X's have
10:45:01 25 two reasons why they don't meet that element.

Pelc - direct

10:45:07 1 Q. I know that you put two X's where there was also a
10:45:11 2 comparing limitation. But with respect to the tomographic
10:45:16 3 densitometry model, the model terms, is there 1 or 2 reasons
10:45:20 4 why those don't infringe?

10:45:23 5 A. That's right. The ones that talk about patient
10:45:27 6 densitometry models, those have two reasons. First, they
10:45:32 7 don't have the merging of multiple tomography scans and they
10:45:38 8 don't have densitometry.

10:45:39 9 Q. Dr. Pelc, let's turn to your first reason where the
10:45:44 10 ProMax 3D systems did not infringe the claims of the Osseo
10:45:46 11 patent. Can you explain at a high level why it's your
10:45:50 12 opinion that they do not do densitometry?

10:45:52 13 A. Just to repeat one more time, densitometry has been
10:45:56 14 construed by the court to mean quantitatively calculated
10:45:59 15 bone density. And all of the claims include the
10:46:04 16 densitometry limitation.

10:46:06 17 Q. Are Hounsfield units quantitatively calculations of
10:46:09 18 bone density?

10:46:11 19 A. No, no, I think we will go through a little bit more.
10:46:14 20 But they are not. Hounsfield units are not densitometry.

10:46:16 21 Q. And I'm showing on slide 42 the asserted claims and
10:46:20 22 there is some red highlighting. What is that indicating?

10:46:22 23 A. So the densitometry word is highlighted in the claims
10:46:26 24 that include that word directly. But on the '374 patent,
10:46:30 25 you see that tomographic model is highlighted because the

Pelc - direct

10:46:42 1 Court's construction is that the tomographic models of the
10:46:50 2 '374 patent include densitometry.

10:46:55 3 Q. Dr. Pelc, earlier today when you talked about two
10:47:00 4 ways that densitometry is done in the field with x-rays.
10:47:02 5 What were those again?

10:47:04 6 A. Well the two accepted ways of doing bone density
10:47:09 7 calculations are, DEXA, dual energy x-ray absorptiometry, or
10:47:19 8 some way to use dual energy in order to get rid of the
10:47:23 9 errors and be able to get to quantitative calculated bone
10:47:28 10 density or quantitative computed tomography which is
10:47:32 11 abbreviated QCT and that was the method of Genant and Cann.

10:47:38 12 Q. You mentioned those in the two bullet points. What
10:47:41 13 is the point of slide 43?

10:47:43 14 A. Well, the point of slide 43 is that there is no
10:47:50 15 evidence presented in this case that the ProMax 3D systems
10:47:55 16 use dual energy or that they practice quantitatively
10:48:00 17 calculated computed tomography which requires standing the
10:48:07 18 patient simultaneously with standard and using the values of
10:48:10 19 the standard to compute quantitatively bone density.

10:48:17 20 Q. If Dr. Kia did not demonstrate infringement of the
10:48:21 21 densitometry limitation using methods known in the art
10:48:28 22 before densitometry, let's take a look at his theory. What
10:48:33 23 did you understand that Dr. Kia testified to as meeting the
10:48:38 24 densitometry requirements of all of the asserted claims?

10:48:39 25 A. Again, the Osseo patents require densitometry which

10:48:35 1 has been construed to mean quantitatively calculated bone
10:48:38 2 density, and Osseo's interpretation is that the ProMax 3D
10:48:44 3 images which are based on Hounsfield units meet that
10:48:48 4 limitation which I don't agree with. Hounsfield units are
10:48:52 5 scaled values of linear attenuation coefficient as we've
10:48:56 6 heard in this case.

10:48:58 7 Q. If you wanted to convert Hounsfield units to a
10:49:02 8 quantitatively calculated of bone density without using
10:49:10 9 detection a, without using QCT techniques, could it
10:49:14 10 theoretically be done?

10:49:18 11 A. Yes, theoretically it could be done. But it requires
10:49:22 12 knowing additional things about the measurement and the
10:49:26 13 object being scanned. You need to know the x-ray photon
10:49:30 14 energy, that's like the color of the x-rays. And I'll say a
10:49:34 15 little bit more about that. And you also need to know the
10:49:38 16 composition of the material being imaged, by composition, I
10:49:42 17 mean what elements are in it, and what are their fractions
10:49:46 18 in the object.

10:49:50 19 Q. So moving from slide 44 to 45, what are you showing
10:49:54 20 on slide 45?

10:49:58 21 A. So this was trying to go through this exercise, could
10:50:02 22 we theoretically calculate density from Hounsfield units.
10:50:06 23 And here is one way that I came up with doing that. You
10:50:10 24 first have to convert Hounsfield units back to linear
10:50:14 25 attenuation coefficient. Essentially undue to Hounsfield

10:50:11 1 Unit scaling. And then once you have linear attenuation
10:50:16 2 coefficients, unfortunately I bring up another term there is
10:50:19 3 nothing called a mass attenuation coefficient, if you take
10:50:24 4 the ratio of the linear attenuation coefficient, divided by
10:50:27 5 the mass attenuation coefficient, you get density.

10:50:32 6 Q. Can you measure a mass attenuation coefficient in the
10:50:39 7 types of machines?

10:50:39 8 A. No.

10:50:40 9 Q. How would you get the mass attenuation coefficient?

10:50:45 10 A. As I said, you have to know the composition of the
10:50:48 11 material, the fraction by weight of each of the elements.

10:50:51 12 What I am showing -- and we a brief 85 the mass attenuation
10:50:54 13 coefficient as μ over ρ , two Greek letters. ρ is the
10:51:02 14 Greek letter usually used in physics to mean density. And
10:51:07 15 the table shows you the mass attenuation coefficient of
10:51:10 16 water, blood, soft tissue, polystyrene and cortical bone at
10:51:18 17 three different x-ray energies, 40, 60 and 80 keV. If you
10:51:27 18 knew the linear attenuation coefficient of water, you could
10:51:29 19 do the first step of converting Hounsfield units to linear
10:51:32 20 attenuation coefficient undoing the Hounsfield Unit.

10:51:32 21 Then if you knew the mass attenuation
10:51:42 22 coefficient for that object at that energy, you could take
10:51:42 23 the ratio and extract density. But as you see, the mass
10:51:52 24 attenuation coefficient varies quite dramatically as a
10:51:52 25 function of both energy and material.

Pelc - direct

10:51:58 1 So, for example, suppose you took your
10:52:01 2 Hounsfield units, you were able to undo the Hounsfield Unit
10:52:06 3 scaling and get linear attenuation coefficient, and you used
10:52:10 4 ---and it as bone, it was cortical bone but you used the
10:52:15 5 mass attenuation coefficient for water, and I would like you
10:52:17 6 to focus on the 40 keV, column if you use this number
10:52:26 7 instead of this number in the denominator, you make an error
10:52:30 8 of about a factor of three.

10:52:32 9 Similarly, if it's cortical bone and you divide
10:52:39 10 by this number instead of this number, because you have the
10:52:43 11 energy wrong, you make an error of a factor of three. So
10:52:46 12 those are pretty big errors, and you can't just waive your
10:52:51 13 hands at all and then call it quantitatively calculated bone
10:52:56 14 density.

10:52:56 15 Q. Dr. Pelc, in your always of the ProMax 3D systems,
10:52:59 16 did you see any evidence that they record the x-ray photon
10:53:04 17 energy?

10:53:04 18 A. No.

10:53:04 19 Q. Did you see any evidence that the ProMax 3D systems
10:53:07 20 used an x-ray photon energy to calculate bone density?

10:53:11 21 A. No.

10:53:15 22 Q. Moving from slide 45 to 46, what are you summarizing
10:53:21 23 here?

10:53:21 24 A. Well, so just summarizing what we have been talking
10:53:25 25 about, there is no evidence of look up tables for mass

Pelc - direct

10:53:30 1 attenuation coefficients if they were practicing that
10:53:33 2 calculation that I showed you. There is no evidence that
10:53:37 3 they record the photon energy. There is no evidence of any
10:53:44 4 ProMax 3D algorithms or source code that converts Hounsfield
10:53:49 5 units to bone density quantitatively. And uses those values
10:53:54 6 for the images produced. And in fact, I heard Dr. Kia say
10:54:01 7 yesterday that in order to convert Hounsfield units to bone
10:54:05 8 density, you would need to know other things that the system
10:54:09 9 does not know.

10:54:11 10 Q. Now, Dr. Pelc, did anything that Dr. Kia testified to
10:54:14 11 in this trial change your opinions that the ProMax 3D
10:54:17 12 systems did not infringe?

10:54:20 13 A. No.

10:54:24 14 Q. If what Dr. Kia asserts that HU values are
10:54:27 15 densitometry were actually true, would the claims read on
10:54:30 16 the prior art?

10:54:33 17 A. Yes.

10:54:36 18 Q. I want to turn and talk about the second reasons that
10:54:39 19 you gave why the ProMax 3D systems did not infringe the
10:54:42 20 claims. That was with respect to the model terms. Can you
10:54:45 21 explain what these terms are in the asserted claims?

10:54:48 22 A. Yes. So you see the model, the model terms
10:54:51 23 highlighted in the various claims. They all have it. And
10:54:54 24 all of them require merging information from multiple
10:55:00 25 tomographic scans. And as I said, the ProMax 3D systems

10:55:09 1 don't do that.

10:55:10 2 Q. Moving from slide 47 to slide 48, what was, again,
10:55:14 3 can you explain what the Court's construction was with
10:55:17 4 respect to tomographic modeling term?

10:55:20 5 A. So on the left column you see various terms from
10:55:24 6 different claims, all of them have model or modeling in
10:55:29 7 them. Some of them have densitometry and some of them
10:55:33 8 don't. But they all, in the Court's construction, mean
10:55:38 9 merging information from multiple tomographic scans of an
10:55:43 10 object to produce an representation of the object, said
10:55:46 11 representation depicting quantitatively density differences
10:55:51 12 of the object scanned, which is created by the
10:55:54 13 microprocessor in the controller using densitometry from at
10:55:57 14 least one focal plane.

10:56:00 15 Q. Dr. Pelc, if you move to slide 49, what did you think
10:56:04 16 about Dr. Kia's theory that a 3D volume meets the model
10:56:08 17 elements?

10:56:08 18 A. I'm sorry?

10:56:09 19 Q. The 3D volume meets those model requirements of the
10:56:14 20 asserted claims?

10:56:15 21 A. Well, his interpretation was that each view in the
10:56:22 22 tomographic scan was a tomographic scan, which is not true.
10:56:28 23 Each view is a projection, or a frame. And so the detector
10:56:34 24 array does not capture tomographic images. Each frame, each
10:56:38 25 image is just a single view. And the reconstruction

Pelc - direct

10:56:42 1 algorithm does not merge information from multiple
10:56:46 2 tomographic scans, it's just not true.

10:56:48 3 Q. What is the reconstruction server, of the ProMax 3D
10:56:54 4 systems doing?

10:56:54 5 A. It's performing this algorithm that you have heard
10:56:57 6 about called the Feldkamp algorithm which is an efficient
10:57:02 7 way of solving this system of equations or the equivalent of
10:57:07 8 that.

10:57:07 9 Q. Is the data before processing that Feldkamp
10:57:13 10 algorithm, is that tomographic?

10:57:15 11 A. No. The data going into the Feldkamp algorithm are
10:57:19 12 individual projections. And they are not tomographic. Each
10:57:24 13 one of them is a 2D view or projection with superimposition.
10:57:30 14 Tomographic would mean that it represents a slice, but it
10:57:34 15 doesn't represent a slice. It's a projection of the entire
10:57:37 16 object in a particular direction.

10:57:39 17 And so, no way would you say that the
10:57:44 18 reconstruction algorithm merges information from multiple
10:57:49 19 tomographic scans, it is treating or operating on the
10:57:53 20 projections that comprise one tomographic scan.

10:57:58 21 Q. Dr. Pelc, we've just walked through I believe, we
10:58:02 22 talked earlier you said there were two reasons why the model
10:58:05 23 requirements were not met, one had to do with the merging
10:58:08 24 which I think we just discussed and the second had to do
10:58:12 25 with densitometry. Was your second reason the same as what

Pelc - direct

10:58:15 1 we talked about with respect to densitometry?

10:58:17 2 A. That's right.

10:58:18 3 Q. I think we can move on to your third one, moving from
10:58:21 4 slide 49 to slide 50. What are the comparing requirements
10:58:25 5 of the asserted claims?

10:58:27 6 A. So the comparing is included in claim one of the '262
10:58:35 7 patent and claim six of the '374 patent. And we should read
10:58:42 8 them, the claim language carefully.

10:58:47 9 The '262 patent beginning in that claim element
10:58:51 10 before the highlighting, said computer creating, storing and
10:58:57 11 comparing three dimensional digital densitometry models. It
10:59:02 12 is the computer that is doing the comparing.

10:59:06 13 And in claim six of the '374 patent, similarly
10:59:11 14 it says said computer is further adapted to compare said
10:59:17 15 first tomographic model with said second tomographic model.
10:59:21 16 Again, the controller, I'm sorry, the controller is doing
10:59:24 17 the comparing.

10:59:26 18 There is another highlighted section which has
10:59:31 19 to do with the output device communicating densitometry
10:59:36 20 model comparison information. So if the computer is not
10:59:42 21 doing the comparing, there isn't any comparison information
10:59:47 22 to be communicated and you didn't infringe that element,
10:59:50 23 either.

10:59:50 24 Q. And that element you were just describing relates to
10:59:53 25 claim one of the '262 patent?

Pelc - direct

- 10:59:54 1 A. Yes, that's correct.
- 10:59:57 2 Q. Moving to slide 51, can you explain why it's your
11:00:00 3 opinion that the ProMax 3D systems do not meet the comparing
11:00:03 4 element?
- 11:00:04 5 A. Yes. This is a high level summary. There is no
11:00:07 6 densitometry in the ProMax 3D systems as the court has
11:00:11 7 construed the term. There is no quantitative comparison of
11:00:16 8 densitometry information between two models. And there is
11:00:19 9 no comparison done by the controller or computer.
- 11:00:24 10 Q. Now, Dr. Pelc, Dr. Kia showed a number of different
11:00:28 11 images from the Romexis software. Did any of those
11:00:31 12 demonstrate that the ProMax 3D systems met the comparing
11:00:34 13 limitations?
- 11:00:35 14 A. No.
- 11:00:37 15 Q. I'm going to move to slide 53. On slide 53 on the
11:00:42 16 left, you have an image of what looks like what was
11:00:47 17 described yesterday as part of the implant modules?
- 11:00:50 18 A. That's correct.
- 11:00:51 19 Q. Can you explain that figure?
- 11:00:52 20 A. Yes. It is a figure from the implant module. And it
11:00:52 21 is showing some display of Hounsfield units in the region of
11:01:00 22 the implant. Whatever comparing is being done, it is not
11:01:10 23 being done by the computer, it's being done by the person
11:01:17 24 observing the image. And the images that are shown are all
11:01:22 25 from one volume, they're all from one scan. There are not

Pelc - direct

11:01:24 1 two models here, there is one model. So you can't be doing
11:01:28 2 comparing of two models.

11:01:30 3 Q. And now I want to clarify a little bit. So the HU
11:01:35 4 units are showing and your opinion is that Hounsfield units
11:01:38 5 are not densitometry?

11:01:40 6 A. That's right. That's correct. So it's not
11:01:43 7 densitometry for the reasons that I stated, but in addition,
11:01:47 8 the comparison is not being done by the computer. And in
11:01:50 9 this case, in addition there aren't even two models.

11:01:54 10 Q. Now, moving to slide 54, on slide 54 is something
11:02:00 11 that's been shown from the TMJ module. Can you describe for
11:02:05 12 the jury what the TMJ module is?

11:02:08 13 A. The TMJ module, TMJ stands for temporal
11:02:14 14 temporomandibular joint, it's the joint in your jaw up here,
11:02:18 15 and normal people have two. And the TMJ module allows the
11:02:23 16 dentist or the physician to compare or to look in detail at
11:02:29 17 the temporomandibular joints and in addition compare the
11:02:34 18 left to the right. Again, these are side-by-side
11:02:37 19 presentations. The comparison is being done by the
11:02:42 20 observer, not the computer. There is only one model here as
11:02:46 21 well. There is one head that was scanned, so there are not
11:02:52 22 two models. And there is no quantitative information shown.
11:02:56 23 So I don't see how this can be quantitatively comparing.

11:03:01 24 Q. And then on slide 55, Dr. Pelc, you have an excerpt
11:03:07 25 that talks about the superimposition sub module. Can you

Pelc - direct

11:03:12 1 explain what that is?

11:03:13 2 A. The superimposition sub module allows the user to
11:03:18 3 compare to observe two scans of the patient, one could be
11:03:25 4 before treatment, one is after treatment. And to view them
11:03:29 5 together to try to ascertain what changed between before and
11:03:36 6 after.

11:03:37 7 The first thing that has to be done is if you
11:03:43 8 have two volume scans, you have to line them up to each
11:03:46 9 other. And this is done by the observer picking three
11:03:52 10 points in the anatomy of the first model and the same three
11:03:56 11 pieces of anatomy in the second model, and then the computer
11:04:02 12 translates and rotates the two models so that they are
11:04:06 13 hopefully now close to alignment. And the user then has the
11:04:11 14 ability to manually adjust that further.

11:04:14 15 But all of that really required input from the
11:04:17 16 user in specifying the landmarks and then confirming that
11:04:21 17 they are in alignment in sufficient alignment. And then you
11:04:32 18 can display them side-by-side.

11:04:33 19 In this image on the right, you actually see a
11:04:38 20 red dot in the bridge of the nose. That is one of the
11:04:42 21 points that the observer selected. And then there is also
11:04:48 22 -- so there is the red dot. And here is a green dot that
11:04:52 23 the observer put on the temple. And then the computer is
11:04:57 24 going to shift and rotate these models to hopefully get them
11:05:00 25 close to alignment. And as I said the observer is free to

11:05:10 1 further adjust.

11:05:10 2 Q. And so the sitting process that you're showing on
11:05:15 3 slide 56, I want to go back to some of these figures that
11:05:19 4 Dr. Kia showed yesterday. On slide 57, what are you showing
11:05:23 5 on the left?

11:05:24 6 A. So on the left is a screen shot from the overlay
11:05:33 7 capability of the superimposition module. It is displaying
11:05:37 8 the two volumes together. One is in grayscale and the other
11:05:44 9 one is transparent, so you can see them together and try to
11:05:49 10 discern where was there change.

11:05:52 11 It's the observer that is comparing. The
11:05:57 12 computer is just getting the models there for you to do the
11:06:01 13 comparison, the comparison. So a side-by-side comparison or
11:06:06 14 even an overlay is not a comparison being done by the
11:06:12 15 controller or the computer. And similarly -- or as I said,
11:06:17 16 there is no densitometry there. And there is no
11:06:21 17 quantitative comparison.

11:06:23 18 Q. Now, I believe that there may have been some
11:06:26 19 testimony about the side-by-side display of two volumes, and
11:06:31 20 then there is also the testimony about the overlay. What is
11:06:34 21 your opinion about whether the overlay function of the
11:06:37 22 superimposition module meets the comparing limitation?

11:06:42 23 A. I do not believe that that meets the limitation.

11:06:44 24 Q. Dr. Pelc in your analysis of the ProMax 3D systems,
11:06:47 25 did you see any evidence of the computer controller

11:06:51 1 comparing the claim models?

11:06:55 2 A. No.

11:06:55 3 Q. With respect to the overlay function of the
11:06:58 4 superimposition module, what is your summary for why that
11:07:04 5 does not meet the comparing limitation?

11:07:05 6 A. Well it requires manual fitting by the user, there is
11:07:10 7 no evidence that the computer or controller is comparing
11:07:13 8 densitometry information between those models. HU values
11:07:19 9 aren't shown, so even if you thought HU values were
11:07:22 10 densitometry, they're not shown. And any comparison is
11:07:28 11 qualitative, it's not quantitative as required by the
11:07:31 12 Court's claim construction.

11:07:35 13 Q. So Dr. Pelc, can you remind the jury the three main
11:07:39 14 reasons that you have presented today for why Planmeca did
11:07:42 15 not infringe any claims of the Osseo patents?

11:07:44 16 A. Yes. The ProMax 3D did not do densitometry, it did
11:07:49 17 not merge multiple tomographic scans to create the claimed
11:07:53 18 models and the comparer or the controller of the ProMax 3D
11:07:58 19 did not compare the claimed models.

11:08:01 20 Q. So moving from slide 59 to slide 60, in summary, what
11:08:07 21 is your ultimate opinion as to whether the claims were
11:08:10 22 infringed by Planmeca?

11:08:11 23 A. My opinion is that they were not infringed, this is
11:08:15 24 just a redisplay of the slide I showed you earlier with the
11:08:19 25 claim elements that are not met by the ProMax 3D machines.

Pelc - direct

11:08:23 1 Q. And the highlighting here represents your opinions
11:08:26 2 that there is no densitometry, the model requirements are
11:08:29 3 not met and the comparing requirements are not met?

11:08:32 4 A. That's correct.

11:08:34 5 Q. I want to turn now, Dr. Pelc, to talk a little bit
11:08:39 6 about Planmeca's response to the Osseo letters. As part of
11:08:43 7 your analysis in this case, did you review the
11:08:45 8 correspondence between Osseo and Planmeca?

11:08:48 9 A. I did, yes.

11:08:49 10 Q. Were you in the courtroom when Dr. Massie testified
11:08:52 11 about that correspondence?

11:08:53 12 A. Yes.

11:08:54 13 Q. Were you in the courtroom when Mr. Pienkowski
11:08:57 14 testified about that correspondence?

11:08:59 15 A. Yes.

11:09:00 16 Q. Dr. Pelc, I would like you to turn in your notebook
11:09:03 17 to Tab 26, which I believe is in the second binder.

11:09:32 18 A. Yes.

11:09:33 19 Q. Dr. Pelc, is this part of the correspondence that you
11:09:36 20 reviewed?

11:09:37 21 A. Yes.

11:09:38 22 Q. And is this labeled at the top joint Exhibit 0013?

11:09:40 23 A. Yes.

11:09:45 24 MS. PESCHEL: Your Honor, I would like to move
11:09:47 25 joint Exhibit 13 into evidence.

Pelc - direct

11:09:48 1

THE COURT: Any objection to 13?

11:09:52 2

MR. OSTROW: No objection.

11:09:56 3

THE COURT: JTX-13 is received.

11:09:59 4

(JTX Exhibit No. 13 was admitted into evidence.)

11:10:00 5

BY MS. PESCHEL:

11:10:00 6

Q. May I publish it to the jury, Your Honor?

11:10:03 7

THE COURT: Yes, you may.

11:10:04 8

BY MS. PESCHEL:

11:10:06 9

Q. Now, Dr. Pelc, I think this was talked about

11:10:10 10

yesterday, but if you know, if you don't know, that's fine,

11:10:13 11

but do you know what date that the top e-mail was sent?

11:10:18 12

A. I think Marraskuuta must be November or something.

11:10:24 13

Q. Thank you, here Mr. Tawast is responding that

11:10:32 14

Planmeca understand the patent relates to using dental or

11:10:34 15

orthopedic patient densitometry models, do you agree that

11:10:37 16

the '301 and '262 patent relate to using dental and

11:10:41 17

orthopedic patient densitometry models?

11:10:47 18

A. Yes.

11:10:47 19

Q. Mr. Tawast also says that Planmeca is not involved in

11:10:51 20

nor do we have any short term plans for at least going into

11:10:54 21

such applications. Is that consistent with your opinion

11:10:57 22

that the ProMax 3D systems did not do densitometry and did

11:11:00 23

not create the models required by the claims?

11:11:03 24

A. Yes. Planmeca was not involved in densitometry, at

11:11:08 25

least the ProMax 3D systems did not practice that. I don't

Pelc - direct

11:11:12 1 know about their short term plans. But I take him at his
11:11:17 2 word.

11:11:18 3 Q. Mr. Tawast also notified Osseo that implementing CT
11:11:23 4 densitometry dates decades back. Is that consistent of your
11:11:27 5 knowledge of the field including the history you discussed
11:11:30 6 earlier in your testimony?

11:11:31 7 A. Yes.

11:11:32 8 Q. Are you aware of any additional communication between
11:11:35 9 the parties?

11:11:38 10 A. Yes.

11:11:41 11 Q. Dr. Pelc, can you turn to Tab 27 in your binder?

11:11:51 12 A. Yes.

11:11:51 13 Q. At Tab 27 is a document marked joint exhibit or
11:11:57 14 JX-16. Have you reviewed that as part of your analysis in
11:12:00 15 the case?

11:12:00 16 A. Yes.

11:12:03 17 Q. This has already been introduced into evidence.

11:12:09 18 Mr. Herndon, if you could put up JX-16 at page 3.

11:12:12 19 At page 3, it refers to the 2009 correspondence
11:12:20 20 and says Osseo Imaging presenting the same scope
11:12:23 21 interpretation of the Osseo patents. Do you see that?

11:12:32 22 A. Yes, I see it now. In the June 21st letter.

11:12:42 23 Q. Do you agree with respect to densitometry and
11:12:46 24 modeling that the court has construed the '301 patent model
11:12:52 25 term and the '374 patent model term have the same meaning?

Pelc - direct

11:12:56 1 A. The densitometry model information has the same
11:13:00 2 meaning, yes.

11:13:00 3 Q. And that would be in the '301 patent tomographic
11:13:05 4 densitometry model and in the '374 patent tomographic model?

11:13:10 5 A. That's correct.

11:13:10 6 Q. Mr. Tawast also says that Planmeca is unable to
11:13:14 7 recognize a single Osseo patent claim which would validly
11:13:17 8 cover any Planmeca product. Is that consistent with your
11:13:21 9 opinions in this case?

11:13:27 10 A. Yes.

11:13:34 11 Q. Mr. Herndon, can you put up the demonstrative for
11:13:37 12 Dr. Pelc at slide 56. Dr. Pelc, earlier we discussed that
11:13:58 13 part of your work in this case was to assess whether the
11:14:02 14 Osseo patents are valid or invalid. In making that
11:14:05 15 assessment, did you apply the same meaning to the claims
11:14:08 16 that you did in reaching the conclusion that the ProMax 3D
11:14:11 17 systems did not infringe the claims?

11:14:12 18 A. Yes.

11:14:13 19 Q. And when you made you're assessment with respect to
11:14:17 20 non-infringement, did you apply the meaning to the claims
11:14:20 21 from the Court's claim construction and what one of, a
11:14:23 22 person of ordinary skill in the art would have interpreted
11:14:26 23 for the rest of the claims?

11:14:27 24 A. That's right, what a person of skill in the art in
11:14:30 25 1999 would have interpreted the claims to mean.

Pelc - direct

11:14:35 1 Q. Now, we have heard -- let me move to slide 67.

11:14:39 2 We have heard discussions of the qualifications
11:14:42 3 of one of ordinary skill in the art. What is your opinion
11:14:45 4 as to the qualifications of a person of ordinary skill in
11:14:48 5 the art with respect to the Osseo patents in 1999?

11:14:51 6 A. In my opinion, a person of ordinary skill in the art
11:14:56 7 in 1999 would have had a graduate degree engineering or a
11:15:02 8 physical science with experience in densitometry and/or
11:15:05 9 tomographic imaging, and because I have worked with many
11:15:09 10 people who didn't have graduate degrees but are incredibly
11:15:13 11 talented, I also included as an alternative an under
11:15:17 12 graduate degree in engineering or physical science, but with
11:15:21 13 more experience, at least five years of combined experience
11:15:25 14 in densitometry and/or tomographic imaging.

11:15:31 15 And I also believe that the person would be
11:15:35 16 familiar with things like how do we generate x-rays and
11:15:39 17 detect them, computed tomography or x-ray tomosynthesis and
11:15:43 18 quantitative bone densitometry using x-rays.

11:15:47 19 Q. As of December of 1999, did you have at least the
11:15:51 20 qualification of one of ordinary skill in the art?

11:15:55 21 A. Yes.

11:15:59 22 Q. Dr. Pelc, I suspect given your background that that
11:16:03 23 we all heard about this morning, you may have possibly had
11:16:07 24 more qualifications as of December 1999. In all of your
11:16:11 25 analysis in this case the you apply the knowledge and skill

Pelc - direct

11:16:11 1 of one of ordinary skill in the art?

11:16:12 2 A. I did.

11:16:13 3 Q. How does your definition of one of ordinary skill in
11:16:16 4 the art differ from Dr. Kia's?

11:16:18 5 A. It differs a little bit. His definition is a
11:16:22 6 bachelors degree in electrical or computer engineering. And
11:16:29 7 at least three years of experience in diagnostic imaging.

11:16:33 8 Q. As of December of 1999, did you have at least the
11:16:36 9 qualifications of one of ordinary skill in the art under
11:16:40 10 Dr. Kia's definition?

11:16:42 11 A. Yes.

11:16:42 12 Q. Dr. Pelc, can you please explain your invalidity
11:16:47 13 opinions at a very high level for the jury?

11:16:49 14 A. Yes. In my opinion, the, all the asserted claims are
11:16:54 15 obvious in light of the prior art, meaning the things that
11:16:58 16 the person of ordinary skill in the art would know from
11:17:01 17 previous publications or patents. And that also includes
11:17:07 18 the admissions by Osseo of what was known at the time and I
11:17:14 19 put together three combinations of references as examples of
11:17:20 20 how a person of ordinary skill in the art would find it
11:17:27 21 obvious to -- find the claim elements obvious. And the
11:17:32 22 first combination is the Webber patent, the paper by Cann
11:17:37 23 that we've talked about, and Dimaxis user manual, and the
11:17:42 24 second combination is patents by Guenther and Mazess and a
11:17:45 25 paper that's been called Fontevraud here in this litigation.

11:17:53 1

11:17:54 2 Q. Dr. Pelc, could you also read opinions with invalid
11:17:57 3 with respect to written description and enablement?

11:18:05 4 A. Yes, I believe that the comparing limitations that we
11:18:05 5 talked about and they are in claim one of the '262 patent
11:18:07 6 and claim six of the '374 patent lack written description
11:18:12 7 and enablement. And that the energy source limitation in
11:18:20 8 claim one of the '262 patent lack enablement as to the use of
11:18:23 9 an electron beam to perform densitometry modeling.

11:18:29 10 Q. This is from the summary of your opinions on slide 58
11:18:32 11 and slide 59, what types of technology were known prior to
11:18:36 12 1999?

11:18:37 13 A. Yes. So these are the kind of things that the two
11:18:41 14 parties have agreed were known before 1999. On the left you
11:18:47 15 have hardware and systems, kinds of things that the parties
11:18:51 16 agreed were known. And on the right are software or
11:18:57 17 specific functions. So the parties have agreed that x-ray
11:19:00 18 equipment, x-ray sources, sensors, collimated x-ray beams,
11:19:05 19 input devices, everything that you see there, analog or
11:19:09 20 digital converters, computed tomography, all of those things
11:19:13 21 were known before 1999. And similarly placing a patient's
11:19:18 22 dental structure between an x-ray source and detector,
11:19:23 23 storing data on computers, CT reconstruction software,
11:19:27 24 Hounsfield units and densitometry, all of these were known
11:19:30 25 and the parties agreed to that.

Pelc - direct

11:19:31 1 Q. And Dr. Pelc, just for the record, that would include
11:19:35 2 positioning motors, controllers, processors, memory devices
11:19:39 3 and output devices?

11:19:41 4 A. Yes, I'm sorry I didn't read all the things on the
11:19:45 5 left column but all of those were known and the parties
11:19:48 6 agreed to it.

11:19:48 7 Q. I know it was a lot on the slide. But ultimately the
11:19:52 8 parties have agreed that a lot of the words in the claims
11:19:55 9 are met by the prior art?

11:19:56 10 A. That's true.

11:19:57 11 Q. Is that a fair summary?

11:20:00 12 Dr. Pelc, can you turn to Tab 31 in your second
11:20:06 13 binder.

11:20:09 14 A. Yes.

11:20:12 15 Q. What is this document?

11:20:14 16 A. This is a -- the begun they are patent, and the 884
11:20:20 17 and it's labeled DX-8.

11:20:23 18 Q. Did you rely on the Guenther patent in your analysis
11:20:27 19 in this case?

11:20:27 20 A. I did.

11:20:29 21 MS. PESCHEL: Your Honor, at this time I would
11:20:32 22 like to move into evidence Defense Exhibit 8.

11:20:34 23 THE COURT: Any objection?

11:20:36 24 MR. OSTROW: No objection.

11:20:40 25 THE COURT: DTX-8 is received.

Pelc - direct

(DTX Exhibit No. 8 was admitted into evidence.)

11:20:42 1

11:20:44 2

BY MS. PESCHEL:

11:20:51 3

Q. Can you explain at a high level, Dr. Pelc, when

11:21:02 4

Guenther was filed and issued?

11:21:02 5

A. Yes. The Guenther patent was filed in February 1st

11:21:06 6

of 1995 and it issued March 19th of 1996. .

11:21:16 7

A. And the first inventor name is Guenther. And it's a

11:21:22 8

patent to a particular kind of panoramic x-ray machine.

11:21:27 9

Q. And this particular patent was assigned to Siemens,

11:21:31 10

correct?

11:21:32 11

A. That's right.

11:21:33 12

Q. If could go back to the demonstrative, Mr. Herndon.

11:21:38 13

I believe on your slide, Dr. Pelc, that you may point out

11:21:42 14

some of the figures from this patent with a little bit more

11:21:46 15

detail. Can you explain what you're showing here?

11:21:48 16

A. Yes. So these are figures 3 and 8 from the Guenther

11:21:53 17

patent. On the left you see that it has an x-ray source and

11:21:56 18

an x-ray detector or sensor. On the right in addition it

11:22:01 19

has a keyboard as an input device, a computer or controller

11:22:07 20

that is capable of performing calculations. And it has a

11:22:12 21

display.

11:22:12 22

Q. And what you were seeing on the left looks like it

11:22:16 23

might be specific for that dentomaxillofacial area is that

11:22:22 24

right?

11:22:22 25

A. That's right, you see the patient's dental structure

11:22:25 1 between the x-ray source and the detector.

11:22:29 2 Q. So these are sort of figures that show you at a high
11:22:34 3 level what the structure looked like; correct?

11:22:36 4 A. That's right.

11:22:37 5 Q. And then if we move to slide 71, can you explain what
11:22:41 6 you're showing here?

11:22:42 7 A. So this is more of a block diagram kind of view. You
11:22:51 8 see the x-ray sources, and this which is Figure 7 from
11:22:52 9 Guenther, it has a control unit that he, in the text
11:23:00 10 indicates has a microprocessor in it. It has four motors,
11:23:05 11 3, 4, that are controlled by the control unit. It has a
11:23:12 12 display and an operating panel that is an input device and
11:23:16 13 an output device.

11:23:23 14 Q. Dr. Pelc, do you have another example?

11:23:23 15 A. Yes. So these are figures from my '080 patent, just
11:23:32 16 to demonstrate that this hardware was known and in my '080
11:23:38 17 patent here you see the x-ray source producing a collimated
11:23:43 18 beam, the sensor is at the bottom, it has motors that I
11:23:48 19 don't highlight here that are able to both translate that
11:23:54 20 about the patient and also rotate that C arm, that supports
11:24:00 21 the x-ray source and detector can rotate.

11:24:03 22 And the system also has a computer and
11:24:08 23 controller which is both an input device and an output
11:24:12 24 device.

11:24:14 25 Q. Dr. Pelc, was there any discussion of prior art in

11:24:17 1 the specifications of the Osseo patents?

11:24:20 2 A. Yes.

11:24:20 3 Q. What did the Osseo patents say about tomography?

11:24:26 4 A. So early on in the text of the -- all of the Osseo
11:24:34 5 patents, it indicates that tomography or sexual radiography
11:24:38 6 techniques using scanning x-ray beams have previously been
11:24:42 7 employed for dental applications. So concedes that that
11:24:50 8 part of it was not new. And it list five references as
11:24:58 9 examples of that.

11:24:59 10 Q. Are you going to talk about any of those references
11:25:02 11 today?

11:25:02 12 A. Yes. The '686 patent which is listed last is the
11:25:11 13 Webber patent that we will be talking about. And the one
11:25:15 14 just before that -- no, I'm sorry. So that's the one. The
11:25:23 15 '686 patent is the Webber patent and we'll be talking about
11:25:27 16 that.

11:25:28 17 Q. Okay. Just for the record, on slide 73 we're showing
11:25:31 18 an excerpt from the '301 patent at column 1, line 61 to 67?

11:25:38 19 A. Yes, that's what this means, column one, lines 61 to
11:25:43 20 67.

11:25:43 21 Q. Then I believe on slide 74 you have an excerpt from
11:25:48 22 column two, lines 1 to 8. Why did you include this?

11:25:52 23 A. This is again from the Osseo patents. And they say
11:25:55 24 that in the medical field, densitometry procedures are used
11:26:00 25 for measuring bone mineral density or BMD by utilizing

11:26:07 1 scanning x-ray beams. And it gives three examples, the '080
11:26:12 2 patent, the '765 patent, and the RE162 patent.

11:26:20 3 Q. Is the '080 patent listed here your patent?

11:26:24 4 A. That's correct.

11:26:26 5 Q. Moving to slide 75, what do the Osseo patents admit
11:26:31 6 if anything about densitometry models being in the prior
11:26:39 7 art?

11:26:39 8 A. That it admits that fast computers are obviously
11:26:43 9 available, were available before 1999 with large memories
11:26:46 10 and that that has led to the digital eggs of x-ray images,
11:26:51 11 including for mapping BMD models. And that digital BMD
11:27:02 12 models, patient models are also used for comparison
11:27:02 13 purposes. In other words that the field was already
11:27:05 14 comparing models before and after, before and after it being
11:27:13 15 with the patient's own prior BMD histories, or a patient,
11:27:21 16 comparing a patient to a population. That's what it means
11:27:24 17 by standard models, what would be average for a person of
11:27:29 18 this age and gender.

11:27:32 19 Q. Do you have any disagreement with these aspects of
11:27:35 20 the Osseo patents in terms of what they're saying about what
11:27:39 21 was known and available as of 1999?

11:27:42 22 A. No, I don't disagree with that at all.

11:27:47 23 Q. Turning to slide 76, what did the Osseo patents say
11:27:51 24 about tomography and densitometry equipment?

11:27:55 25 A. That it seeks to provide a method of using or

Pelc - direct

11:28:02 1 utilizing commercially available tomography equipment, that
11:28:06 2 could be adapted to perform the method of the claims. And
11:28:11 3 in the second text you see existing densitometry equipment.

11:28:16 4 Q. And as you've testified today, tomography equipment
11:28:21 5 was known, and densitometry equipment was known by 1999?

11:28:25 6 A. That's right.

11:28:27 7 Q. And so these particular excerpts do come from the
11:28:34 8 '301 patent at column 3, lines 10 to 11, and column 3,
11:28:40 9 lines 18 to 20?

11:28:41 10 A. Yes.

11:28:41 11 Q. Slide 77, you have an excerpt from column 4 at 17 to
11:28:46 12 23. Why did you include this?

11:28:48 13 A. Well in the discussion in the Osseo patent about
11:28:50 14 x-ray equipment, it says that examples of x-ray equipment
11:28:55 15 adaptable for use with the present invention are disclosed
11:28:58 16 in U.S. patent, and you see there, that's my '080 patent,
11:29:00 17 and you see two other patents listed as examples of x-ray
11:29:11 18 equipment that could be adapted.

11:29:12 19 Q. And the x-ray equipment is what you have just
11:29:18 20 described a little earlier with respect to your own patents?

11:29:20 21 A. Right. The x-ray, usually in this case, x-ray
11:29:24 22 equipment means the x-ray source, the detector and the
11:29:27 23 things that hold them and moves them around.

11:29:31 24 Q. Dr. Pelc, were you in the courtroom when Dr. Massie
11:29:35 25 testified?

Pelc - direct

11:29:35 1

A. I was.

11:29:36 2

Q. Did you hear him make any admissions about the prior art?

11:29:39 3

11:29:39 4

A. Well, he said that densitometry to diagnose

11:29:43 5

osteoporosis, breakdown or decalcification or

11:29:48 6

demineralization of bone was known. That tomography to

11:29:53 7

create 3D models was known. And that comparing past and

11:29:58 8

present x-ray images was normal practice. Was known.

11:30:05 9

Q. So that summary is on slide 78. Can you summarize

11:30:12 10

for the jury on slide 79 what all of these, what you just

11:30:17 11

discussed, how it relates to the claims?

11:30:21 12

A. Again as we have seen before on the left are the

11:30:25 13

asserted claims of the '301 patent, in the center the '262

11:30:30 14

patent and on the right the '374 patent, two claims. And if

11:30:34 15

we were to highlight on these, on the language of this, all

11:30:40 16

of the things that the two parties have agreed was known,

11:30:44 17

almost everything would be highlighted. And we're left

11:30:48 18

really with very few things on which there is any contention

11:30:52 19

as to whether or not they were known in the art.

11:31:00 20

Q. What are you showing on slide 80, and I believe it

11:31:03 21

may be something we have seen before?

11:31:05 22

A. Yes. So this is a slide that I showed you before.

11:31:09 23

This is the machine described in the Mozzo paper that was

11:31:13 24

commercialized as the NewTom 9000, devoted to

11:31:17 25

dentomaxillofacial imaging using the cone beam computed

Pelc - direct

11:31:27 1 tomography. And clearly this was known before 1999 since
11:31:32 2 the paper was published in 1998.

11:31:41 3 Q. Now, when we look at this slide a little earlier, I
11:31:44 4 want to be clear, was 3D cone beam computed tomography known
11:31:49 5 in the art prior to 1999?

11:31:54 6 A. Yes, not only was cone beam computed tomography known
11:31:58 7 and that dates back to more than a decade prior to this, but
11:32:01 8 in fact it had already been used for dental imaging.

11:32:04 9 Q. And then again, you showed earlier, and I just want
11:32:09 10 to be clear that was dental densitometry using tomography
11:32:15 11 known before 1999?

11:32:19 12 A. Yes, both of these as I described earlier are
11:32:25 13 examples of papers before 1999 that demonstrate that
11:32:31 14 tomography was applied to dentistry. And I'm sorry, that
11:32:37 15 dental densitometry using tomography was applied in
11:32:43 16 dentistry before 1999.

11:32:49 17 Q. Dr. Pelc, how did all of this prior art inform your
11:32:55 18 invalidity opinion?

11:32:59 19 A. Yes. So the legal standard for obviousness is that
11:33:05 20 you can't get a patent -- the invention is not identical
11:33:11 21 disclosed in a single reference, you can't get a patent if
11:33:17 22 the differences between the subject matter taught to be
11:33:23 23 patented and/or the prior art and the prior art, excuse me
11:33:29 24 -- let me just start over again.

11:33:35 25 A patent may not be obtained even though the

11:33:27 1 invention is not identically disclosed or described if the
11:33:31 2 differences between the subject matter sought to be patented
11:33:36 3 and the prior art are such that the subject matter as a
11:33:39 4 whole would have been obvious at the time of the invention
11:33:44 5 was made to a person of ordinary skill in the art to which
11:33:48 6 the subject matter pertains.

11:33:51 7 Q. Did you apply this understanding of obviousness in
11:33:56 8 your analysis in this case?

11:33:57 9 A. Yes, I did.

11:33:58 10 Q. And what is your understanding of Planmeca's burden
11:34:03 11 to prove obviousness?

11:34:04 12 A. Planmeca's burden to prove obviousness is clear and
11:34:10 13 convincing.

11:34:10 14 Q. Going from slide 82 to 83, are there factors to
11:34:14 15 consider when doing an obviousness analysis?

11:34:17 16 A. Yes. We need to consider the level of the person of
11:34:21 17 ordinary skill in the art at the time the invention was
11:34:24 18 made. The scope and content of the prior art. What
11:34:30 19 differences there are between the claimed invention and the
11:34:32 20 prior art. And secondary, what are called secondary
11:34:32 21 considerations.

11:34:32 22 Q. Dr. Pelc, what is your opinion as to whether there
11:34:42 23 are any relevant secondary considerations in this case?

11:34:45 24 A. I have not heard anyone voice that there are
11:34:48 25 secondary considerations. But, yes.

Pelc - direct

11:34:54 1 Q. Just so that we're aware of what those might be, can
11:34:58 2 you tell us what secondary considerations are, it seems like
11:35:06 3 a term out of the air?

11:35:07 4 A. Yes, the secondary considerations that one should use
11:35:10 5 when deciding whether or not the patented claim is obvious
11:35:17 6 is commercial success, long-felt but unsolved need,
11:35:25 7 unsuccessful attempts by others to meet the need, copying of
11:35:31 8 the claimed invention, unexpected and superior results, that
11:35:36 9 is that the combination of elements leads to something
11:35:41 10 that's unexpected, acceptance and praise by others, and
11:35:47 11 independent invention by others.

11:35:50 12 Q. And Dr. Pelc, is it your understanding that there has
11:35:53 13 to be a nexus between these types of things if they're
11:35:56 14 present and the claimed invention?

11:35:58 15 A. That's right. So even if the -- for example, even if
11:36:01 16 the product accused is commercially successful, you have to
11:36:04 17 analyze whether the commercial success is related to the
11:36:14 18 inventive element, inventive element meaning the part of the
11:36:18 19 claim that's new, is that part of the claim that's new
11:36:23 20 leading to the commercial success. Is there a nexus between
11:36:27 21 the commercial success and the invention.

11:36:31 22 Q. And what is your opinion as to whether there is a
11:36:34 23 nexus between the success of the ProMax 3D systems and the
11:36:38 24 claimed invention?

11:36:39 25 A. I don't believe there is.

Pelc - direct

11:36:46 1 Q. I want to turn now, you said that you had two
11:36:47 2 examples of obviousness combinations?

11:36:50 3 A. Yes.

11:36:50 4 Q. I want to turn now to the first one which I believe
11:36:53 5 you said was a combination of a patent called Webber, a
11:36:57 6 scientific article called Cann and then the Dimaxis manual.

11:37:02 7 A. Yes. That's right.

11:37:04 8 Q. We touched on the state of the art at the time the
11:37:11 9 Osseo patents were filed. Did you do an element-by-element
11:37:11 10 analysis of obviousness to determine whether this
11:37:15 11 combination renders the asserted claims obvious?

11:37:18 12 A. Yes, I did.

11:37:20 13 Q. I want to talk at a high level with respect to the
11:37:27 14 combination that you're making. Can you start with the
11:37:30 15 Webber patent and let us know when that was filed and
11:37:33 16 issued?

11:37:33 17 A. Yes. The Webber patent was filed on December 13th,
11:37:41 18 1991. The inventor's name is Richard Webber. He worked at
11:37:49 19 Wake Forest University in the dental school. And it was
11:37:52 20 issued on May 25th, 1993.

11:38:02 21 Q. Webber has previously been admitted as joint
11:38:05 22 Exhibit 4. Can you give at a high level what Webber was
11:38:08 23 talking about in this patent?

11:38:11 24 A. Webber is talking about a patent, patenting in this
11:38:18 25 case, a system to do tomographic imaging: Tomographic

11:38:28 1 imaging in dentistry it's called three-dimensional panoramic
11:38:33 2 dental radiography method and apparatus which avoids the
11:38:37 3 subject's spine.

11:38:38 4 Q. I think if I move from 86 to 87 you have a comparison
11:38:42 5 here. Can you explain this for the jury?

11:38:46 6 A. Sure. On the right is Figure 1 from the Osseo
11:38:50 7 patents showing -- and the color coding will become clearer
11:38:55 8 in a minute, but color coded some of the boxes. And on the
11:39:03 9 left are two figures from the Webber patent, Figure 7 and
11:39:10 10 Figure 8 from the Webber patent.

11:39:11 11 So you can see that the Webber patent as an
11:39:15 12 x-ray detector array at the top. That's 33. It has an
11:39:23 13 x-ray source, it has a motor to move them around. Here you
11:39:28 14 see the detector array in Figure 8. And the Osseo patents
11:39:34 15 have an x-ray source, a detector array, a motor, motors to
11:39:40 16 move the object in multiple directions and it has an A to D
11:39:47 17 converter. As we'll see, in the Webber system, the A to D
11:39:53 18 converter is inside of the detector array.

11:39:57 19 Q. Dr. Pelc, is it a fair assessment to say that the
11:40:03 20 hardware or structure of these two things have a lot of
11:40:07 21 similarities?

11:40:08 22 A. That's right, similar there is the computational
11:40:13 23 equipment in Webber, the computational equipment in the
11:40:16 24 Osseo patents, and output devices in them as well. And input
11:40:22 25 devices.

11:40:23 1 Q. Moving on to slide 88 where you're showing the first
11:40:30 2 page of the scientific article we have been referring to as
11:40:30 3 the Cann or Cann 1980. Can you give at a high level an
11:40:36 4 explanation to the jury about what exactly this article was
11:40:39 5 discussing?

11:40:40 6 A. Yes. As I said earlier, it used a -- in fact a GE
11:40:46 7 scanner that had an x-ray source detector, motors,
11:40:52 8 controllers and all of that. And it produced computed
11:40:56 9 tomography images that were then converted to bone
11:41:01 10 densitometry using the technique that they developed of
11:41:07 11 quantitatively calculated tomography.

11:41:10 12 Q. I believe we talked about Webber initially you said
11:41:13 13 it was present, it was referenced in the Osseo patent. Was
11:41:18 14 the Cann 1980 article referenced at all in the Osseo patent?

11:41:23 15 A. No, it was not. And there is no discussion in the
11:41:25 16 Osseo patents of quantitatively calculated tomography at
11:41:30 17 all.

11:41:30 18 Q. Did the Patent Office consider the Cann 1980 article
11:41:34 19 when reviewing the applications for the Osseo patent?

11:41:37 20 A. No.

11:41:37 21 Q. What teachings would a person of ordinary skill in
11:41:40 22 the art consider from the Cann 1980 article on
11:41:44 23 quantitatively calculated tomography to add to the Webber
11:41:47 24 imaging system?

11:41:48 25 A. Well, in particular, adding the quantitative modeling

Pelc - direct

11:41:53 1 component that Cann paper describes.

11:41:57 2 Q. Again, we're just trying to do a little summary
11:42:01 3 before we have to go element by element. On slide 89, you
11:42:05 4 have, it says Dimaxis overview. What's the purpose of this
11:42:09 5 article?

11:42:09 6 A. The Dimaxis was talked about yesterday. It was a
11:42:15 7 software package that Planmeca had for -- that allowed the
11:42:21 8 viewing of images, this is, as was described yesterday as
11:42:26 9 the software system or the viewing system before Romexis.
11:42:32 10 And one of the capabilities of Dimaxis was to display images
11:42:37 11 in color. And that's what's in that inset.

11:42:45 12 And what I am using as a reference is the user
11:42:48 13 manual for Dimaxis and this was published in November 1998.

11:42:54 14 Q. And I believe there is only one claim of the asserted
11:42:57 15 claims, claim seven of the '301 patent that requires color
11:43:01 16 coding. In 1999, before December of 1999, was it known in
11:43:07 17 the art to use color coding to represent digital images?

11:43:13 18 A. Yes, it was known. And it was used at times because
11:43:18 19 our eye is more sensitive to changes in color than to
11:43:22 20 changes in gray levels, so it makes intensity differences or
11:43:28 21 grayscale differences easier to appreciate.

11:43:32 22 Q. Dr. Pelc, can you explain to the jury why there would
11:43:37 23 have been a motivation to combine this Webber dental x-ray
11:43:42 24 equipment with the quantitative densitometry method
11:43:47 25 disclosed in the Cann 1980 article?

Pelc - direct

11:43:50 1 A. Yes. And this is an important step in an obviousness
11:43:54 2 analysis that the person of ordinary skill in the art needs
11:43:59 3 to have, or might have, should have a motivation to combine
11:44:06 4 those references. The two systems that we're talking about
11:44:12 5 use similar x-ray equipment, x-ray sources, electronic
11:44:16 6 detectors, computers, motors. In the case of Webber, we
11:44:24 7 have seen some of the hardware components. In the case of
11:44:27 8 Cann, they're in the GE CT/T 7800 scanner that he used. I
11:44:35 9 also would like to point out that the Webber reference, the
11:44:38 10 one on the left which I'm using first because it's a dental
11:44:43 11 imaging system and a lot is being made of the patents for
11:44:47 12 dentistry, that the Webber paper references and teaches CT.
11:44:51 13 In fact, one of the Hounsfield patents is the first listed
11:45:01 14 patent on the front face of the Webber patent, and it has
11:45:07 15 several other CT references. So it would encourage the
11:45:11 16 person of skill in the art to think about other combinations
11:45:18 17 with CT.

11:45:18 18 Webber, in fact, has a figure of a scanner and
11:45:20 19 describes how CT scanners work.

11:45:22 20 So those are among the things that the person of
11:45:26 21 skill in the art -- I think demonstrates that a person of
11:45:30 22 skill in the art would be encouraged to combine these
11:45:34 23 things.

11:45:37 24 One other thing that I'll mention is that
11:45:42 25 Dr. Webber not only was known for his developments in dental

Pelc - direct

11:45:47 1 imaging, but his work is cited in the medical imaging
11:45:52 2 community as well. Demonstrating that there really isn't a
11:45:59 3 difference between dental imaging and diagnostic or medical
11:46:06 4 imaging when it comes to how the technology works and so on.

11:46:08 5 Q. Dr. Pelc, can you explain to the jury why there would
11:46:12 6 have been a motivation to combine for one of ordinary skill
11:46:15 7 in the art as of December 1999 with the Webber and the
11:46:19 8 Dimaxis?

11:46:22 9 A. Yes, thank you. The Webber -- on the left is a --
11:46:28 10 some of the text from the Webber patent at column 10, lines
11:46:32 11 19 through 26. And Webber says the image may also be
11:46:36 12 projected on to a visual display such as a cathode ray tube
11:46:43 13 screen. And as of 1999, cathode ray tube screens used in
11:46:49 14 computer systems more likely than not were color. But as I
11:46:54 15 also said, use of color, pseudo color we call it in
11:47:00 16 diagnostic imaging or medical imaging was known as evidenced
11:47:05 17 by the Dimaxis system and user manual.

11:47:12 18 MS. PESCHEL: Your Honor, as a logistical issue
11:47:15 19 I'm about to start an element-by-element analysis. Would
11:47:18 20 you like me to continue?

11:47:20 21 THE COURT: No, I think this is probably a good
11:47:22 22 time to break for lunch. As long as the lawyers have
11:47:25 23 provided lunch appropriately on a timely basis. They have.
11:47:30 24 It's confirmed your lunch is ready, ladies and gentlemen.

11:47:32 25 So we'll take a forty-minute recess for lunch as

Pelc - direct

11:47:37 1 we previously have. We're in recess.

11:47:42 2 COURT CLERK: All rise.

11:47:43 3 (Jury leaving the courtroom at 11:47 a.m.)

11:48:10 4 THE COURT: Thank you for remaining standing.

11:48:15 5 We're in recess.

11:48:16 6 (A luncheon recess was taken.)

12:33:57 7 THE COURT: Please be seated. So during the
12:34:03 8 luncheon break some of the jurors were asking questions
12:34:07 9 about when we would be finished with the evidence, et
12:34:09 10 cetera. I would like to tell them as a group that we are
12:34:11 11 confident that we will submit this before the close of
12:34:15 12 business on Friday. Is that fair?

12:34:19 13 MR. OSTROW: Yes, Your Honor.

12:34:20 14 MS. PESCHEL: Yes, Your Honor.

12:34:21 15 THE COURT: I will tell them that now. Because
12:34:23 16 that's what we've told them from the beginning. And they
12:34:26 17 like us to confirm that. And then that means they may have
12:34:30 18 to come back on Monday, pretty much a guarantee we don't
12:34:31 19 give it to them by the close of business on Friday. If you
12:34:40 20 bring the jury out, Ms. Grimes.

12:34:52 21 (Jury entering the courtroom at 12:34 p.m.)

12:35:10 22 THE COURT: Please be seated, ladies and
12:35:12 23 gentlemen. Ladies and gentlemen of the jury, during the
12:35:14 24 lunch time I had some inquiries as to whether the lawyers
12:35:18 25 would be finished with the trial. It's our anticipation

Pelc - direct

12:35:21 1 that we will have the matters submitted to you for your
12:35:24 2 decision by Friday. The question is whether -- how late on
12:35:29 3 Friday afternoon it will be. But there is no question that
12:35:32 4 all the evidence will be presented and we'll give this
12:35:36 5 matter to you for your deliberation on Friday. But if it's
12:35:40 6 too late in the afternoon, you're going to have to come back
12:35:43 7 on Monday, okay. And that is kind of what we thought at the
12:35:47 8 very beginning but I just wanted to confirm that with you
12:35:50 9 and I have confirmed that with the lawyers as well.

12:35:53 10 Right now, Dr. Pelc is still on the stand. If
12:35:57 11 you would come forward, doctor. You may proceed,
12:36:24 12 Ms. Peschel.

12:36:25 13 MS. PESCHEL: Thank you, Your Honor.

12:36:26 14 BY MS. PESCHEL:

12:36:26 15 Q. Mr. Herndon, may we pull up slide 92 of the
12:36:32 16 demonstratives. PDX-4.

12:36:34 17 Dr. Pelc, we were just about to get into your
12:36:38 18 element by element analysis of invalidity with respect to
12:36:41 19 the first combination that you mentioned. I want to start
12:36:42 20 and maybe shortcut a little bit by giving some words that we
12:36:52 21 can use to describe these various claim elements.

12:36:54 22 So, is it okay with you if we call the
12:36:58 23 controller and computer requirement that and we're referring
12:37:01 24 to the '301 patent, a controller with a microprocessor and
12:37:05 25 memory device connected to the microprocessor with respect

Pelc - direct

12:37:08 1 to the '262 patent, a computer including a digital memory
12:37:12 2 storing patient densitometry information and an input and
12:37:15 3 output and with respect to the '374 patent a controller with
12:37:18 4 a microprocessor and a memory device connected to the
12:37:20 5 microprocessor?

12:37:21 6 A. Yes, that would be fine.

12:37:24 7 Q. So what are you showing on slide 93?

12:37:27 8 A. So this is figures and texts from the Webber patent
12:37:34 9 showing the computer, it's saying that it's, for example, a
12:37:39 10 mini computer, it has a controller, it has memory, it has
12:37:44 11 input and output devices.

12:37:48 12 Q. Would that have had a microprocessor?

12:37:50 13 A. Yes.

12:37:52 14 Q. Dr. Pelc, do those disclosures meet the structural
12:37:56 15 requirement for the controller and computer required by the
12:37:59 16 Osseo patent claims?

12:38:00 17 A. Yes.

12:38:00 18 Q. We can check those off as disclosed?

12:38:03 19 A. Yes.

12:38:03 20 Q. Another element is an input device, specifically for
12:38:07 21 the '301 patent an input device connected to the
12:38:10 22 microprocessor for the '262 patent, an input, and for the
12:38:13 23 '374 patent, an input device connected to the
12:38:17 24 microprocessor. Can we call those an input device?

12:38:20 25 A. Sure.

Pelc - direct

12:38:20 1 Q. Where in Webber is an input device disclosed. I'm
12:38:25 2 showing slide 96?

12:38:26 3 A. Sure. And for the benefit of the jurors, they can
12:38:30 4 put the input device here can be the detector array which is
12:38:36 5 providing data or the keyboard or what have you, you have
12:38:40 6 the detector array there providing input.

12:38:43 7 Q. And you're showing figures 7 and 8?

12:38:46 8 A. Figures 7 and 8 and then from the text at column 10,
12:38:51 9 10 to 26, the signals from the detector array may be stored
12:38:55 10 in the controller, again making it clear that the controller
12:38:58 11 also has memory.

12:39:00 12 Q. And in your opinion does that meet the requirement
12:39:04 13 for an input or input device for the claims of the Osseo
12:39:08 14 patent?

12:39:08 15 A. Correct.

12:39:09 16 Q. Dr. Pelc, there is element called a positioning motor
12:39:14 17 specifically in the '301 patent, a positioning motor
12:39:17 18 connected to the microprocessor and moveable in response to
12:39:19 19 and from said microprocessor, and in the '374 patent, a
12:39:23 20 positioning motor connected to the microprocessor and
12:39:25 21 responsive to commands from said microprocessor, can we call
12:39:28 22 that a positioning motor for the rest of your testimony?

12:39:31 23 A. Yes. And the court has noticed that there is a word
12:39:35 24 missing here between to and from, and the court has said
12:39:41 25 that's signals.

Pelc - direct

12:39:42 1 Q. Thank you. Moving to slide 99, Dr. Pelc. What are
12:39:47 2 you showing with respect to Webber regarding positioning
12:39:51 3 motors?

12:39:51 4 A. So you see the positioning motor, it rotates that C
12:39:56 5 arm in figure 5. In Figure 7 from Webber, you see the motor
12:40:03 6 is connected to the controller. And you see text from
12:40:09 7 column 7, 10 to 17. And it says that the -- for
12:40:18 8 electronically controlling x-ray generation, by x-ray source
12:40:24 9 and the rotation of the motor.

12:40:32 10 Q. In your opinion, does Webber disclose the positioning
12:40:32 11 motor elements required by the '301 and '374 patent?

12:40:36 12 A. Yes.

12:40:37 13 Q. Moving to slide 101, Dr. Pelc, each of these patent
12:40:43 14 claims has some element or requirement for x-ray equipment,
12:40:48 15 specifically for the '301 patent, x-ray equipment including
12:40:52 16 an x-ray source and a detector array?

12:40:54 17 A. Yes.

12:40:55 18 Q. For the '262 patent a dental or orthopedic input
12:41:00 19 device including an energy source and an energy sensor, said
12:41:03 20 source and said sensor being placed with at least a portion
12:41:06 21 of the patient's dental or orthopedic structure there
12:41:09 22 between, said sensor transferring signals to the computer
12:41:12 23 input and said signals representing densitometry of the
12:41:15 24 patient's dental or orthopedic structure, and x-ray
12:41:18 25 equipment including an x-ray source, a detector array and a

12:41:23 1 restricted beam device for the '374 patent?

12:41:26 2 Q. Can we treat all of these devices together using the
12:41:30 3 term x-ray equipment?

12:41:31 4 A. Sure.

12:41:31 5 Q. Can you explain to us and maybe start with slide 1 or
12:41:34 6 2 wherein Webber the x-ray equipment requirements are met?

12:41:39 7 A. This is Figure 5 from Webber, and it says that there
12:41:42 8 is an x-ray source, this is numeral 32, and 43 is a
12:41:50 9 collimator which is a restricted beam device as we've
12:41:54 10 described. And Webber has arrays of detectors and the text
12:42:01 11 at column five, lines 24 to 30, you see collimated x-ray
12:42:10 12 source, a detector, such as a vertical, linear charge
12:42:12 13 coupled device array. And that's the detector.

12:42:21 14 Q. Looking at slide 102, what are you showing here?

12:42:22 15 A. This is an alternate detector in Webber, in the page
12:42:28 16 of the patent it's just below this, to make it clear that an
12:42:33 17 alternative embodiment of this, instead of a set of vertical
12:42:38 18 lines, you could just make a whole big 2D array of detector
12:42:50 19 pixels and put that here.

12:42:50 20 Q. And then in slide 103, what are you showing with
12:42:52 21 these references to x-ray equipment in Webber?

12:42:52 22 A. This is again showing the x-ray source collimated to
12:43:03 23 make five vertical lines of x-ray hitting the the detector
12:43:07 24 array. And that they rotate in a horizontal plane.

12:43:14 25 Q. What is in column seven lines 49 to 66 of Webber

12:43:21 1 regarding x-ray equipment?

12:43:22 2 A. Well, it describes that these six vertical lines of
12:43:28 3 x-rays are produced from a single source, so it's a single
12:43:32 4 source using a six-way collimator and then a vertical
12:43:36 5 detector array having a plurality, here six, of linear
12:43:42 6 detector arrays, and also as shown is the rotation, I guess
12:43:49 7 that's this arrow here, that this thing can rotate around
12:43:53 8 the patient.

12:43:54 9 Q. And again, that's rotating around the head and neck
12:43:58 10 region of the patient?

12:43:59 11 A. That's right. That's right.

12:44:00 12 Q. And Dr. Pelc, you mentioned that there is a six-way
12:44:04 13 collimator. How is that relevant to the claim limitations?

12:44:09 14 A. The claim limitation that I think one of them talks
12:44:13 15 about a restricted beam device and so it's restricting the
12:44:17 16 beam, the collimator is doing the restricting.

12:44:21 17 Q. Moving from slide 103 to 104, what is your opinion as
12:44:25 18 to whether Webber discloses the x-ray equipment requirements
12:44:30 19 of the Osseo claim?

12:44:31 20 A. It does.

12:44:32 21 Q. All right. Dr. Pelc, I next want to look at the
12:44:35 22 claim limitations for converter and conversion means. In
12:44:38 23 the '301 patent it requires a conversion means for
12:44:42 24 converting a signal from said detector array, said
12:44:45 25 conversion meanings being connected to said detector array

Pelc - direct

12:44:49 1 and to said microprocessor. And for the '374 patent, it
12:44:52 2 requires a convertor for converting a signal from said
12:44:57 3 detector array, said converter being connected to said
12:45:01 4 detector array and to said microprocessor and we refer to
12:45:04 5 those as the conversion means and the converter requirement?

12:45:08 6 A. Yes.

12:45:09 7 Q. Moving from 105 to 106, Dr. Pelc where is there
12:45:15 8 conversion means or a convertor?

12:45:17 9 A. The Court has construed conversion means to be a
12:45:25 10 analog to digital convertor, it's inside the detector array.
12:45:27 11 That's a conversion means, a converter is something that
12:45:31 12 somehow transforms signal here it says transforming means
12:45:36 13 to, in order to convert the signal from one to the other and
12:45:41 14 Webber is describing this transform step here in his block
12:45:47 15 diagram as being a converter. There is also a converter,
12:45:53 16 this is a display converter that's basically an interface
12:45:57 17 between the controller and the display device. So those are
12:46:02 18 all converters. And there is a conversion means in the
12:46:05 19 detector.

12:46:11 20 Q. So is it your opinion that the converter in
12:46:14 21 conversion means requirement of the asserted claims are met
12:46:18 22 by the claims disclosed in Webber?

12:46:20 23 A. Yes.

12:46:20 24 Q. Moving from slides 107 to 108, Dr. Pelc, there are
12:46:24 25 also requirements for an outlet device, sometimes it's

Pelc - direct

12:46:27 1 called a display color monitor, for example in the '301
12:46:32 2 patent claim one it says an output device connected to said
12:46:35 3 microprocessor. In claim seven, it refers to an output
12:46:38 4 device includes a color monitor adapted to receive said
12:46:43 5 tomographical densitometry model output color coded to
12:46:47 6 represent densitometry. Can we refer to those as an output
12:46:50 7 device?

12:46:50 8 A. Yes.

12:46:50 9 Q. And then in the '262 patent it says an output device
12:46:54 10 connected to said computer output and communicating
12:46:57 11 densitometry model comparison information, and then in the
12:47:00 12 '374 patent, claim one, it requires an output device
12:47:04 13 connected to said microprocessor, can we also refer to those
12:47:12 14 takes an output device?

12:47:12 15 A. Yes.

12:47:12 16 Q. Dr. Pelc, moving from slide 108 to 109, where are
12:47:15 17 Webber are there disclosed output devices?

12:47:19 18 A. Webber has a, we talked about it earlier, it has a
12:47:22 19 visual display such as a cathode ray tube, that's numeral
12:47:25 20 54, you can see it here in the drawings in figures 7 and 8.

12:47:32 21 Q. Are there any disclosures in Webber that were
12:47:35 22 relevant to your obviousness analysis?

12:47:42 23 A. Webber says display 54 the design of these elements
12:47:45 24 are are well-known to those having skill in the art. I
12:47:48 25 agree with that completely.

Pelc - direct

12:47:50 1 Q. Dr. Pelc, with respect to claim seven of the '301
12:47:53 2 patent, the claim language says that the output device
12:47:56 3 includes the color monitoring adapted to receive said
12:48:00 4 tomographical densitometry model output color coded to
12:48:05 5 represent densitometry. Does Webber have an explicit
12:48:10 6 description of color coding output?

12:48:12 7 A. Webber does not have an explicit one, it says the
12:48:15 8 display can be a cathode ray tube which as I mentioned
12:48:19 9 earlier more likely than not was a color display. But just
12:48:22 10 to make sure, make it clear, we can bring in the Planmeca
12:48:28 11 Dimaxis imaging software manual which teaches the -- how one
12:48:34 12 does pseudo color coding in order to apply that pseudo color
12:48:40 13 to grayscale image.

12:48:42 14 Q. Dr. Pelc, does this combination teach all of the
12:48:45 15 output device elements required by the Osseo patent claims?

12:48:49 16 A. Yes.

12:48:49 17 Q. So we can check those off?

12:48:51 18 A. Yes.

12:48:54 19 Q. All right. Dr. Pelc, in the '262 patent there is an
12:49:02 20 element that's not present in the other claims. It says
12:49:02 21 imaging software associated with said computer. Can we just
12:49:05 22 refer to that as imaging software?

12:49:09 23 A. Yes.

12:49:09 24 Q. Where in this Webber reference does it disclose
12:49:13 25 imaging software?

Pelc - direct

12:49:14 1 A. In many places, but you see some of that highlighted
12:49:19 2 here in text from Webber at various places, like the
12:49:25 3 computer can be used to render the image of a particular
12:49:31 4 structure of interest in proper focus, that's related to the
12:49:35 5 reconstruction that the computer is doing in the Webber
12:49:39 6 panoramic imaging. This means can it can have a
12:49:45 7 deconvolution algorithm which is computer algorithms,
12:49:50 8 software to synthesize true three dimensional representation
12:49:58 9 of the tissue, existing software have demonstrated that
12:50:07 10 tomosynthetic data can be processed into any desired two
12:50:07 11 dimensional projection, known tomosynthetic enhancement
12:50:12 12 techniques may be used, including computer core recollection
12:50:16 13 of artifacts, all of those are algorithm imaging software.

12:50:20 14 Q. Just so the record is clear, Dr. Pelc you were
12:50:23 15 referring on slide 114 to Webber at column 6 line 5464 to
12:50:29 16 67, column 72 to 6, column 89 to 14, column 9, 5 to 10 and
12:50:36 17 25 to 35?

12:50:37 18 A. That's correct.

12:50:38 19 Q. So can we check off the imaging software element as
12:50:41 20 having been met by Webber?

12:50:43 21 A. Yes.

12:50:47 22 Q. Dr. Pelc, all of the claims require densitometry,
12:50:52 23 correct?

12:50:53 24 A. That's correct.

12:50:53 25 Q. And we've discussed that this morning so if it's okay

Pelc - direct

12:50:56 1 with you I'm just going to refer to everything highlighted
12:50:59 2 in red as having a densitometry requirement?

12:51:01 3 A. That's right.

12:51:04 4 Q. Now, on slide 117, I notice that you're making
12:51:08 5 reference too the Cann 1980 article. Can you explain that?

12:51:11 6 A. Yes. So by itself, Webber is not densitometry as the
12:51:16 7 court has construed the claim. So the person of skill in
12:51:24 8 the art would bring in the teaching from the Cann reference
12:51:26 9 to calculate the mineral equivalent for each vertebra in
12:51:31 10 terms of milligrams per milliliter of bone mineral,
12:51:41 11 potassium hydroxy.

12:51:41 12 Q. You were referring to slide 17 an excerpt from the
12:51:44 13 Cann 1980 article, page 495?

12:51:47 14 A. That's correct, yes. And just to guide the jury,
12:51:50 15 this line indicates that this slice, it's at that location,
12:51:58 16 and also to remind you these are the cross-sections of the
12:52:02 17 known standards that are used to calculate the bone mineral
12:52:09 18 equivalent.

12:52:09 19 Q. Dr. Pelc, what else is disclosed in the Cann 1980
12:52:13 20 article regarding densitometry?

12:52:17 21 A. So Cann in addition to describing the computed
12:52:27 22 tomography method validated, show the density and
12:52:33 23 reproducibility of the method. So you see that there, that
12:52:41 24 the data obtained in these five studies provided independent
12:52:48 25 information about the density and positioning

12:52:50 1 reproducibility of the expected variation in the CT number
12:52:54 2 of calibration materials.

12:52:59 3 Q. Dr. Pelc, would it have been difficult for a person
12:53:02 4 of ordinary skill in the art as of December of 1999 to take
12:53:07 5 the quantitatively calculated computed tomography method of
12:53:11 6 the Cann 1980 article and applied it to the equipment that
12:53:15 7 we described for Webber?

12:53:18 8 A. The person of skill in the art would understand how
12:53:20 9 to combine those references into a single system.

12:53:24 10 Q. And then moving from slide 118 to 119, Dr. Pelc, the
12:53:29 11 densitometry elements of the Osseo patent claims met by the
12:53:32 12 disclosures in the Cann 1980 article?

12:53:35 13 A. Yes.

12:53:39 14 Q. Then Dr. Pelc in the non-infringement section of your
12:53:42 15 testimony we discussed the various model requirements of the
12:53:45 16 asserted claims. Can we refer to those here as the model or
12:53:49 17 model requirements?

12:53:50 18 A. Yes.

12:53:51 19 Q. And then all require densitometry; correct?

12:53:52 20 A. That's right.

12:53:52 21 Q. Can you explain to the jury wherein Webber there is
12:54:00 22 any description of these modeling requirements?

12:54:05 23 A. So Webber is a tomosynthesis system that produces
12:54:13 24 multiple slices and he says how to produce the, a three
12:54:19 25 dimensional model from it. Like here you see a true three

12:54:24 1 dimensional representation of tissues. At column eight
12:54:30 2 lines 9 to 14. And it says that the process signals may be
12:54:36 3 transferred to a remote computer for remote analysis or
12:54:39 4 viewing. The image may also be projected on a visual
12:54:44 5 display such as a cathode ray tube, that remote computer can
12:54:50 6 process signals, do comparisons and the like.

12:54:54 7 Q. Okay. And now I believe I heard you earlier say that
12:54:58 8 Webber couldn't do densitometry and that's why we -- that's
12:55:01 9 why a person of ordinary skill in the art might look to the
12:55:04 10 Cann 1980 article. Could the same thing in terms of the
12:55:10 11 densitometry requirement of the modeling claims?

12:55:12 12 A. Yes, absolutely.

12:55:14 13 Q. Claim limitation.

12:55:16 14 So is it fair to say that in this example
12:55:19 15 combination you're giving for obviousness that the model
12:55:24 16 requirements are met?

12:55:24 17 A. Yes.

12:55:34 18 Q. Dr. Pelc, I believe this may be the last limitation
12:55:37 19 that we're walking through as an example there are a couple
12:55:41 20 --

12:55:42 21 A. I'm sorry, can I back up.

12:55:43 22 Q. Absolutely?

12:55:44 23 A. There is another component that's needed in the
12:55:47 24 modeling claim and that is merging information. And one of
12:55:50 25 the things that is in common is the use of dual energy for

12:55:56 1 his bone mineral method, although we haven't talked about
12:55:59 2 it, there is a description in Cann of using dual energy CT
12:56:04 3 for producing his bone mineral estimates. The combining of
12:56:11 4 the two individual energy data sets of Cann to produce the
12:56:17 5 model is the real merging of multiple tomographic data sets
12:56:23 6 that the claim calls for.

12:56:27 7 Q. Moving from slide 122 to 123, I believe the last set
12:56:33 8 of limitations are storing and comparing model requirements,
12:56:38 9 for example the '301 patent has a means for storing,
12:56:42 10 preexisting tomographic dental orthopedic densitometry
12:56:46 11 model, the '262 patent requires said computer creating
12:56:50 12 storing and comparing the three dimensional digital
12:56:54 13 densitometry model without the use of fiducial markers of
12:56:59 14 patient dental structure and the output device connected to
12:57:03 15 said computer output communicating densitometry model
12:57:06 16 comparison information?

12:57:07 17 A. The '374 patent also requires the controller to be
12:57:11 18 adapted for storing and in claim six of the '374 patent,
12:57:14 19 adapted to compare. Can we generally refer to those as the
12:57:18 20 storing and comparing limitations?

12:57:20 21 A. Yes.

12:57:22 22 Q. Where in Webber does it disclose either storing or
12:57:26 23 comparing?

12:57:28 24 A. So in this text that I think we saw earlier, the
12:57:32 25 signals of the detector array may be stored in the

12:57:33 1 controller. So the controller has storage. And then --

12:57:39 2 Q. I'm sorry, let me go back just to 124. Just so we
12:57:44 3 know what you were pointing to. On the right is from
12:57:48 4 Webber, column ten, lines 10 to 23?

12:57:51 5 A. Yes. Yes.

12:57:53 6 Q. All right. And then what are you showing on slide
12:57:56 7 125?

12:57:56 8 A. Then in 125, this is from Webber at column 9, 5 to
12:58:01 9 10. Tissue changes can be quantitatively obtained, tissue
12:58:04 10 changes just to emphasize the word changes, can be
12:58:11 11 quantitatively obtained from careful comparison of existing
12:58:14 12 panoramic radiographs and those produced according to the
12:58:21 13 present invention, so the prior and the current.

12:58:24 14 Q. And then on slide 126, this is referencing again the
12:58:31 15 Cann 1980 article at joint Exhibit 5. What are you showing
12:58:34 16 here?

12:58:35 17 A. Yes. I talked about this earlier, so these are the
12:58:38 18 images from Cann that we saw before. And the table where he
12:58:41 19 reported not only Hounsfield Unit values for the three
12:58:44 20 vertebrae at three points in time, but also the mineral
12:58:51 21 content, that is the bone mineral density or bone density
12:58:54 22 quantitatively calculated at three points in time, allowing
12:59:01 23 a comparison, but in addition, Cann says the coefficient of
12:59:04 24 variations for calculated mineral content normalized to the
12:59:11 25 calibration solutions, that's his term for the standard is

Pelc - direct

12:59:20 1 2.8, and then similarly that's for the mineral content. And
12:59:33 2 then in addition, an interesting thing that they did is they
12:59:33 3 used two different GE 7800 scanners and they looked to see
12:59:39 4 how similar were the results for the same bones on two
12:59:42 5 different machines. And they said that that variation among
12:59:49 6 the two machines was less than two percent. So this is
12:59:55 7 quantitative comparison of the densitometry models.

13:00:02 8 Q. Dr. Pelc, is it your opinion that the combination of
13:00:05 9 Webber and Cann discloses the storing and comparing model
13:00:09 10 limitations of the Osseo patents?

13:00:11 11 A. Yes.

13:00:14 12 Q. And then as I'm showing on your slide 128, is it your
13:00:19 13 opinion that the -- we have walked through each of the
13:00:23 14 elements of the Osseo claims?

13:00:24 15 A. Yes.

13:00:26 16 Q. So in the combination of Webber and Cann, and with
13:00:31 17 respect to claim seven of the '301 patent, the Dimaxis user
13:00:36 18 manual are all the elements disclosed?

13:00:39 19 A. Yes.

13:00:39 20 Q. Did the combination of the Webber and Cann teachings
13:00:44 21 lead to predictable results?

13:00:45 22 A. Absolutely.

13:00:45 23 Q. Why?

13:00:46 24 A. Because there is nothing surprising about what the
13:00:51 25 combination would do, it would produce tomographic volume

13:00:53 1 data in that -- from which one can calculate quantitatively
13:00:59 2 bone mineral density and the -- there is nothing surprising
13:01:05 3 in the combination.

13:01:07 4 Q. What is your opinion as to whether this combination
13:01:10 5 of references renders obvious the claims of the Osseo
13:01:13 6 patents?

13:01:13 7 A. I believe it does.

13:01:20 8 Q. Dr. Pelc, I believe you mentioned the second
13:01:22 9 combination. What are the references that you're going to
13:01:25 10 use in in second combination?

13:01:27 11 A. The Guenther patent that we talked about, the Mazess
13:01:31 12 patent that we will describe briefly and this paper that is
13:01:33 13 being called Fontevraud.

13:01:36 14 Q. Let's discuss the Guenther patent first because we
13:01:40 15 have already touched on it. So I'm showing on slide 131 the
13:01:44 16 Guenther patent which is Defense Exhibit 8. Can you tell us
13:01:48 17 when it was filed, when it was issued?

13:01:50 18 A. It was filed February 1, 1995, and issued March 19th
13:01:55 19 of 1996.

13:01:58 20 Q. Did the Patent Office have this Guenther patent
13:02:00 21 before it considered the Osseo patents?

13:02:02 22 A. I believe it did.

13:02:04 23 Q. The;884 patent?

13:02:08 24 A. Can we look at the front.

13:02:12 25 Q. Sure. If you turn to Tab 1, I believe?

Pelc - direct

13:02:21 1 Q. Actually it's not tab one, can you turn to Tab 7 of
13:02:24 2 your binder there is JX-1 which is the '301 patent?

13:02:28 3 A. Thank you. I'm sorry, so the Massie patents cite two
13:02:43 4 other Guenther patents but not this one.

13:02:45 5 Q. Dr. Pelc, can you explain what the Guenther patent
13:02:51 6 title means?

13:02:58 7 A. Yes, the title of the patent is dental x-ray
13:03:03 8 diagnostic installation for producing panoramic x-ray
13:03:04 9 exposures of the skull of a patient.

13:03:07 10 Q. What is Guenther doing here?

13:03:08 11 A. So it's a dental panoramic machine with particular
13:03:15 12 features.

13:03:17 13 Q. Dr. Pelc, I'm going to draw your attention to Tab 36
13:03:20 14 of your second binder.

13:03:24 15 A. Yes.

13:03:26 16 Q. What is that?

13:03:27 17 A. That's a -- the Mazess '445 patent, DX-7.

13:03:35 18 Q. Did you use that in your invalidity analysis?

13:03:38 19 A. Yes, I did.

13:03:40 20 MS. PESCHEL: Your Honor, I would like to offer
13:03:42 21 into evidence defendants Exhibit 7.

13:03:45 22 THE COURT: Any objection to seven?

13:03:46 23 MR. OSTROW: No objection.

13:03:48 24 THE COURT: DX-7 is received.

13:03:49 25 (DX Exhibit No. 7 was admitted into evidence.)

Pelc - direct

13:03:50 1

BY MS. PESCHEL:

13:03:54 2

Q. Dr. Pelc, we're showing DX-7 on the screen. Can you

13:03:57 3

let us know what the dates of this patent filing and

13:04:02 4

issuance were?

13:04:06 5

A. Yes the patent itself was filed on December 1, 2000,

13:04:11 6

but claims priority to March 30, 1999.

13:04:25 7

Q. And that's in the related U.S. application data?

13:04:29 8

A. Right here.

13:04:29 9

Q. Can you explain what a division is?

13:04:33 10

A. Yes, I'm not a lawyer but my understanding of

13:04:37 11

divisions is an inventor submits a patent and the Patent

13:04:41 12

Office says your claims are in different fields, you have to

13:04:45 13

divide the patent and choose one or the other. And correct

13:04:49 14

me if I'm wrong, so a division, a division of that would be

13:04:53 15

the specification but with a different set of claims.

13:05:07 16

Q. Did the Patent Office consider the Mazess '445 patent

13:05:11 17

when it was looking at Osseo's patent claims?

13:05:15 18

A. No.

13:05:19 19

Q. Who was Richard Mazess?

13:05:23 20

A. Richard Mazess is the Mazess I talked about earlier,

13:05:27 21

he was my under graduate research advisor.

13:05:31 22

Q. Just for the record, the number of this patent --

13:05:35 23

A. He's still alive.

13:05:39 24

Q. The number of this patent is U.S. patent number

13:05:43 25

6315;445; correct?

Pelc - direct

13:05:31 1

A. Yes.

13:05:31 2

Q. All right. And then if you could turn to Tab 37 in your binder.

13:05:37 3

13:05:38 4

A. Yes.

13:05:45 5

Q. What is this document?

13:05:47 6

A. This is a paper presented at the conference in

13:05:54 7

Fontevraud, France by Genant and Cann and others and it's

13:06:00 8

JX-0008.

13:06:04 9

MS. PESCHEL: Your Honor, I would like to move

13:06:06 10

into evidence joint Exhibit 8.

13:06:08 11

THE COURT: Any objection to eight?

13:06:10 12

MR. OSTROW: No objection.

13:06:11 13

THE COURT: JX-8 is received.

13:06:14 14

(JX Exhibit No. 8 was admitted into evidence.)

13:06:15 15

BY MS. PESCHEL:

13:06:17 16

Q. Now, Dr. Pelc, you mentioned that this patent came

13:06:21 17

out of a workshop. Can you explain that a little bit more?

13:06:24 18

A. Sure. A workshop is like a conference, tends to be

13:06:29 19

more interactive and researchers come together to share

13:06:32 20

ideas and results. And this happens to be a workshop on

13:06:36 21

bone and soft tissue densitometry using computed tomography.

13:06:42 22

And you'll see it's actually the further one. There were

13:06:52 23

presumably three before this. It was held in the,

13:06:52 24

Fontevraud, France in 1964 and this is from the published

13:07:02 25

proceedings which are publishing of the abstracts of the

13:07:04 1 research that was presented there. It actually appeared in
13:07:08 2 this journal, the journal of computer assisted tomography in
13:07:13 3 1985.

13:07:14 4 Q. If we could zoom out a little bit, Mr. Herndon. Who
13:07:17 5 were the authors on this article?

13:07:20 6 A. So the first two authors, they'll be listed here, are
13:07:30 7 Genant and Cann, who we've talked about. They were the same
13:07:36 8 two people who were the authors of the Cann 1980 paper, with
13:07:40 9 a few other collaborators who were involved at the
13:07:44 10 department of radiology at the University of California at
13:07:48 11 San Francisco.

13:07:52 12 Q. So we were showing the jury the actual references,
13:08:00 13 and I just want to take a step back and talk about just an
13:08:04 14 overview of each of those.

13:08:06 15 Now, Mazess is titled densitometry adapter for
13:08:10 16 compact x-ray fluoroscopy machine. What kind of
13:08:15 17 densitometry was disclosed in this patent?

13:08:16 18 A. So one of the goals of the Mazess patent is to take
13:08:21 19 an existing fluoroscopy system which is shown here and use
13:08:24 20 it for densitometry. And he does this using dual energy.

13:08:32 21 Q. And then on slide 133 with respect to Fontevraud,
13:08:37 22 it's titled bone and soft tissue densitometry using computed
13:08:42 23 tomography. What kind of densitometry is disclosed in this
13:08:44 24 article?

13:08:45 25 A. Yes. This is using the same technique that was shown

Pelc - direct

13:08:49 1 in the previous paper, but on a different scanner, they're
13:08:55 2 now using a newer model, the GE 9800 scanner, and you see
13:09:01 3 images both this lateral x-ray like image and a
13:09:05 4 cross-section, and here are the standards of the patient.
13:09:10 5 And it reported -- it's an update of the report, of the
13:09:16 6 research that they've conducted on quantitatively calculated
13:09:21 7 tomography for bone mineral determination. Among the things
13:09:24 8 that the paper reports is that the method has by then
13:09:32 9 implemented, been implemented at 150 sites. And as I
13:09:38 10 mentioned, at their cite they used a GE 9800 scanner to
13:09:38 11 determine bone mineral density in milligrams per cubic
13:09:43 12 centimeter.

13:09:43 13 Q. Do you have any experience with the GE 9800 scanner?

13:09:47 14 A. Quite a bit. That's the scanner that I helped design
13:09:50 15 when I was at GE.

13:09:53 16 Q. And in the Fontevraud article did they determine bone
13:09:59 17 density in milligrams per cubic centimeter?

13:10:03 18 A. Yes, they did.

13:10:04 19 Q. Dr. Pelc what are you showing on slide 134?

13:10:07 20 A. So on the right is the text from the Fontevraud paper
13:10:13 21 and it says recent improvements in CT scanner technology
13:10:19 22 with the GE CT 9800 scanner have produced increased
13:10:25 23 precision and reduced radiation exposure. And this is the
13:10:29 24 picture of the 9800, gantry the patient goes into the
13:10:35 25 opening and the operator console of the scanner.

Pelc - direct

13:10:38 1 Q. And now the portion of Fontevraud that you read or
13:10:45 2 pointed to on page 602 says recent improvements. How recent
13:10:49 3 was that in our timeline?

13:10:51 4 A. Well, this was presented in 1984, and -- well, so
13:10:59 5 it's not recent compared to 1999. I would say the 9800 had
13:11:04 6 been out for a year or so.

13:11:08 7 Q. Dr. Pelc, what motivation would a person of ordinary
13:11:11 8 skill in the art prior to 1999 have to combine these
13:11:15 9 references?

13:11:15 10 A. Much like what we talked about with the previous
13:11:19 11 combination, the hardware are the same sort of components.
13:11:24 12 All of them use electronic detectors. They all have
13:11:31 13 computers. And these are the same field that dental imaging
13:11:34 14 and the body imaging fields are the same. And there is no
13:11:39 15 unexpected results.

13:11:40 16 Q. Are you aware of anything in the art that suggested
13:11:45 17 you cannot do tomography modeling in dentistry in noon 99?

13:11:50 18 A. No, in fact as we already saw it had already.

13:11:52 19 Q. Are you aware of anything that would suggest you
13:11:55 20 could not combine the teachings of the tomography reference
13:11:57 21 regarding the structure of an imaging device with those of a
13:12:00 22 densitometry reference like Mazess?

13:12:02 23 A. No.

13:12:04 24 Q. Would the knowledge of one of skill in the art have
13:12:07 25 contributed to the motivation to combine these references?

Pelc - direct

13:12:10 1 A. Certainly, because a person of skill in the art would
13:12:12 2 know about these machines, a person of skill in the art, as
13:12:18 3 long as the publications are in her or his field, is
13:12:23 4 familiar with them.

13:12:26 5 Q. Dr. Pelc, what motivation would a person of ordinary
13:12:29 6 skill in the art prior to 1999 have to combine the scanning
13:12:36 7 device of Guenther with the calculations in densitometry
13:12:36 8 techniques taught in Fontevraud?

13:12:38 9 A. Yeah. This is an interesting additional motivation
13:12:41 10 to combine. The motivation that's in Mazess is let's take
13:12:47 11 an existing device and modify it, primarily with software
13:12:51 12 but not entirely to do new things without greatly impacting
13:12:56 13 the footprint and other things about this. So the
13:13:01 14 combination would entail replacing the detector in Guenther
13:13:06 15 with an area detector which by 1999 were widely available,
13:13:11 16 and then changing the software that controls the x-ray
13:13:17 17 exposure and the way the signals are processed.

13:13:23 18 Q. And then at slide 137, you have an excerpt from
13:13:28 19 Fontevraud at page 604. What is the purpose of referencing
13:13:34 20 the excerpt?

13:13:39 21 A. This is from the writing by Genant and Cann
13:13:41 22 colleagues, they say that many of the advanced CT scanners
13:13:45 23 worldwide may be modified for quantitative CT measurements
13:13:50 24 at relatively little cost. They're telling you this is easy
13:13:53 25 to implement.

13:13:57 1 Q. Alright, Dr. Pelc. It's now the point in time where
13:14:00 2 we need to walk through each element and show where it's met
13:14:04 3 in the references. Would it be okay if we used the same
13:14:08 4 nomenclature that we used for the other combinations to kind
13:14:12 5 of shortcut that a little bit for the jury?

13:14:15 6 A. I think that would be a good idea.

13:14:17 7 Q. With the respect to the controller and computer
13:14:20 8 requirements, where are those disclosed in Guenther as shown
13:14:23 9 on slide 139?

13:14:24 10 A. So you see in Figure 7 of Guenther, there is a
13:14:29 11 control unit numeral 36. There is a computer that includes
13:14:31 12 the display device at, I think the computer is numeral eight
13:14:41 13 and the display screen is 48.

13:14:47 14 Q. And then on slide 140, it appears you have some
13:14:50 15 excerpts from the Mazess patent, Mazess '445. What are you
13:14:55 16 showing here?

13:14:57 17 A. So this is the, in Figure 6 of Mazess, you see the
13:15:02 18 computer that's controlling things. And has the ability to
13:15:08 19 do image processing. And the Mazess says the computer
13:15:14 20 contained in the shelf on the cart, I guess is pointing to a
13:15:18 21 different image. In any case, there is a computer 22.

13:15:22 22 Q. Dr. Pelc, what is your opinion as to whether the
13:15:26 23 controller and computer requirements of the Osseo patent
13:15:29 24 claims are met by by these references?

13:15:32 25 A. They are met.

Pelc - direct

13:15:35 1 Q. Now, the next element that we discuss was input
13:15:39 2 device. Wherein Guenther is there a disclosure of input
13:15:43 3 devices?

13:15:44 4 A. There is an input device here in the keyboard of the
13:15:47 5 computer on Figure 8 on the right and in Figure 7 you see
13:15:51 6 position sensors that are sending to the control unit the
13:15:56 7 computer information about the position of the various
13:16:00 8 things that are being controlled by the motors, or moved by
13:16:03 9 the motors.

13:16:04 10 Q. And as I move from slide 142 to 143, Dr. Pelc, does
13:16:11 11 Mazess also disclose an input device?

13:16:13 12 A. Yes, in addition to the keyboard that's on the lower
13:16:16 13 left, you see the CCD camera that's part of the detector of
13:16:23 14 Mazess and it's connected to the computer, the computer 22
13:16:28 15 through the image processing to do the image processing.

13:16:33 16 Q. What is your opinion as to whether these disclosures
13:16:36 17 are sufficient to meet the input device requirements of the
13:16:40 18 Osseo patent claims?

13:16:41 19 A. My opinion is they're met.

13:16:45 20 Q. All right. Dr. Pelc, another requirement of the
13:16:47 21 Osseo patent claims is for a positioning motor. Which
13:16:50 22 reference in this example combination discloses positioning
13:16:54 23 motors?

13:16:54 24 A. Certainly Guenther has positioning motors as we saw.
13:16:58 25 You see them there in Figure 7 and in the text from column

13:17:02 1 four, lines 54 to 64.

13:17:04 2 Q. Does that positioning motor have a connection to a
13:17:07 3 microprocessor?

13:17:07 4 A. It does. It does and it says that the control unit
13:17:11 5 35 contains control electronics 36 having a microprocessor
13:17:17 6 by means of which four adjustment motors are controlled.

13:17:21 7 Q. Does that mean it's responsive to commands from that
13:17:24 8 microprocessor?

13:17:24 9 A. Yes.

13:17:24 10 Q. Dr. Pelc, what is your opinion as to whether the
13:17:29 11 positioning motor requirements of the Osseo patent claims
13:17:31 12 are met?

13:17:32 13 A. They are met.

13:17:34 14 Q. All right. What about x-ray equipment, wherein
13:17:37 15 Guenther are there disclosures of the required x-ray
13:17:41 16 equipment?

13:17:41 17 A. So in Guenther in this figure you can see the x-ray
13:17:46 18 source here in number five on the right. And the detector
13:17:51 19 array that is in opposite on the other side of the patient.
13:17:52 20 And the x-ray source has a collimator. And it says here it
13:18:00 21 has an x-ray source as well as an x-ray pick up unit six,
13:18:02 22 and that it says further that digital x-ray means, like a
13:18:10 23 CDD line sensor can, can be be used. So it's got digital
13:18:22 24 detectors.

13:18:22 25 Q. In the Guenther device is the patient's dental or

13:18:25 1 orthopedic structure being placed in between the source and
13:18:29 2 the sensor?

13:18:29 3 A. It is.

13:18:30 4 Q. And just for the record, the portions that you were
13:18:34 5 pointing to on slide 147 were from the Guenther patent at
13:18:40 6 Figure 3 and column two, lines 43 to 51?

13:18:45 7 A. That's correct, thank you.

13:18:47 8 Q. Oh slide 148, it appears you have some excerpts for
13:18:50 9 the Mazess patent. What are you showing here?

13:18:52 10 A. Yes. This is from Mazess Figure 6, we can see the
13:18:57 11 detector is here, and the x-ray source --I'm sorry, I
13:19:00 12 shouldn't say here. The detector is 82 and 84. And the
13:19:00 13 x-ray source is 72. And the x-ray sensor is an image
13:19:17 14 intense fire coupled to a CDD camera, so in contrast to the
13:19:23 15 Guenther detector, this is a large area detector.

13:19:28 16 Q. And then on the right of slide 148 you have a column
13:19:33 17 16 lines 1 to 9 you have highlighted x-ray source 322
13:19:37 18 projects a cone beam of x-ray radiation. Why do you have
13:19:42 19 that highlighted?

13:19:42 20 A. Just to emphasize the fact that it has a cone beam.
13:19:46 21 You can also see the cone beam in the drawing. That goes
13:19:54 22 along with that area detector, the image intensifies.

13:19:57 23 Q. Does an x-ray source that produced a cone beam of
13:20:02 24 x-ray radiation require a restricted beam device?

13:20:06 25 A. Yes.

Pelc - direct

13:20:08 1 Q. So Dr. Pelc, is it your opinion that the x-ray
13:20:11 2 equipment requirements are met by the disclosures you just
13:20:21 3 discussed?

13:20:21 4 A. Yes.

13:20:21 5 Q. Moving on to the conversion and converting means
13:20:22 6 requirement on slide 150, you have an excerpt from column
13:20:27 7 two lines 43 of 61 of Guenther. What are you showing here?

13:20:32 8 A. Yes, as I read earlier from the same text, I believe,
13:20:37 9 we have a digital x-ray means, a CDD line sensor that has an
13:20:42 10 A to D converter in it. And in Mazess, we have a CDD
13:20:47 11 camera, at 84 and that similarly, has an A to D converter in
13:20:54 12 it, and in the text from column six, lines 38 to 67, you can
13:21:02 13 just see emphasizing it that the camera provides digital
13:21:07 14 radiation values.

13:21:09 15 Q. Why do you say that the camera provides digital
13:21:13 16 radiation values means there is a converter?

13:21:16 17 A. Well something must have taken the image in the
13:21:20 18 imaging intensifier which is analog and converted it to
13:21:25 19 digital values, and that's the digitization step that's
13:21:31 20 happening in the CDD camera.

13:21:32 21 Q. Dr. Pelc, what is your opinion as to whether these
13:21:36 22 disclosures in Guenther and Mazess meet the conversion and
13:21:40 23 converting requirements of the '301 and '374 patent?

13:21:43 24 A. They do.

13:21:44 25 Q. Dr. Pelc the final hardware element we discussed

13:21:47 1 earlier was the output device. Where in Guenther is an
13:21:50 2 output device disclosed?

13:21:52 3 A. So in Guenther we have a display here. And you can
13:21:59 4 see -- I'm sorry, here and ten, in Figure 7, and also in 48
13:22:08 5 is the output device in Figure 8.

13:22:18 6 Q. All right. And moving from slide 153 to 154, what
13:22:18 7 about in Mazess are there output devices disclosed?

13:22:22 8 A. Yes. Mazess also has an output device. You can see
13:22:26 9 a display here, number 18 in Figure 6. And the text that
13:22:31 10 goes along with it at columns four, lines 22 to 34 say that
13:22:37 11 it's a video monitor, and the video monitor can very well be
13:22:45 12 a color monitor, and generally would be at the time of the
13:22:48 13 invention.

13:22:50 14 Q. Would one of ordinary skill in the art in 1999 have
13:22:54 15 thought that an output device like the Mazess video monitor
13:22:59 16 would be able to display color images?

13:23:01 17 A. I think it's likely that a person of skill in the art
13:23:04 18 would know that that can be a color monitor, but if you
13:23:07 19 wanted to, you can bring in the Dimaxis user manual at this
13:23:11 20 point.

13:23:11 21 Q. And again, was it common as of 1999 to have software
13:23:12 22 to do color coding or imaging and models?

13:23:12 23 A. Yes, as demonstrated by the Dimaxis user manual.

13:23:27 24 Q. Dr. Pelc, for the Osseo claim requirements relating
13:23:31 25 to an output device, what is your opinion as to whether

13:23:34 1 these references disclose all those requirements?

13:23:39 2 A. They do.

13:23:40 3 Q. Dr. Pelc, do Guenther or Mazess disclose imaging
13:23:45 4 software?

13:23:45 5 A. They do. This is from Guenther on the left of the
13:23:49 6 slide from column five, lines 15 to 21, you see that he
13:23:54 7 talks about the apparatus having image processing, which is
13:23:59 8 an example of that. And from Mazess, in the abstract, he
13:24:06 9 says software loaded into the associated digital imaging
13:24:10 10 fluoroscopy equipment provides necessary correction of the
13:24:14 11 images for the quantitative accuracy needed for bone
13:24:20 12 densitometry.

13:24:20 13 Q. Dr. Pelc, for the imaging software requirement of the
13:24:23 14 '262 patent, what is your opinion as to whether that's met?

13:24:26 15 A. That is met.

13:24:29 16 Q. Dr. Pelc, the next claim requirement is densitometry.
13:24:32 17 Where is it met in this example combination?

13:24:35 18 A. Well, as we've talked previously about quantitative
13:24:39 19 computed tomography, the quantitative CT, QCT method uses
13:24:42 20 the standards to convert the measured Hounsfield units to
13:24:46 21 quantitative -- to quantitative mineral content using
13:24:50 22 calculations.

13:24:53 23 Q. And you're showing on slide 158, the Fontevraud
13:25:00 24 article at page 602. And you have highlighted bone mineral
13:25:03 25 content milligrams per cubic centimeter, what is that?

Pelc - direct

- 13:25:12 1 A. Right. So this is the caption to this figure, and
13:25:18 2 the whole section says an oval region of interest centered
13:25:22 3 in the vertebral body is used for determining calcium bone
13:25:28 4 mineral content milligrams per centimeter cubed?
- 13:25:32 5 Q. Is that a measure of bone density in mass per volume?
- 13:25:36 6 A. Yes.
- 13:25:36 7 Q. I believe you also testified earlier that Mazess
13:25:39 8 relates to densitometry, does Mazess disclose densitometry
13:25:42 9 as required by the Court's claim construction?
- 13:25:44 10 A. Yes. It does. It quantifies bone density using dual
13:25:52 11 energy.
- 13:25:53 12 Q. All right. And on slide 159, you're showing excerpts
13:25:56 13 from column 18, lines 24 to 32. And column 20, lines 46 to
13:26:02 14 63. Are those both indications that Mazess is calculating
13:26:08 15 bone density?
- 13:26:08 16 A. Yes. That's correct.
- 13:26:13 17 Q. Now with respect to the densitometry disclosures that
13:26:18 18 we just talked about in Mazess and Fontevraud, would one of
13:26:25 19 skill in the art at this time in December of 1999 been
13:26:28 20 familiar with both the detection and the quantitatively
13:26:32 21 calculated computed tomography to do densitometry?
- 13:26:32 22 A. Yes.
- 13:26:32 23 Q. And would they have been motivated to combine those
13:26:38 24 with then current imaging devices?
- 13:26:42 25 A. Yes.

Pelc - direct

13:26:43 1 Q. Dr. Pelc what is your opinion as to whether the
13:26:46 2 disclosures in Fontevraud and Mazess meet the requirement
13:26:53 3 for the Osseo claims for densitometry?

13:26:53 4 A. They do.

13:26:56 5 Q. Now the next requirement is for the model terms,
13:27:00 6 model requirements. Dr. Pelc, what is Guenther is relevant
13:27:05 7 to these modeling terms?

13:27:06 8 A. Guenther is a tomographic method, it is making
13:27:12 9 panoramic tomograms, this is from claim one of Guenther, and
13:27:17 10 you can see he is calling them panoramic tomograms.

13:27:22 11 Q. Would a person of ordinary skill in the art in
13:27:23 12 December of 1999 combine the teachings from either of the
13:27:27 13 densitometry references you described, would they have
13:27:30 14 created a system that meets the model requirements of the
13:27:33 15 claim?

13:27:33 16 A. Yes. And one of ordinary skill in the art if
13:27:36 17 necessary could bring the tomographic method of Fontevraud
13:27:43 18 as well.

13:27:49 19 Q. So, Dr. Pelc, in your opinion, are the modeling
13:27:53 20 requirements of the claims met by this combination?

13:27:56 21 A. They are. As I mentioned, the method would use dual
13:28:02 22 energy which is brought by the Mazess reference, that's the
13:28:05 23 merging information from multiple tomographic scans. And
13:28:09 24 you would have multiple tomographic scans when you rotated
13:28:14 25 the Guenther gantry with Mazess's dual energy -- area

13:28:21 1 detector.

13:28:27 2 Q. Dr. Pelc, the claims also require the storing and
13:28:29 3 comparing comparing elements that we discussed earlier.
13:28:31 4 Wherein Guenther is there evidence of storing or comparing
13:28:34 5 models?

13:28:35 6 A. Well, it says that here in column five, lines 15 to
13:28:41 7 21, such a combination is advantageous particularly given an
13:28:46 8 apparatus having digital image processing, but you would
13:28:51 9 need to have memory, is that what we're talking about.

13:28:53 10 Q. The storing, I believe?

13:28:54 11 A. Storing, so the digital image processing would
13:28:58 12 require memory and storing.

13:29:05 13 Q. Moving from slide 163 to 164, on slide 164 you're
13:29:11 14 showing the Mazess patent and an excerpt from column 20
13:29:15 15 lines 26 to 63. What are you showing here?

13:29:17 16 A. Yeah. So now we're on to to comparing part of
13:29:21 17 storing and comparing. And what Mazess says is that he, at
13:29:28 18 this point in the patent, he's described a way to define a
13:29:32 19 region in which he will calculate bone density. And it says
13:29:36 20 that that technique will locate reproducibly a particular
13:29:42 21 region of the forearm or the OS Calcis, the OS Calcis is the
13:29:50 22 heel. And so the reason that you would want too
13:29:54 23 reproducibly locate a particular region is so that the
13:30:00 24 comparison makes sense. It's really well-known in your
13:30:04 25 field that if you want to track tissue over time,

Pelc - direct

13:30:08 1 reproducibly identifying the tissue is essential, otherwise
13:30:13 2 you're comparing Apples and oranges.

13:30:16 3 Q. Dr. Pelc, is it your opinion that the combination of
13:30:18 4 references you just discussed would have rendered obvious
13:30:26 5 the storing and comparing model requirements of the claims
13:30:26 6 of the Osseo patent?

13:30:26 7 A. Yes.

13:30:26 8 Q. And then after going through each of these references
13:30:29 9 and their disclosures on an element by element basis, what
13:30:32 10 is your opinion as to whether the combination of Guenther,
13:30:35 11 Mazess and Fontevraud render obvious the asserted claims?

13:30:39 12 A. They do.

13:30:41 13 Q. And then I believe with respect to claim seven of the
13:30:45 14 '301 patent, you also mentioned that to the extent there was
13:30:48 15 any issue with the color coding, you could add in the
13:30:51 16 Dimaxis manual, would that combination have rendered obvious
13:30:54 17 claim seven of the '301 patent?

13:30:58 18 A. That's correct.

13:31:01 19 Q. Dr. Pelc, in addition to prior art invalidity, did
13:31:04 20 you consider invalidity for other reasons?

13:31:07 21 A. I did.

13:31:08 22 Q. I'm on slide 168 now. There is something called
13:31:13 23 written description. Can you explain to the jury what that
13:31:16 24 is?

13:31:18 25 A. Yes. Written description issue has to do with making

13:31:19 1 sure that the written description is sufficient for the
13:31:24 2 person of skill in the art to be assured that the inventor
13:31:30 3 had possession of the invention.

13:31:36 4 Q. And on slide 169, it appears you have the comparing
13:31:40 5 limitation highlighted. What is your opinion as to whether
13:31:44 6 the '262 and 34 patents provide written descriptions support
13:31:52 7 for the comparing limitations?

13:31:52 8 A. I believe they do not.

13:31:52 9 Q. If they lacked written description support, are those
13:31:55 10 claims invalid?

13:31:55 11 A. That's correct.

13:31:58 12 Q. Now, I believe we may have heard a little bit about
13:32:01 13 claim scope in this case. For the written description
13:32:04 14 requirement, does it require that you describe the whole
13:32:07 15 scope of the claims?

13:32:08 16 A. Yes. So if a claim has broad scope, the entire
13:32:13 17 scope, the entire breath of the scope has to be enabled.

13:32:17 18 Q. Right. That's enablement?

13:32:21 19 A. Sorry, has to be described well enough that a person
13:32:24 20 of skill in the art would appreciate that the inventor had
13:32:28 21 possession.

13:32:32 22 Q. All right. On slide 170, you have an excerpt from
13:32:36 23 the '374 patent at column two, lines 22 to 32. How does
13:32:41 24 that impact your opinion about the lack of written
13:32:44 25 description and comparing requirement?

Pelc - direct

13:32:49 1 A. The Osseo patents describe two kinds of comparing,
13:32:52 2 here in the background of the invention it's talking about
13:32:57 3 digital BMD patient models are also used for comparison
13:33:01 4 purposes with standard models with patients's own prior BMD
13:33:07 5 histories.

13:33:09 6 Q. And what does that -- can you describe what that
13:33:12 7 means?

13:33:12 8 A. Here, we really aren't sure whether the comparison is
13:33:18 9 with respect to the whole model, so if you think of the
13:33:21 10 model as being the 3D array, that 3D image, is that what
13:33:28 11 we're supposed to be comparing, what the computer is
13:33:31 12 supposed to be comparing, one 3D volume with another 3D
13:33:35 13 volume, or is it parameters of the model. A parameter of
13:33:39 14 the model would be like what Cann does, he draws a region of
13:33:44 15 interest and calculates the bone mineral in one vertebra, so
13:33:50 16 he are we comparing two -- one number from one model with
13:33:55 17 one number of the other model which is easy to do, the
13:33:59 18 computer can readily do that, and in fact was widely done in
13:34:03 19 the field. Or are we comparing models which is much harder
13:34:08 20 to do, and in my opinion in 1999, the person of skill in the
13:34:13 21 art needed a lot of help to understand how to, the computer
13:34:18 22 is supposed to compare these 3D models. So that's the
13:34:22 23 breath of the claim.

13:34:27 24 Q. Now, Dr. Pelc, if Osseo was to stand up and show you
13:34:32 25 for example, Figure 6(A) and 6(B) of the '262 patent, would

Pelc - direct

13:34:39 1 that provide written description for the comparing
13:34:41 2 limitations of the '374 patent?

13:34:46 3 A. Oh, yes, I see your point. No, because the '262
13:34:53 4 patent was a continuation in part, and it had additional
13:35:00 5 material added. Additional material was added when the '262
13:35:03 6 patent was filed. So you can't use the text that's in the
13:35:08 7 '262 patent that is not in the '374 patent to argue that
13:35:14 8 there was adequate written description in the '374 patent
13:35:18 9 because the text wasn't there.

13:35:20 10 Q. And then that was slide 173, I want to move to slide
13:35:25 11 175. Can you talk a little bit about why is it your opinion
13:35:28 12 that the comparing requirements in the '262 patent claim one
13:35:32 13 are not met -- are not- there is no written description
13:35:36 14 support for them in the Osseo patents?

13:35:38 15 A. So, what it says here, just below the highlighted
13:35:43 16 section, the computer 104 also includes comparison software
13:35:48 17 which is adapted for digitally comparing baseline and
13:35:53 18 patient specific dental and orthopedic densitometry models.
13:35:57 19 But it doesn't say anything about how that adapting is
13:36:02 20 supposed to be done. Think of adapting as programing. You
13:36:05 21 have to take this computer and program it to do this digital
13:36:10 22 comparing, but there is no description about how the
13:36:15 23 comparing step is supposed to be done.

13:36:21 24 Q. Dr. Pelc, what is your opinion as to whether the
13:36:25 25 comparing requirement in the Osseo claims lack written

13:36:29 1

description?

13:36:30 2

A. I believe it lacks written description for the full

13:36:32 3

breath of comparing them.

13:36:34 4

Q. All right. And with respect to enablement as shown on

13:36:42 5

slide 176, first, did you reach an opinion regarding whether

13:36:43 6

or not the claims contain the comparing limitations are

13:36:48 7

invalid for lack of enablement?

13:36:50 8

A. Right. So enablement is a term that says that the

13:36:56 9

description in the patent is sufficient that a person of

13:37:00 10

skill in the art doesn't require undue experimentation to

13:37:05 11

figure out what it is that the invention is supposed to do.

13:37:10 12

That would enable the invention. And in my opinion, the

13:37:15 13

'262 patent does not enable the source limitation with

13:37:21 14

respect to the electron beam source.

13:37:26 15

Q. I think that might be a different one, but let's talk

13:37:29 16

about enablement with respect to the comparing limitation

13:37:32 17

first?

13:37:32 18

A. Oh, I'm sorry.

13:37:34 19

Q. Okay. So are there factors that you would consider

13:37:38 20

in terms of a lack of enablement analysis?

13:37:42 21

A. Yes. We should take into consideration the quantity

13:37:42 22

of experimentations required, the amount and direction of

13:37:52 23

guidance presented in the patent, the presence or absence of

13:37:52 24

working examples, the nature of the invention, the state of

13:38:00 25

the prior art at the time, the relative skill of those in

Pelc - direct

13:38:03 1 the art, predictability or unpredictability of the art and
13:38:08 2 the breath of the claims.

13:38:10 3 Q. Just with respect to the comparing limitations, on
13:38:13 4 slide 178, why is it your opinion that those lack
13:38:18 5 enablement?

13:38:19 6 A. Because with respect to comparing full models, the
13:38:24 7 person of skill in the art in 1999 did not know how to
13:38:28 8 program the computer to do that comparison, it would require
13:38:32 9 undue experimentation.

13:38:35 10 Q. All right. Now, Dr. Pelc, you mentioned a lack of
13:38:39 11 enablement for electron beam source. Move from slide 179 to
13:38:43 12 180, can you describe what you're talking about in terms of
13:38:47 13 an electron beam source?

13:38:51 14 A. Yeah. So here you see claim one of the '262 patent,
13:38:55 15 and the -- that clause calls for an energy source, and the
13:39:00 16 reason that the language was changed from x-ray source to
13:39:04 17 energy source is that in the '262 patent, additional matter
13:39:10 18 was brought in to describe the possibility of doing this
13:39:14 19 with an electron beam source. And we will show pictures of
13:39:18 20 that soon. But I want to --

13:39:22 21 Q. I apologize. But did you apply the same standard for
13:39:26 22 enablement that you applied as to the comparing limitations?

13:39:30 23 A. Yes.

13:39:34 24 Q. And so moving to slide 182 which I think is a
13:39:38 25 substance of your argument, can you explain why you think

Pelc - direct

13:39:39 1 there is a lack of enablement with respect to energy source?

13:39:42 2 A. Yes. This is Figure 4-A from the '262 patent and it
13:39:46 3 says that here is the electron beam source and a detector on
13:39:51 4 the other side of the jaw, and the beam is the dotted line
13:39:56 5 going between them.

13:39:57 6 This picture was shown before and Dr. Massie who
13:40:02 7 showed it said he thought an electron beam source was an
13:40:07 8 x-ray source, a type of x-ray source. But what the patent
13:40:11 9 says is that the beam source and the sensor are both placed
13:40:18 10 externally whereby the electron beam passes through the
13:40:22 11 patient. The patient is being probed not by x-rays by but
13:40:29 12 an electron beam.

13:40:31 13 Q. Does that make any sense to you?

13:40:32 14 A. Frankly, no.

13:40:35 15 Q. Can you explain why using an electron beam source
13:40:39 16 would be different than an x-ray source?

13:40:42 17 A. Well in order to have an electron beam, the electrons
13:40:45 18 would have to penetrate the object. These would have to be
13:40:49 19 very, very energetic electrons in order to be able to pass
13:40:53 20 all the way from one side of the jaw to the other. In doing
13:41:00 21 so, electrons traveling that path would deliver a huge
13:41:03 22 amount of radiation to the patient. From a technical point
13:41:07 23 of view, creating, focusing and steering such an electron
13:41:11 24 beam would require very significant amounts of power,
13:41:15 25 powerful magnets, but the specification says that this

Pelc - direct

13:41:20 1 electron beam source could be intraoral and wireless.

13:41:25 2 Frankly, it's not believable.

13:41:28 3 Q. Dr. Pelc, with someone reading the speaks -- would a
13:41:31 4 person of ordinary skill in in the art as of December of
13:41:38 5 1999 been able to read the disclosures, the written
13:41:40 6 specification of the '262 patent and understand how to
13:41:42 7 implement an electron beam source as the energy source in
13:41:49 8 the claim -- in claim one?

13:41:49 9 A. No.

13:41:51 10 Q. Dr. Pelc, can you summarize for the jury your
13:41:51 11 invalidity opinions?

13:41:51 12 A. Yes. I believe all the asserted claims are obvious
13:41:51 13 in light of the prior art, including admissions by Osseo and
13:42:01 14 the the combinations that I showed, Brummer -- I'm sorry,
13:42:01 15 that's the wrong combination. I think all of the claims are
13:42:11 16 obvious.

13:42:11 17 Q. Dr. Pelc, I want to move on quickly to the last piece
13:42:21 18 of work that you did in this case. Were you asked to
13:42:21 19 provide some technical guidance with respect to information
13:42:21 20 that the damages expert for Planmeca would need to use?

13:42:31 21 A. Yes.

13:42:31 22 Q. On slide 188, can you explain your understanding of
13:42:31 23 what technological apportionment is?

13:42:41 24 A. Yes. And this comes up with a patent is for not an
13:42:41 25 entirely new machine but rather an improvement to a machine.

Pelc - direct

13:42:51 1 And the patentee must show what the improvement has added to
13:42:55 2 the usefulness of the machine. The process of apportionment
13:42:59 3 is the separation of the benefits of the improvement from
13:43:03 4 other benefits that are really due to prior art or other
13:43:07 5 things that are known. And the goal is to determine the
13:43:11 6 incremental value attributable to the inventive element.
13:43:16 7 So, for example, suppose I invent a new kind of car tire,
13:43:21 8 and I patent it and the claim says an automobile with an
13:43:27 9 engine, a transmission, and four wheels with said wheels
13:43:32 10 having tires. The automobile, the engine, the transmission,
13:43:37 11 the wheels, those are known. The inventive element is my
13:43:43 12 new tires. And I cannot be entitled to royalties on the
13:43:47 13 entire car or the value of the entire car when what I did
13:43:52 14 was make an improvement on the tires.

13:43:54 15 Q. Dr. Pelc, I think you just gave a great summary of
13:43:58 16 apportionment overall. Did you look at the value or the
13:44:02 17 money aspect of apportionment?

13:44:05 18 A. No, I looked at the technical side of things, at the
13:44:09 19 technical apportionment, rather than economic apportionment.
13:44:14 20 I'm not a damages expert.

13:44:18 21 Q. And then as Mr. Blok testified yesterday, as part of
13:44:22 22 any damages analysis, you must assume that there is
13:44:27 23 infringement and the patent claims are valid. Based on your
13:44:31 24 testimony today, do you agree that there is infringement and
13:44:35 25 that the patent claims are valid?

Pelc - direct

13:44:34 1 A. No, I still believe strongly that the patent is not
13:44:37 2 valid and is not infringed, but for purposes of this
13:44:42 3 analysis, I assume that it is valid and infringed.

13:44:46 4 Q. Now, Dr. Pelc, were you here when Dr. Kia testified?

13:44:51 5 A. Yes.

13:44:52 6 Q. And as shown on slide 189, did you see his feature
13:44:57 7 analysis?

13:44:57 8 A. I did.

13:44:59 9 Q. Do you agree with his feature analysis?

13:45:01 10 A. No, I do not.

13:45:04 11 Q. Let's look at his feature analysis. Can you explain
13:45:07 12 at a high level before going feature by feature what some of
13:45:13 13 the problems with his analysis was?

13:45:15 14 A. Well, Dr. Kia omitted a large number of features in
13:45:20 15 the ProMax system, and what that does is overinflate the
13:45:24 16 apparent value of the features that he did consider because
13:45:27 17 those other features have value. Amount them are a variety
13:45:32 18 of reconstruction algorithms that are in the ProMax system
13:45:37 19 and as we've heard, Dr. Massie did not invent reconstruction
13:45:42 20 algorithms. There is a flat panel sensor and pulsed
13:45:42 21 exposures that are important to reduce radiation.
13:45:42 22 Dr. Massie didn't invent those. ProFace, that we talked
13:45:52 23 about, that's the combination of a face image with cone beam
13:45:52 24 CT. Jaw motion, and a variety of other things, all of the
13:46:02 25 non-3D imaging modes, bite wings, panoramic imaging and

Pelc - direct

13:46:15 1 cephalometry, they are a part of the product but not covered
13:46:17 2 by the invention.

13:46:17 3 Q. Dr. Pelc, I notice on this list there may be some
13:46:22 4 optional features, did you include those because some of the
13:46:25 5 accused systems would have been sold with those optional
13:46:29 6 features?

13:46:29 7 A. That's right.

13:46:30 8 Q. Let's start at the very first feature that Dr. Kia
13:46:35 9 discussed, the 3D cone beam computed tomography model scan.
13:46:39 10 Did Dr. Massie invent 3D cone beam computed tomography?

13:46:43 11 A. No, he did not.

13:46:45 12 Q. Does Dr. Kia's attribution of a hundred percent of
13:46:50 13 the weight of this feature account for other party's
13:46:55 14 contributions?

13:46:55 15 A. It does not.

13:46:57 16 Q. Do you know what the 3D model scan feature is?

13:47:00 17 A. Well, actually the 3D model scan feature is the
13:47:04 18 scanning of a model, not of the patient, but a model of the
13:47:11 19 patient's jaw and teeth. So actually when you scan a 3D
13:47:17 20 model, you don't have the patient's dental structure and it
13:47:20 21 makes no sense to measure bone density.

13:47:24 22 Q. So on -- let's see. On slide 192, let's look at the
13:47:32 23 volume stitching. What is your opinion as to whether
13:47:35 24 Dr. Kia appropriately apportioned the volume stitching
13:47:39 25 feature on his analysis?

Pelc - direct

13:47:41 1 A. Well, Dr. Kia gives this a ten percent weight and
13:47:46 2 gives the entirety of that weight as covered by the asserted
13:47:49 3 claims. But the Osseo patent doesn't describe volume
13:47:53 4 stitching. It doesn't even describe 3D cone beam CT.

13:47:58 5 Q. Let's look at the third line on slide one flea. Open
13:48:03 6 patient positioning. Should that be attributed to the
13:48:06 7 asserted claims of Osseo's patents?

13:48:08 8 A. No, first of all, as we saw in the presentation by
13:48:12 9 Mr. Muller, the open patient positioning was known and
13:48:17 10 implemented by Planmeca before the filing date of this
13:48:21 11 patent. -have we also saw the same idea of the open patient
13:48:26 12 positioning with the C arm hanging down vertically in the
13:48:31 13 Guenther patent. So open patient positioning was known in
13:48:35 14 the prior art.

13:48:36 15 In addition, the Osseo patents say that we --
13:48:39 16 that the intent is to implement his method on commercially
13:48:43 17 available tomography equipment. If you do that, you can't
13:48:47 18 claim the value of that commercially available tomography
13:48:51 19 equipment.

13:48:53 20 Q. All right. And then the fourth feature listed in his
13:48:58 21 table is SCARA technology. Why should he not have allocated
13:49:04 22 a hundred percent of that feature to the Osseo patent?

13:49:07 23 A. Again, the SCARA technology was implemented by
13:49:10 24 Planmeca well before the filing date of the invention.

13:49:12 25 Q. And then, Dr. Pelc, were you asked to perform any

13:49:19 1 other technical analysis?

13:49:21 2 A. Yes. So I looked at which features are included in
13:49:27 3 the basic Romexis software and which ones are not included.
13:49:33 4 I'm sorry, the basic system and which once are not included
13:49:37 5 in an upgrade. The features not included in the upgrade may
13:49:42 6 be not included either because the parts are already there,
13:49:46 7 or because they don't come with the standard software
13:49:54 8 package.

13:49:54 9 Q. And did you discuss this distribution of features as
13:49:56 10 to whether they were included in the upgrade or not with
13:49:58 11 Mr. Bone, Planmeca damages expert?

13:50:00 12 A. Yes.

13:50:00 13 Q. And the included features as shown on your slide 195
13:50:11 14 would have been 3D CBCT imaging, stitching, AINO noise
13:50:14 15 removal, Planmeca calm, Planmeca ARA, ROI or region of
13:50:16 16 interest and the flat panel sensor?

13:50:21 17 A. Yes.

13:50:23 18 Q. Now, Dr. Pelc, in your opinion was the feature
13:50:26 19 analysis of Dr. Kia sufficient to separate the value of the
13:50:30 20 alleged infringement in the Osseo patents from the prior art
13:50:32 21 features or features unrelated to those patents?

13:50:32 22 A. Yes.

13:50:33 23 Q. The feature analysis of Dr. Kia was sufficient to do
13:50:41 24 that?

13:50:42 25 A. No, no, I'm sorry, it was not.

13:50:43 1 Q. What would have been a better approach?

13:50:46 2 A. So the question one should ask is what value did the
13:50:51 3 Osseo patents add, in particular the inventive element of
13:50:55 4 the Osseo patents add and that value must exclude what was
13:51:00 5 in the prior art which as we saw was an extensive list.

13:51:05 6 Q. And with respect to technological apportionment, did
13:51:09 7 you perform your own analysis to attempt to isolate the
13:51:13 8 alleged value of the inventive elements?

13:51:15 9 A. Yes, I did.

13:51:16 10 Q. What were your conclusions as to the value added?

13:51:20 11 A. So what I ended up concluding is that -- because the
13:51:24 12 Massie patents did not invent hardware, I concluded that the
13:51:31 13 inventive element must be implemented in software. So I
13:51:37 14 looked for a software module that could embody or represent
13:51:43 15 that. It can't be the reconstruction PC software because
13:51:48 16 that implements the Feldkamp algorithm and that was known as
13:51:53 17 we know. They can't be the things that are standard in the
13:52:00 18 3D software because Dr. Massie did not invent 3D cone beam
13:52:05 19 CT. And the 3D standard software therefore is not relevant
13:52:12 20 here.

13:52:12 21 So given the assumption of infringement and
13:52:15 22 validity, I chose the superimposition problem as the best
13:52:20 23 representative of the value added.

13:52:23 24 Q. All right. Dr. Pelc, just briefly with respect to
13:52:25 25 non-infringing alternatives, are you familiar with that

13:52:31 1 concept?

13:52:32 2 A. Yes.

13:52:33 3 Q. Do you have any examples of non-infringing
13:52:35 4 alternatives that would apply to this case?

13:52:37 5 A. Yes. The Mozzo systems the NewTom 9000 is a
13:52:49 6 non-infringing alternatives since it predates the patents.

13:52:52 7 MS. PESCHEL: No further questions, Your Honor.

13:52:55 8 THE COURT: This is as good a place as any to
13:52:58 9 take our afternoon recess, ladies and gentlemen. So let's
13:53:02 10 take ten.

13:53:03 11 COURT CLERK: All rise.

13:53:05 12 (Jury leaving the courtroom at 3:53 p.m.)

13:53:25 13 THE COURT: So the record should reflect we're
13:53:28 14 outside the presence of the jury. You may be seated, ladies
13:53:31 15 and gentlemen. My jury instruction calvary has landed from
13:53:40 16 the Philadelphia airport. So do we have a set of something
13:53:41 17 she can look at?

13:53:41 18 MR. QURESHI: I will find out.

13:53:51 19 THE COURT: Whatever you got, give it to me,
13:53:52 20 okay, and then we'll go from there. So let's take ten.

13:54:02 21 (A brief recess was taken.)

14:08:42 22 THE COURT: Please be seated. So what's the
14:08:52 23 jury instruction report?

14:08:53 24 MR. FEINLAND: Your Honor, we're just putting in
14:08:55 25 footnotes with your changes, we're moving the common parties

14:08:59 1 and we are get them to you very shortly.

14:09:05 2 Just let you know there is not many
14:09:09 3 disagreements.

14:09:09 4 THE COURT: Would you e-mail it to me.

14:09:11 5 MR. FEINLAND: Sure.

14:09:13 6 THE COURT: And I don't want to press you too
14:09:15 7 much, but whether do you think you'll have it to me, before,
14:09:19 8 during, or when? Our next break isn't scheduled until after
14:09:28 9 3 o'clock.

14:09:28 10 MR. FEINLAND: I'm going to send it to the other
14:09:30 11 side in about ten minutes and they already sent us our
14:09:32 12 revision and I assume we'll probably send it over to you
14:09:34 13 right after that.

14:09:34 14 THE COURT: It might be less than half an hour.

14:09:41 15 MR. FEINLAND: Should be.

14:09:44 16 MR. GOLDEN: Your Honor for what it's worth some
14:09:46 17 of the least amount of disputes I have ever seen in a lot of
14:09:48 18 different cases working on jury instructions.

14:09:51 19 THE COURT: I have noticed that as well. And
14:09:54 20 that's what I was talking about when I said that there was a
14:09:57 21 high level of professionalism working between you and I
14:10:00 22 appreciate that. You haven't disappointed me yet but I'm
14:10:03 23 waiting.

14:10:11 24 MR. DIETRICH: Your Honor I'm in the process of
14:10:14 25 typing an e-mail to you to provide that draft. And I just

Pelc - cross

14:10:16 1 want to let the court know that some of the red lines and
14:10:19 2 there is not very many are actually agreed. And so I just
14:10:23 3 wanted to be able to show the changes to the Court's draft
14:10:27 4 easily, so maybe at the charge conference we can just tell
14:10:30 5 you that's agreed or not agreed. There is not going to be a
14:10:33 6 lot here, Your Honor, there really isn't?

14:10:36 7 THE COURT: I just want a visual copy so that my
14:10:39 8 clerk can work on the draft so that when we come back out
14:10:42 9 here for the discussion for jury instructions that we're
14:10:48 10 pretty close, as close as we can be.

14:10:51 11 MR. DIETRICH: Okay. Would the court like a
14:10:53 12 paper copy as well?

14:10:54 13 THE COURT: Yes. But I think I'll leave it to
14:10:56 14 my clerk to print it for me and then that way hopefully
14:11:02 15 we'll all be on the same page with everybody else. Thank
14:11:06 16 you.

14:11:07 17 All right. Go get the jury.

14:11:11 18 (Jury entering the courtroom at 2:11 p.m.)

14:11:34 19 THE COURT: Please be seated, ladies and
14:11:38 20 gentlemen.

14:11:42 21 Dr. Pelc, if you would return to the witness
14:11:46 22 stand.

14:11:50 23 Cross-examination, counsel.

14:12:00 24 MR. OSTROW: Thank you, Your Honor.

14:12:05 25 BY MR. OSTROW:

- 14:12:06 1 Q. Good afternoon, Dr. Pelc.
- 14:12:09 2 A. Good afternoon.
- 14:12:09 3 Q. My name is Seth Ostrow, one of the attorneys
14:12:12 4 representing Osseo, you may recall we met before?
- 14:12:15 5 A. I recall.
- 14:12:16 6 Q. And that was in the context of your deposition,
14:12:19 7 correct?
- 14:12:19 8 A. That's correct.
- 14:12:20 9 Q. And that was roughly about three years ago, do you
14:12:23 10 remember that?
- 14:12:23 11 A. I think it was in 2019.
- 14:12:25 12 Q. Right. September, so we're almost on the three-year
14:12:30 13 anniversary of your deposition. You have a transcript of
14:12:32 14 your deposition in one of the binders your attorney gave
14:12:36 15 you, or Planmeca attorneys, right? I think it's behind
14:12:40 16 Tab 4 of giant book number one.
- 14:12:49 17 A. Yes.
- 14:12:50 18 Q. I just want to make sure you have it there because to
14:12:54 19 the extent issues come up, I might have to refer to it?
- 14:12:57 20 A. I'll just close the book for now.
- 14:13:00 21 Q. For now, yes. Thank you.
- 14:13:02 22 Dr. Pelc, on direct examination you took us
14:13:14 23 through your background which is long and quite impressive.
14:13:19 24 I just wanted to ask you a few specific questions about your
14:13:23 25 background. Okay?

14:13:24 1

A. Sure.

14:13:25 2

Q. You went through your educational background, we got

14:13:28 3

these slides that you used for that purpose. During your --

14:13:32 4

any of your degrees, did you take any courses focused on

14:13:38 5

dental imaging?

14:13:40 6

A. No.

14:13:41 7

Q. What about dental care, dentistry, anything like

14:13:45 8

that?

14:13:46 9

A. No.

14:13:50 10

Q. Go to the next slide, John. On the next slide you

14:13:53 11

went through your work history which started with your work

14:13:57 12

at General Electric medical systems. When you were at

14:14:00 13

General Electric medical systems, I think you talked about

14:14:02 14

working on some computed tomography machines, correct?

14:14:06 15

A. Yes, among other things.

14:14:08 16

Q. And that was for medical imaging, correct?

14:14:12 17

A. Yes. Although they were used for nondestructive

14:14:14 18

testing also.

14:14:19 19

Q. What does that mean?

14:14:21 20

A. Actually our scanners were used by GE aviation to

14:14:22 21

scan turbine blades to see whether the turbine blades were

14:14:31 22

good enough to be in an airplane engine.

14:14:37 23

Q. Okay. That's interesting. Thank you, did you do any

14:14:38 24

work in designing of machines focused on dental imaging?

14:14:43 25

A. No.

- 14:14:44 1 Q. Let's move on to your work teaching at Stanford
14:14:49 2 University. So you were in the department of radiology,
14:14:53 3 right, you were an associate professor then a full
14:14:56 4 professor, do I get that right?
- 14:14:57 5 A. That's correct.
- 14:14:58 6 Q. And as part of this, you were teaching courses to
14:15:03 7 medical students?
- 14:15:04 8 A. To physicians.
- 14:15:08 9 Q. So people who had already graduated medical school?
- 14:15:12 10 A. That's right.
- 14:15:12 11 Q. And this was to MD's, these courses?
- 14:15:16 12 A. Yes.
- 14:15:17 13 Q. Did you teach any courses specifically to dentists,
14:15:20 14 D.D.S's?
- 14:15:22 15 A. No.
- 14:15:24 16 Q. And your work at the -- let's go to the next slide.
14:15:31 17 You then talked about some of your under
14:15:34 18 graduate and then your graduate research and you certainly
14:15:38 19 did a lot with respect to computed tomography and
14:15:42 20 tomosynthesis and so forth. Did any of this research focus
14:15:47 21 on dental imaging?
- 14:15:48 22 A. No, they were used for dental imaging but they didn't
14:15:52 23 focus on dental imaging.
- 14:15:53 24 Q. They were used by you for dental imaging?
- 14:16:00 25 A. They were used by me to image the region of the mouth

14:16:03 1 and jaw, yes. In addition, they were used by others in
14:16:11 2 dental imaging, yes.

14:16:14 3 Q. When you say they were used, this was research,
14:16:19 4 right?

14:16:19 5 A. That's right.

14:16:20 6 Q. So you're talking about the science behind said
14:16:24 7 computed tomography, that later got applied to dental
14:16:26 8 imaging, is that what you mean?

14:16:28 9 A. That and also the systems I helped concrete at GE
14:16:31 10 medical systems were used to image the head and mouth of
14:16:31 11 patients.

14:16:31 12 Q. Okay. We'll talk a little bit more about that in a
14:16:41 13 bit. But as far as your research as a student and a
14:16:41 14 graduate student and then your work at GE, you were not
14:16:51 15 specifically researching or designing anything for dental
14:16:51 16 imaging purposes; right? That's what you told me at your
14:16:51 17 deposition right?

14:17:01 18 A. Yes, specific for dental imaging, no.

14:17:04 19 Q. Let's go to slide seven. On slide seven, you got a
14:17:12 20 very large number of, impressively large number of articles
14:17:12 21 here. So you were an author on 220 peer reviewed journal
14:17:21 22 articles and then you also were an author on 360 research
14:17:24 23 papers, that's cumulative, those don't overlap, right?

14:17:24 24 A. So, the cumulative would be the sum of the two.

14:17:32 25 Q. That's what I meant?

- 14:17:34 1 A. Yes. So in addition to the 220 are the 360.
- 14:17:38 2 Q. So it's 580 total, right?
- 14:17:41 3 A. Yeah, it's now a little more than that.
- 14:17:43 4 Q. But at least at the time?
- 14:17:45 5 A. That's right.
- 14:17:46 6 Q. Were any of those articles specifically focused on
- 14:17:49 7 dental imaging?
- 14:17:50 8 A. No.
- 14:17:55 9 Q. I see you have listed here some courses that you have
- 14:17:59 10 taught, x-ray computed tomography, so forth. Did you ever
- 14:18:04 11 teach any courses on dental imaging?
- 14:18:06 12 A. No.
- 14:18:07 13 Q. Next slide.
- 14:18:08 14 And then finally I'm not sure the jury saw this,
- 14:18:14 15 but this is the slide about your 95 patents; right?
- 14:18:17 16 A. Yes.
- 14:18:17 17 Q. You're an inventor on 95 patents?
- 14:18:19 18 A. That's correct.
- 14:18:20 19 Q. Were any of those patents specifically focused on
- 14:18:23 20 improvement in dental imaging?
- 14:18:25 21 A. No.
- 14:18:26 22 Q. If I were to do a search, say the word teeth, you
- 14:18:32 23 know, in any field of your 95 patents, how many patents
- 14:18:36 24 would come up?
- 14:18:39 25 A. I have no idea.

- 14:18:37 1 Q. Would it surprise you that the answer is 0?
- 14:18:40 2 A. No.
- 14:18:41 3 Q. Because you didn't really do any work on dental
- 14:18:44 4 imaging systems; right, that's why it wouldn't surprise you?
- 14:18:48 5 A. I suspect that if you did that same search looking
- 14:18:50 6 for gallbladder you might also find 0.
- 14:18:54 7 Q. Okay. How about the word dental, how many times do
- 14:18:57 8 you think that comes up in your 95 patents?
- 14:18:59 9 A. I don't know.
- 14:19:00 10 Q. Would it surprise you that the word appears once in
- 14:19:03 11 all 95 patents?
- 14:19:04 12 A. No.
- 14:19:06 13 Q. And if the appearance of that word, I think a patent
- 14:19:11 14 you mentioned detecting foreign objects, you used dental
- 14:19:15 15 filling as an example, does that ring a bell?
- 14:19:18 16 A. Yes, it's not a detecting foreign objects, it was to
- 14:19:24 17 improve the quality of images in the jaw due to the
- 14:19:28 18 detrimental effects of fillings on CT scan.
- 14:19:32 19 Q. But other than that one patent where that word
- 14:19:35 20 appears, you're not surprised to find out that the word
- 14:19:38 21 never appears anywhere else, right?
- 14:19:40 22 A. No.
- 14:19:42 23 Q. You know Dr. Massie patents the word dental is all
- 14:19:47 24 over the place, right?
- 14:19:48 25 A. Yes.

- 14:19:52 1 Q. Do you know if all teeth are made of the same
14:19:58 2 material composition?
- 14:19:59 3 A. No.
- 14:20:00 4 Q. You don't know?
- 14:20:01 5 A. That's correct.
- 14:20:02 6 Q. Do you know what teeth are made of?
- 14:20:05 7 A. I know that teeth have a bone core, they have an
14:20:11 8 enamel outer surface.
- 14:20:12 9 Q. What material is in that bone core?
- 14:20:15 10 A. The bone core has cells, it has hydroxyapatite
14:20:23 11 mineral.
- 14:20:23 12 Q. Is that it?
- 14:20:25 13 A. I don't know exhaustively what's in bone, in the
14:20:29 14 teeth.
- 14:20:29 15 Q. In the teeth. You consider teeth a type of bone,
14:20:32 16 though, right?
- 14:20:33 17 A. I consider teeth as having bone.
- 14:20:35 18 Q. Right. Okay. So let's get our terminology. My bad.
14:20:40 19 So teeth also have roots in them, so if we exclude the
14:20:45 20 nerves, if we exclude the soft tissue like the nerves, you
14:20:49 21 consider what's left as being bone; right?
- 14:20:52 22 A. At least bony.
- 14:20:52 23 Q. You told me in your deposition that you did, but I'll
14:21:00 24 take that, that's fine, I'll take that for today.
- 14:21:03 25 Do you know the accuracy needed in imaging

14:21:08 1 techniques in dental machines in order to be useful to
14:21:12 2 dentists?

14:21:15 3 A. The accuracy of what?

14:21:18 4 Q. Of a dental imaging device, how accurate it has to be
14:21:23 5 to provide data that a dentist can rely on?

14:21:26 6 A. How accurate does it have to be in what?

14:21:28 7 Q. In imaging, in whatever it's imaging.

14:21:32 8 A. You mean like dimensionally?

14:21:35 9 Q. In terms of let's say x-rays, right, so x-rays that
14:21:39 10 have linear attenuation and the dentist will look at it,
14:21:43 11 right, but that's not a hundred percent accurate, you need
14:21:47 12 to explain some issues, artifacts and so forth. Do you have
14:21:51 13 an idea of how accurate the images have to be for the
14:21:54 14 dentist to be able to rely on it?

14:21:56 15 A. Your question is not very precise. If you used the
14:22:01 16 word accuracy, you have to have a measurement that the
14:22:04 17 accuracy refers to. What aspect of the image are you asking
14:22:08 18 me the accuracy about?

14:22:12 19 Q. Let's talk about grayscale values, grayscale?

14:22:15 20 A. Grayscale values.

14:22:17 21 Q. Yes. Do you have an idea of how accurate the
14:22:20 22 grayscale has to be in the image for the dentist to be able
14:22:23 23 to rely on it?

14:22:25 24 A. I don't think it has to be very accurate in grayscale
14:22:30 25 images.

- 14:22:30 1 Q. Do you know what the number is?
- 14:22:32 2 A. I think as long as the interesting structures are
14:22:36 3 within the dynamic range of the image, you'll be okay.
- 14:22:41 4 Q. Do you know if there is a standard in the dental
14:22:44 5 industry what accuracy the machines have to have?
- 14:22:47 6 A. Accuracy in what?
- 14:22:48 7 Q. The same thing I just asked you sir?
- 14:22:51 8 A. In grayscale imaging?
- 14:22:53 9 Q. Yes?
- 14:22:54 10 A. I don't know a specific specification, no.
- 14:22:56 11 Q. What about bone density measurements, do you know how
14:22:58 12 accurate bone density measurements have to be in dental
14:23:00 13 imaging machines to be reliable to dentists?
- 14:23:01 14 A. No.
- 14:23:02 15 Q. You never worked on any dental imaging machines,
14:23:11 16 right, is that part of the reason?
- 14:23:14 17 A. No, that's not why, I actually researched this and I
14:23:18 18 couldn't find any reference that described how accurate the
14:23:21 19 bone density of teeth have to be.
- 14:23:22 20 Q. When did you research this?
- 14:23:23 21 A. Oh, in preparation for this, and I could not find a
14:23:27 22 particular reference.
- 14:23:28 23 Q. You did it -- I do recall you and I had this
14:23:32 24 discussion during your deposition so you went and tried to
14:23:35 25 research it afterwards, is that what you are saying?

14:23:39 1 A. No, that's not what I am saying, I said that I
14:23:42 2 researched it.

14:23:46 3 Q. You spent some time discussing one of your patents
14:23:50 4 that was cited by Dr. Massie, do you remember that?

14:23:53 5 A. Yes.

14:23:53 6 Q. The '080 patent?

14:23:56 7 A. Yes.

14:23:56 8 Q. Can we take a look at that, I think it's behind
14:23:59 9 Tab 11 of your binder. Hang on. It's Tab 10. DX-4.

14:24:16 10 A. Yes.

14:24:17 11 Q. Does this patent have anything to do with dental
14:24:20 12 imaging?

14:24:31 13 A. Like you said I would be surprised if the word dental
14:24:37 14 appears. I would not go so far to say that it has nothing
14:24:42 15 to do with dental imaging.

14:24:49 16 Q. Is this patient that you see here, this is Figure 5,
14:25:00 17 is this patient having their teeth imaged?

14:25:10 18 A. The apparatus that you see there scans in the, so,
14:25:20 19 here you see a three dimensional coordinate system, and this
14:25:25 20 structure scans -- can scan from head to foot. So at the
14:25:30 21 time of this drawing, it looks like maybe the x-ray beam is
14:25:32 22 going through the thigh.

14:25:42 23 Q. Go back to Figure 1, please, 238.

14:25:47 24 What is shown here in Figure 1 of your patent?

14:25:54 25 A. So, we see a scan through the body, just

14:26:04 1

representative.

14:26:05 2

Q. So that thing in the middle, I think either 16 or 22,

14:26:11 3

that's the patient's spine, right?

14:26:13 4

A. That's right.

14:26:14 5

Q. And the area around that is what, the part of the

14:26:16 6

abdomen?

14:26:18 7

A. That depends on where you are. What we know for sure

14:26:23 8

is that these are the arms, so imagine laying down, you see

14:26:28 9

the 20.

14:26:29 10

Q. Okay?

14:26:30 11

A. 20 are the arms.

14:26:31 12

Q. 20 are the arms?

14:26:33 13

A. Those are the arms. So it's somewhere in the body

14:26:37 14

where you have both vertebral bodies and arms.

14:26:42 15

Q. But no teeth, right?

14:26:44 16

A. Not this cross-section.

14:26:46 17

Q. Are there any images of actual -- are there any

14:26:49 18

images in your patent that show what your machine would

14:26:57 19

generate, the machine that you patented?

14:27:00 20

A. No.

14:27:07 21

Q. Why not?

14:27:11 22

A. Well, my understanding is the purpose of the figures

14:27:14 23

are to help teach the invention, and it wasn't necessary to

14:27:19 24

have a picture of the final image to teach the invention.

14:27:24 25

Q. Okay. That's not just a rule for your patent, right,

14:27:27 1 that's the general rule for all patents. Would you agree?

14:27:29 2 A. That is my understanding.

14:27:31 3 Q. So the fact that Dr. Massie's patents don't have
14:27:34 4 images of teeth, the same answer applies, you agree it was
14:27:39 5 not necessary?

14:27:40 6 A. It wasn't necessary if the patent was taught
14:27:44 7 sufficiently.

14:27:45 8 Q. Okay. And if could go back to slide nine. So it
14:28:07 9 doesn't quite say it here, although I think this came out
14:28:11 10 during your direct. This is an excerpt from one of
14:28:14 11 Dr. Massie's patents; right?

14:28:17 12 A. Yes.

14:28:18 13 Q. And the image on the left, I know, I can recognize
14:28:22 14 this, the '301 patent, and then its it's an excerpt, so in
14:28:26 15 Dr. Massie's patents, he included information that in the
14:28:31 16 medical field, densitometry procedures are used for
14:28:35 17 measuring bone morphology density by utilizing scanning
14:28:41 18 x-ray beam techniques and he gives some examples including
14:28:44 19 your patent, that's what happened here, right?

14:28:46 20 A. Yes.

14:28:48 21 Q. And this was because it's in his patent that means it
14:28:52 22 was in his patent application?

14:28:54 23 A. Yes.

14:28:56 24 Q. It couldn't be in the patent if it wasn't in the
14:28:58 25 application?

- 14:28:57 1 A. That's correct.
- 14:28:58 2 Q. And because it was in the application, that means
- 14:29:01 3 that the patent examiner at the U.S. Patent Office read this
- 14:29:05 4 or had it available to read; correct?
- 14:29:08 5 A. Yes.
- 14:29:10 6 Q. Which means that the patent examiner was told by
- 14:29:15 7 Dr. Massie that he could look at these things, including
- 14:29:18 8 your patent?
- 14:29:20 9 A. Yes.
- 14:29:22 10 Q. So he came clean with the Patent Office that he knew
- 14:29:24 11 about this stuff including your patent?
- 14:29:26 12 A. With respect to densitometry.
- 14:29:30 13 Q. Okay. But your patent is listed something that the
- 14:29:34 14 examiner could go look at?
- 14:29:36 15 A. Yes.
- 14:29:37 16 Q. He was aware of it?
- 14:29:38 17 A. I'm sorry?
- 14:29:39 18 Q. The examiner was aware of it?
- 14:29:40 19 A. Yes.
- 14:29:52 20 Q. Sorry, just trying to find the slide. Give me a
- 14:30:00 21 second.
- 14:30:01 22 We'll continue with that point a little later.
- 14:30:15 23 Let's go to slide 13. This slide and I think the next one
- 14:30:22 24 are a list of materials you reviewed. Right?
- 14:30:27 25 A. A general description.

14:30:29 1 Q. General description. Is there anything that's --
14:30:33 2 even in the general sense that's missing from either this
14:30:36 3 slide or the next one, we could call it up if you don't have
14:30:40 4 a hard copy. There you go. Is there any major category of
14:30:45 5 materials that you reviewed that's just not on this list?

14:30:56 6 A. As I said, I looked at the -- I read the patent
14:30:59 7 history as well as the patents.

14:31:03 8 Q. Okay. What else? Well, Mr. Ostrow, nothing comes to
14:31:34 9 mind but if you tell me what you're thinking of, I'll tell
14:31:38 10 you if I looked at it?

14:31:39 11 Q. I'm going to take you up on that offer. How about
14:31:42 12 source code, did you review any source code?

14:31:45 13 A. No.

14:31:45 14 Q. Why not?

14:31:46 15 A. Because Dr. Kia never presented an argument related
14:31:53 16 to source code. I had the source code available, and I did
14:32:01 17 not need source code to understand his arguments, so I did
14:32:05 18 not see a need to actually read the source code.

14:32:08 19 Q. What about to understand how the ProMax system or
14:32:13 20 Romexis software works, would it not have been helpful to
14:32:16 21 review the source code for that purpose?

14:32:20 22 A. I read the deposition transcripts and I had
14:32:23 23 discussions with Mr. Pienkowski and Mr. Muller, and as I
14:32:32 24 said, I read the manuals and I believed those sources at
14:32:35 25 their word.

14:32:40 1 Q. Okay. So that was enough for you to form the basis
14:32:43 2 of your opinion?

14:32:44 3 A. About how the machines worked, yes.

14:32:47 4 Q. Right. Thank you. That's what I meant, but I
14:32:50 5 appreciate the clarification.

14:32:51 6 What about using the machine, using a ProMax
14:32:55 7 machine, it's not on here. Did you ever use one?

14:32:59 8 A. I have not used one, no.

14:33:01 9 Q. You didn't go to Finland and just walk in their
14:33:05 10 office and just start using it?

14:33:07 11 A. I did not. The only time I have personally used a
14:33:12 12 dental x-ray machine was in my training, I did some
14:33:17 13 experiments on a panoramic machine.

14:33:20 14 Q. Your training, your training for what?

14:33:24 15 A. My studies, my graduate training, I had a course on
14:33:31 16 radiological physics that included, if you want to go to the
14:33:36 17 slide that talks about my education, you can tell you where
14:33:39 18 it was?

14:33:39 19 Q. I think we'll minimize it, I think the jury has seen,
14:33:44 20 around 1976, that's when you got your masters at Harvard, is
14:33:50 21 that what you're referring to?

14:33:51 22 A. In that era I had courses on radiological imaging
14:33:56 23 which included dental imaging. Your question was did I have
14:34:00 24 courses that focused on dental imaging, they certainly
14:34:05 25 included dental imaging and we did experiments on a

14:34:08 1 panoramic x-ray machine.

14:34:10 2 Q. So the last time you used a dental imaging machine
14:34:14 3 was almost 50 years ago?

14:34:18 4 A. Not quite, but that's the last time I personally
14:34:22 5 operated one.

14:34:22 6 Q. I'm sorry, 48, 47, something like that. You
14:34:31 7 concluded it wasn't necessary to use one of the ProMax
14:34:34 8 machines with the Romexis software in order to understand
14:34:37 9 how the system work and to give your opinion, right?

14:34:41 10 A. That's correct.

14:34:42 11 Q. Even though you're working with them and you could
14:34:46 12 have just gone to Hoffman estates or Finland and looked at
14:34:51 13 it, you chose not to do that, right?

14:34:54 14 A. No. And I can clarify that if you like.

14:34:59 15 Q. No, I think we all understand fine. Thank you.

14:35:02 16 If your attorney wants you to clarify it, she'll
14:35:07 17 give you that option.

14:35:09 18 A. I understand.

14:35:17 19 Q. Let's go to slide 19. This is one of the devices
14:35:32 20 that you discussed during your direct, do you remember this?

14:35:41 21 A. Yes.

14:35:41 22 Q. Is this a dental imaging machine?

14:35:45 23 A. No.

14:35:51 24 Q. Okay. Let's go to slide 21. I'm sorry, I didn't
14:35:57 25 mean -- were you saying something?

14:35:59 1 A. So the -- I don't think I talked about this, but this
14:36:05 2 particular CT scanner had what we call a water bag. It was
14:36:14 3 certainly not an advantage of the machine that the patient's
14:36:18 4 head is inserted in the machine, it can only image heads,
14:36:22 5 and a bag was inflated, the patient's head goes into a
14:36:31 6 flexible bag that then is inflated with water. And that
14:36:35 7 limited the machine to scanning you know, roughly down to
14:36:40 8 the eyes. So depending on the angulation you might have
14:36:46 9 been able to catch some of the other jaw, but certainly not
14:36:50 10 down to the chin. On the other hand this machine because it
14:36:54 11 was available was often used for experiments on a variety of
14:37:00 12 objects not inside the person. So people could have brought
14:37:04 13 mandibles and used it to image teeth and it would have done
14:37:10 14 so quite well.

14:37:14 15 Q. As far as you know, that was never done?

14:37:18 16 A. I did not look for such papers, but I actually would
14:37:22 17 be surprised if it wasn't.

14:37:26 18 Q. Okay. I appreciate that.

14:37:30 19 Let's go to slide 22. Dr. Pelc, slide 22 was --
14:37:34 20 you introduced us to this Cann article; right?

14:37:38 21 A. Yes.

14:37:42 22 Q. Okay. And this Cann article you say teaches bone
14:37:46 23 densitometry and quantitative computed tomography?

14:37:50 24 A. Yes.

14:37:54 25 Q. And the title of the article is precise measurement

14:38:00 1 of vertebral mineral content using computed tomography, do
14:38:04 2 you see that?

14:38:04 3 A. Yes.

14:38:04 4 Q. What is vertebral mineral content?

14:38:08 5 A. It's the bone mineral content of the vertebra, the
14:38:12 6 vertebra, that is one of the vertebra.

14:38:17 7 Q. I'm sorry, I was looking down I didn't see where you
14:38:20 8 pointed?

14:38:21 9 A. This laser pointer is not very reliable. That bone
14:38:25 10 that you see there.

14:38:27 11 Q. Talk me through it.

14:38:29 12 A. Yes, that's it.

14:38:31 13 Q. This?

14:38:31 14 A. That's a cross-section of a vertebra.

14:38:34 15 Q. What's a vertebra?

14:38:36 16 A. It's one of the bones in the spine.

14:38:38 17 Q. So it's not -- that's not a tooth, these aren't
14:38:42 18 teeth?

14:38:42 19 A. That is not a tooth. It would be quite abnormal to
14:38:46 20 have a tooth there.

14:38:48 21 Q. There being in your spine?

14:38:52 22 A. Yes.

14:38:53 23 Q. So this was a machine for measuring spines, and this
14:38:57 24 is I think you introduced this for the idea of quantitative
14:39:02 25 computed tomography; right?

14:39:03 1

A. That's right.

14:39:04 2

Q. In part. Just explain, you may have explained this already, how did quantitative computed tomography work?

14:39:07 3

14:39:11 4

A. So the area that you're interested in is scanned.

14:39:21 5

Multiple slices so it's three dimensional tomographic. And

14:39:27 6

at the same time that you are scanning the object that you

14:39:31 7

are interested in, you scan objects whose mineral content

14:39:34 8

you know. And then you take the reconstructed values in the

14:39:43 9

region of the object that you're interested in and you

14:39:46 10

compare them with the known values of the known standards

14:39:50 11

you put in, and from that, calculate quantitatively the bone

14:39:54 12

mineral content.

14:40:00 13

Q. Why is it necessary as part of this process to use

14:40:03 14

the object of known density to scan them, why is that

14:40:07 15

important to do as part of this process?

14:40:11 16

A. Because as I mentioned, the scanner measures a

14:40:15 17

quantity that is the linear attenuation coefficient. And

14:40:19 18

the linear attenuation coefficient is not bone density. It

14:40:23 19

is not quantitatively calculated bone density. And if you

14:40:27 20

need to get from the measurement that the scanner provides

14:40:31 21

to quantitatively calculated bone density or bone density or

14:40:35 22

bone mineral density, you need to have some way of going

14:40:39 23

from the thing that is not bone density to what is bone

14:40:43 24

density. And they -- and that's done through this

14:40:47 25

referencing to the known standards.

14:41:00 1 Q. And why is it that for these kinds of images that the
14:41:07 2 linear attenuation coefficient doesn't in and of itself
14:41:11 3 represent bone density, can you explain the science behind
14:41:14 4 that?

14:41:14 5 A. Yes. The linear attenuation coefficient never equal
14:41:18 6 bone density.

14:41:19 7 Q. So why?

14:41:22 8 A. Because bone density is mass per unit volume, and the
14:41:29 9 linear attenuation coefficient is a parameter of the tissue
14:41:32 10 that determines, that describes the rate at which the x-ray
14:41:38 11 beam is reduced in intensity as it travels through that
14:41:43 12 material, they're just different.

14:41:45 13 Q. If someone was imaging just the bone, just the spine
14:41:49 14 without it being -- from a skeleton, let's say, sorry to get
14:41:54 15 morbid, but I got to make the point, so if someone was
14:41:57 16 imaging just the skeleton using CT, would that alone be able
14:42:05 17 to be an assessment of bone density?

14:42:08 18 A. No.

14:42:08 19 Q. Why not?

14:42:09 20 A. Because you're measuring different things.

14:42:12 21 Mr. Ostrow, suppose I ask you how long is your car, and you
14:42:18 22 answer, my car weighs 2000 pounds. What you're telling me
14:42:24 23 is the weight of your car. But I asked you how long is your
14:42:29 24 car. They're related, they might even be proportional, but
14:42:34 25 they're different.

14:42:36 1 Q. I don't think that's a good example with due respect?

14:42:40 2 A. Do you want me to give you another one?

14:42:42 3 Q. I'll give you one, how about if someone asked me how
14:42:47 4 long my car is and instead of giving that length, tell them
14:42:50 5 if I stand ten feet away and I shine a light, the shadow is
14:42:54 6 12 feet, how about that, and then make them derive the
14:42:59 7 length from that, right?

14:43:00 8 A. Well, first of all, if you stand ten feet away, the
14:43:04 9 shadow will be determined by the height of the car not the
14:43:08 10 length of the car.

14:43:09 11 Q. I'm talking about the length of the shadow. You
14:43:13 12 asked -- your example is length?

14:43:15 13 A. I see.

14:43:16 14 Q. So if I shine my flashlight and I let the person know
14:43:20 15 how far I am, how bright the light is, they know what the
14:43:23 16 parameter is, they can derive the length of the car right?

14:43:28 17 A. Let me clarify yours.

14:43:29 18 Q. Sir yes or no, before you clarify, I listened to your
14:43:33 19 hypothetical, can you just answer my hypothetical, you could
14:43:37 20 do it, right?

14:43:38 21 A. If you measured the length of the shadow of the car,
14:43:42 22 you could infer the length of the car.

14:43:44 23 Q. Thank you. Now, you were going to say?

14:43:46 24 A. Yes, the difference is the shadow of the car is
14:43:50 25 determined entirely by the length of the car. The linear

14:43:55 1 attenuation coefficient is not determined entirely by the
14:43:58 2 density.

14:43:59 3 Q. Okay. We'll come back, let's put a pen in that if we
14:44:05 4 could?

14:44:05 5 A. That's your job.

14:44:06 6 Q. I know, I'm putting a pen on that issue because I
14:44:11 7 want to come to that chart in a minute. I just want to
14:44:15 8 finish this. This article you're doing, you introduced this
14:44:18 9 as sort of the background of the state of the art, right?

14:44:21 10 A. I used this several times in my presentation.

14:44:24 11 Q. This was the Cann article that you used in
14:44:29 12 combination with Webber, I think

14:44:34 13 A. Yes.

14:44:34 14 Q. But standing alone, you are not taking the position
14:44:38 15 or expressing the the opinion that this Cann article
14:44:41 16 anticipates any of the claims of the Osseo patents, right?

14:44:44 17 A. I did not present any anticipation arguments.

14:44:47 18 Q. At all?

14:44:47 19 A. That's correct.

14:44:48 20 Q. So if your opinion, you did not find anything that
14:44:51 21 anticipated Dr. Massie's patents?

14:44:52 22 A. That's not what I said. What I said is I did not
14:44:57 23 make any arguments of anticipation.

14:44:59 24 Q. Well, wouldn't you have if you had found, if you had
14:45:02 25 them?

14:45:04 1 A. You know, those are decisions that lawyers have to
14:45:07 2 make.

14:45:07 3 Q. I mean, anticipation is a better case than
14:45:11 4 obviousness, right?

14:45:13 5 A. So I understand, yes.

14:45:14 6 Q. So presumably if you had a good -- if you had a good
14:45:18 7 case for anticipation, which means something, the patent was
14:45:21 8 not new at all, you would have presented that instead of
14:45:25 9 just combining references as you did, right?

14:45:30 10 A. Mr. Ostrow, I did not present any anticipation
14:45:34 11 arguments.

14:45:36 12 Q. Okay. So let's go to slide 23. This is another
14:45:43 13 article or actually it's two articles PX-98, right, and
14:45:50 14 PX-100 that you put on the screen in your presentation?

14:45:53 15 A. Yes.

14:45:53 16 Q. Same question generally, so these articles, you're
14:45:57 17 not taking the position that these articles anticipate
14:46:02 18 Dr. Massie's claims?

14:46:04 19 A. I did not make an anticipation argument with either
14:46:07 20 of these references.

14:46:09 21 Q. And unless my memory is bad, you also didn't use
14:46:12 22 these in your obviousness arguments, correct?

14:46:14 23 A. That's correct.

14:46:21 24 Q. Slide 24.

14:46:25 25 And this was another article that you presented,

14:46:29 1

the Mozzo 1998?

14:46:32 2

A. Mozzo.

14:46:34 3

Q. Mozzo, sorry. Sorry, same question, you introduced

14:46:42 4

this for purposes of some sort of background of the state of

14:46:47 5

art, right?

14:46:47 6

A. Yes.

14:46:47 7

Q. You're not giving an opinion today that Dr. Massie's

14:46:50 8

patents are either not anticipated or obvious over this

14:46:59 9

reference; correct?

14:46:59 10

A. Well, the problem with that is there are so many

14:47:04 11

possible combination of references that one could put

14:47:04 12

together, I easily could put together an obviousness

14:47:07 13

argument with this reference.

14:47:09 14

Q. But you didn't?

14:47:09 15

A. I didn't.

14:47:11 16

Q. And so your opinion your opinion today does not

14:47:14 17

include any argument that Dr. Massie's patents were obvious

14:47:19 18

over the Mozzo reference, correct?

14:47:21 19

A. That's correct. Alone or in combination with

14:47:25 20

anything.

14:47:26 21

Q. Right. So it's just background material?

14:47:30 22

A. That's how I used it today.

14:47:42 23

Q. Let's go to slide 27. This was another slide you

14:47:52 24

used to help explain -- I'm sorry, 27. Tomography, right,

14:47:52 25

slide 27?

14:48:00 1

A. Yes.

14:48:01 2

Q. And you see how the red lines that are coming out of

14:48:06 3

the, I guess the x-ray energy source, right, these red lines

14:48:12 4

represent one collimated beam, is that what this means?

14:48:19 5

A. All of those lines are coming -- are part of one

14:48:24 6

collimated beam.

14:48:26 7

Q. Because it says, the text says take images from

14:48:30 8

multiple source positions, but I think what you intended was

14:48:34 9

these dotted lines -- what would you call this, x-ray

14:48:39 10

source, energy source, what would you call that?

14:48:41 11

A. That's like an -- that's what an x-ray tube looks

14:48:44 12

like.

14:48:45 13

Q. X-ray tube?

14:48:46 14

A. Uh-huh.

14:48:47 15

Q. So this x-ray tube, the idea of what you're saying is

14:48:51 16

that it would be moved to different positions, right?

14:48:54 17

A. That's right. You would take images like that from

14:48:57 18

the source at different positions and probably be moving the

14:49:01 19

detector with it.

14:49:02 20

Q. The detector is here, P?

14:49:04 21

A. That's right.

14:49:06 22

Q. So this would also move around like in the back?

14:49:08 23

A. Perhaps. There are some tomography techniques where

14:49:11 24

it moves and some tomography techniques where it's standing

14:49:13 25

still.

14:49:17 1 Q. How many images would have to be taken in order to
14:49:20 2 get sort of a 3D view of some part of what's being imaged?

14:49:26 3 A. Well, we heard in this trial that the Planmeca system
14:49:31 4 uses 400, I think it was. I would say hundreds.

14:49:41 5 Q. Hundreds, to what, to image the entire set of the
14:49:45 6 cylinder, ball, I forgot my geometry, whatever that is. So
14:49:53 7 you image the whole set of this, you need hundreds of these
14:49:58 8 images, right? But what if I just wanted-- I'm sorry, let's
14:50:01 9 just ask that question, is that what you meant?

14:50:03 10 A. Sir, I was going to clarify that it depends on the
14:50:07 11 kind of tomography that you're taking. So typically for
14:50:10 12 tomosynthesis, we use tens, tens of frames over a more
14:50:14 13 limited angular excursion. For computed tomography when we
14:50:21 14 go all the way around, typically we use hundreds to even
14:50:26 15 thousands.

14:50:30 16 Q. But again what I was asking was, you would use
14:50:34 17 hundreds or thousands of such images if you're trying to
14:50:38 18 capture everything that's in this cube, right?

14:50:41 19 A. If you wanted good tomography over that entire cube,
14:50:45 20 that's right.

14:50:48 21 Q. What if you only cared about some small subset like a
14:50:52 22 portion of the sphere, you wouldn't have to do hundreds or
14:50:56 23 thousands of images, right?

14:50:59 24 A. You probably do, and I think we need to clarify that.
14:51:03 25 You want to image, I don't know what to call that, let's

14:51:12 1 call it the red egg, okay?

14:51:16 2 Q. Yes.

14:51:17 3 A. So if you wanted to image the red egg, the problem
14:51:23 4 that you have is that in some directions the red egg is seen
14:51:29 5 through the blue cylinder, and in other directions it's seen
14:51:33 6 through the green columns and in other directions it's seen
14:51:37 7 through the orange object. So if you need to separate all
14:51:43 8 of them, it's -- even though you may be interested only in
14:51:47 9 the red egg, you need hundreds to thousands of views.

14:51:57 10 Q. Okay. Now, during your deposition, you may recall
14:52:10 11 you and I talked about similar issues about the number of
14:52:14 12 scans that would be needed or images to makeup a tomographic
14:52:19 13 scan, do you remember that?

14:52:21 14 A. I do.

14:52:22 15 Q. And do you remember what your answer was then?

14:52:27 16 A. No. I mean, I do, but if you're going to ask me
14:52:32 17 about it, I would like to look at the transcript.

14:52:51 18 Q. Okay. I'll have that for you in just a moment. What
14:53:03 19 I'm thinking about is on page 132 of your deposition
14:53:07 20 transcript, 132.

14:53:10 21 A. And can you remind me what tab my deposition
14:53:13 22 transcript is?

14:53:15 23 Q. I want to say four.

14:53:19 24 A. Yes. And page?

14:53:21 25 Q. 132?

14:53:27 1 A. Yes.

14:53:29 2 Q. And so there is a series of questions and answers

14:53:32 3 that began on sort of on line 7 or so. Do you see that? I

14:53:40 4 asked you, I said, I am asking you could there be five of

14:53:44 5 those different measurements that combined to be a

14:53:48 6 tomographic scan, do you see that? I'm just trying to make

14:53:57 7 sure you're --

14:53:59 8 A. I see where you are.

14:54:00 9 Q. And then you said you would describe a technique and

14:54:03 10 I asked you to answer and then if you go down, I asked

14:54:07 11 again, a subset of the measurements together applied, could

14:54:11 12 that constitute one tomographic scan as you understand the

14:54:14 13 term, do you see that at the bottom, line 21 to 24?

14:54:20 14 A. I'm sorry, 21 to 24.

14:54:23 15 Q. Yes.

14:54:29 16 A. Yes. I see that question.

14:54:33 17 Q. Then your answer was, I'm starting on line 25, so 5

14:54:37 18 or 10 or 15 of them can constitute a tomosynthesis scan and

14:54:41 19 to me that is tomographic. Do you see that?

14:54:50 20 A. Yes.

14:54:52 21 Q. I'll use the high end of that, 15 of the scans

14:54:54 22 whether that constitutes tomography, is that what you said?

14:54:58 23 A. That's what I said.

14:55:00 24 Q. And then do you want to change that answer now?

14:55:02 25 A. No, I will say that those five or say 15 could

14:55:11 1 constitute a tomosynthesis scan, yes.

14:55:17 2 Q. And you said, and and to me that is tomography?

14:55:20 3 A. That is correct.

14:55:21 4 Q. And then I asked you whether use the Feldkamp
14:55:24 5 algorithm, whether if the system combines one set of those
14:55:27 6 with another set of those, you would agree that satisfies
14:55:32 7 merging formations for multiple tomographic scans, right?

14:55:35 8 A. That was your question.

14:55:37 9 Q. Right. And then there is a long answer here, I'm
14:55:40 10 happy to read the whole thing, but at the bottom of it, I'm
14:55:43 11 happy to do it, the bottom of it it says the answer is yes,
14:55:47 12 in most cases it would be called a tomosynthesis scan, it's
14:55:51 13 limited angle tomography, do you see that?

14:55:54 14 A. Yes, I see that. And I disagree with it.

14:56:04 15 Q. Okay. Well that's what you said under oath when I
14:56:12 16 asked you the first time?

14:56:13 17 A. That's right.

14:56:14 18 Q. Okay. So now you're saying you were wrong?

14:56:18 19 A. I think in the context of this trial, in the context
14:56:21 20 of this issue where we are trying to ascertain whether or
14:56:30 21 not a machine merges information from multiple tomographic
14:56:35 22 scans, what you are using -- I'm sorry, what you are doing
14:56:38 23 is deleting -- is deleting the meaning of the claim.

14:56:42 24 Q. In your deposition, you said that 15, again, I'm
14:56:52 25 using the high end of the numbers you gave, 15 tomosynthesis

14:56:57 1 scans, that would be a tomography, and then if I did another
14:57:02 2 15 and then I used Feldkamp algorithm to merge those
14:57:06 3 together, that's my merged tomographic model, that's what
14:57:11 4 you said?

14:57:11 5 A. It is, but you are using it to take one tomographic
14:57:14 6 scan and artificially call it multiple tomographic scans, if
14:57:19 7 that was true, why would the court have said that the claim
14:57:23 8 requires merging multiple tomographic scans, it would be any
14:57:27 9 tomographic scan, the court would not have needed to say
14:57:31 10 multiple, merging of multiple tomographic scans.

14:57:35 11 Q. Why not, that's what the patent says? I'm confused
14:57:40 12 --

14:57:40 13 A. What you did.

14:57:41 14 Q. Were you at the Markman hearing?

14:57:43 15 A. Of course not.

14:57:44 16 Q. Okay. So you don't know what Judge Stark was
14:57:47 17 thinking when he wrote this?

14:57:48 18 A. No. I'm reading what he said. But what you are
14:57:51 19 doing, sir, is taking one tomographic scan and for purposes
14:57:52 20 of arguing infringement are breaking it into multiple
14:58:00 21 tomographic scans so that you could then merge them again.

14:58:00 22 Q. No, sir. What I am doing is telling you, telling
14:58:10 23 everybody what you said under oath so that everybody knows
14:58:14 24 the context. You said under oath in a conference room, no
14:58:18 25 pressure, you said whatever you wanted, that 15, 15 scans of

14:58:26 1 tomography merged with another 15 scans, that's tomographic
14:58:31 2 model, that's what you said.

14:58:32 3 A. As an answer to a hypothetical.

14:58:36 4 Q. Now we're in the real world, so the answer doesn't
14:58:40 5 change. Sorry.

14:58:47 6 Let's go because I sense we're going to lose the
14:58:52 7 thread of this. 45, please. Do you remember this slide,
14:58:58 8 you put this up about converting, a method that you had of
14:59:02 9 converting Hounsfield units to linear attenuation
14:59:07 10 coefficients?

14:59:07 11 A. Yes.

14:59:07 12 Q. And so you gave this table. Where does this table
14:59:11 13 come from. It says NIST. Do you see that?

14:59:15 14 A. Yes.

14:59:15 15 Q. Is that where the table comes from?

14:59:17 16 A. Yes.

14:59:18 17 Q. What's NIST?

14:59:19 18 A. The national institute of standards and technology.

14:59:21 19 Q. So this is like the U.S. government's version of
14:59:25 20 science, more or less, science from the U.S. government?

14:59:29 21 A. No, no, the U.S. government interestingly, it's under
14:59:33 22 the department of commerce, and the goal of this is to
14:59:37 23 encourage commerce by providing information about science
14:59:41 24 and technology and among the things that they do is provide
14:59:45 25 information about material properties, how measurements are

14:59:52 1 to be made. They're the people, for example, that define
14:59:55 2 what a meter is, what a second is, so on.

14:59:58 3 Q. So the national institute of standards, they put out
15:00:01 4 this table?

15:00:03 5 A. They have --there is a website that contains mass
15:00:13 6 attenuation coefficient of all elements and a number of
15:00:16 7 different compounds or materials like water, blood, soft
15:00:22 8 tissue, polystyrene or cortical bone each of which has
15:00:26 9 multiple elements in it. So all of that information is
15:00:29 10 available from this, and it's a compilation of measurements
15:00:32 11 and calculations that were done over many years.

15:00:35 12 Q. Okay. So of whatever was in the NIST table, you
15:00:41 13 selected this subset and presented it here; right?

15:00:44 14 A. That's correct.

15:00:47 15 Q. And you have a, you know, a picture here of a tooth;
15:00:54 16 right?

15:00:57 17 A. Yes.

15:00:59 18 Q. It has a cavity, I'm no dentist but that's what it
15:00:59 19 looked like to me. And the tooth, I know we talked about
15:01:02 20 this before, it's sort of the enamel right?

15:01:05 21 A. That's right.

15:01:07 22 Q. And then the bone, what we agree is bone, the gray
15:01:11 23 part?

15:01:14 24 A. The gray part, I think is the bone. I believe that
15:01:17 25 as an Osseo graphic.

- 15:01:19 1 Q. Okay. And this red stuff in the middle, that's the
15:01:23 2 nerve?
- 15:01:24 3 A. The root or whatever is in the inside of the tooth,
15:01:27 4 that's right. Or the nerve and tissue that's inside the
15:01:31 5 tooth.
- 15:01:31 6 Q. The tissue. And this tissue here, this is soft
15:01:34 7 tissue, right?
- 15:01:35 8 A. I think so.
- 15:01:37 9 Q. You're not sure?
- 15:01:38 10 A. That's right.
- 15:01:41 11 Q. Do you know the difference between soft tissue and
15:01:44 12 hard tissue?
- 15:01:45 13 A. Very much so.
- 15:01:46 14 Q. But you don't know that much about teeth, is that why
15:01:49 15 you're not sure?
- 15:01:50 16 A. That's correct.
- 15:01:51 17 Q. Let's take it as a given that this is soft tissue.
15:01:54 18 The patents in this case, are they measuring soft tissue or
15:01:57 19 density or bone density?
- 15:01:59 20 A. Bone density.
- 15:02:00 21 Q. Only bone density, right?
- 15:02:01 22 A. Yes.
- 15:02:02 23 Q. So the patents in this case don't care about this?
- 15:02:05 24 A. Yes.
- 15:02:06 25 Q. Okay. The patents in this case are only caring about

15:02:09 1 the density of this gray material, and maybe the enamel if
15:02:16 2 he considers that hard tissue, right?

15:02:17 3 A. Yes.

15:02:18 4 Q. Now, you presented this table and I think -- I may
15:02:21 5 butcher your walk through so please correct me, I suspect
15:02:26 6 you will anyway, but it's fine. So you tried to explain
15:02:30 7 that the reason why the linear attenuation coefficient can
15:02:36 8 represent density, be density, is because there is also this
15:02:41 9 mass attenuation coefficient, is that the purpose of this?

15:02:43 10 A. The exercise I was going through was can I convert,
15:02:50 11 computationally convert Hounsfield units to density. Okay?
15:02:57 12 And what you said is you first have to convert Hounsfield
15:03:00 13 units to linear attenuation coefficient, and then if you
15:03:04 14 happen to have that and also the mass attenuation
15:03:08 15 coefficient, the ratio would give you density.

15:03:14 16 Q. And if I understood correctly, your point was that
15:03:18 17 because the variability of what's in -- what's being
15:03:23 18 measured, right, the anatomy being measured and the energy
15:03:28 19 levels that it -- there is too much variability to figure
15:03:31 20 this out based on just the linear attenuation coefficient
15:03:34 21 alone, is that right?

15:03:35 22 A. Yeah. And actually there are two points that I want
15:03:38 23 to make. That's one of them. The other is if you wanted to
15:03:42 24 calculate bone density, you would still have to go through
15:03:45 25 the exercise of doing this calculation. And there is no

15:03:51 1 evidence that the Planmeca machine does anything like this.

15:03:55 2 Q. That's if you wanted to calculate density as mass

15:03:59 3 over volume, right?

15:03:59 4 A. That's if you wanted to calculate quantitatively bone

15:04:05 5 density.

15:04:05 6 Q. Remember your example with the car and the shadow?

15:04:08 7 A. Yes.

15:04:08 8 Q. The calculation of the length of the shadow, that's a

15:04:11 9 quantitative calculation, right?

15:04:13 10 A. What units did you measure the length of the shadow

15:04:17 11 in when you went through that hypothetical?

15:04:20 12 Q. Whatever units, people measure length in, I didn't

15:04:24 13 care?

15:04:25 14 A. Feet, for example.

15:04:25 15 Q. Sure?

15:04:26 16 A. And that would give you the length of the car in

15:04:29 17 feet. Both are length measures so you would a length

15:04:31 18 measure and you, from one length measure you got to another

15:04:37 19 length measure. We know how to do that. Linear attenuation

15:04:41 20 coefficient and density are different. That's much more

15:04:44 21 like the example that I gave you about the length of the car

15:04:47 22 and the weight of the car. They're not the same.

15:04:50 23 Q. Right. Okay.

15:04:51 24 We'll come back to that in a second, I don't

15:04:52 25 want to lose the thread of this.

15:04:57 1 So your point was that you know because there is
15:05:01 2 water, water affects -- has an affect on the mass
15:05:09 3 attenuation coefficient, and blood has this affect on mass
15:05:11 4 attenuation attenuation, is that what this table is showing?

15:05:15 5 A. No.

15:05:15 6 Q. Then what is the point of the water, blood, soft
15:05:19 7 tissue, so forth?

15:05:20 8 A. If you wanted to know what this table tells us is
15:05:24 9 that the mass attenuation coefficient of water at 40 keV is
15:05:29 10 .2683.

15:05:32 11 Q. Now, the bony part of the tooth, does that have any
15:05:37 12 water?

15:05:37 13 A. Yes.

15:05:38 14 Q. How much?

15:05:39 15 A. I think quite a bit.

15:05:40 16 Q. Yeah?

15:05:41 17 A. Yeah.

15:05:41 18 Q. When is the last time you looked it up?

15:05:44 19 A. So actually I did look that up. If you look up the
15:05:48 20 composition of bone, there is certainly a fair amount of
15:05:54 21 mineral in the bone, but from what I know, it's only about
15:06:00 22 20 percent of the mass of the bone. The rest of the mass of
15:06:03 23 bone is not mineral.

15:06:04 24 Q. I'm asking you about tooth?

15:06:05 25 A. Well, I think it's similar.

15:06:11 1 Q. Okay. I don't want to testify but when I goggled it,
15:06:14 2 it said 1.4 percent, would that surprise you that water
15:06:18 3 makes up, just the bony part, not the root?

15:06:21 4 A. And what about other soft tissues and proteins.

15:06:26 5 Q. I'm asking one question at a time right now?

15:06:29 6 A. But the problem --

15:06:30 7 Q. I'm asking you if you know, if you knew how much
15:06:34 8 water was in bone and it sounds like I'm not sure that we
15:06:38 9 got an answer here, but from what I know it's very small but
15:06:42 10 I guess you can't confirm that?

15:06:44 11 A. That's right, I can't confirm it. But what I can
15:06:47 12 tell you is that the mass of mineral in the bone depends on
15:06:51 13 what else is in the bone and the bone is not mineral, it
15:07:00 14 also -- it's not just mineral. And as the bone
15:07:04 15 demineralizes, the amount of minerals given the name,
15:07:10 16 demineralizing, the bone doesn't entirely disappear, it gets
15:07:14 17 filled in with other materials, right. And so the chemical
15:07:21 18 composition of bone depends to the state of mineralization.

15:07:24 19 Q. You keep saying bone, I'm asking you about teeth.
15:07:31 20 You're sure that's what happens as teeth because there is a
15:07:33 21 hole here?

15:07:34 22 A. That's because it cracked.

15:07:36 23 Q. So you can't just-he this hole is this crack?

15:07:41 24 A. I'm sorry.

15:07:43 25 Q. I've asked you before if you knew about teeth, so I'm

15:07:46 1 asking you now what you're saying about bones, I'm asking
15:07:50 2 you whether it applies to teeth? Do you actually know what
15:07:55 3 happens when demineralization occurs in the tooth?

15:08:00 4 A. My understanding is that when demineralization occurs
15:08:04 5 in the tooth, the composition of the tooth changes in terms
15:08:08 6 of the fraction by weight of different elements?

15:08:12 7 Q. And the density changes?

15:08:14 8 A. Yes.

15:08:16 9 Q. So is there soft tissue in the bones?

15:08:21 10 A. There are proteins and other things in the bone.

15:08:25 11 Q. How much?

15:08:25 12 A. I don't know.

15:08:26 13 Q. How about blood, is there blood in the bone, of the
15:08:29 14 tooth I'm asking? If you know, how much?

15:08:34 15 A. I don't know. I don't.

15:08:36 16 Q. And polystyrene, how much polystyrene is there in the
15:08:40 17 bone?

15:08:40 18 A. Oh, those are just meant to be exemplary to show that
15:08:41 19 in the range of materials that one might consider, the mass
15:08:50 20 attenuation coefficient changes.

15:08:52 21 Q. Do you know what energy level dental machines do
15:08:52 22 their scans at?

15:09:00 23 A. Well, that's a complication. I know that the
15:09:04 24 Planmeca machine, for example, operates if I remember
15:09:12 25 correctly between x-ray tube voltage of 55 KVP up to over a

15:09:20 1 hundred. But that is not what that number is.

15:09:23 2 Q. What is that number?

15:09:28 3 A. That is the energy of monoenergetic photons which the
15:09:34 4 x-ray tube does not emit and the Planmeca machine does not
15:09:37 5 have.

15:09:37 6 The problem, and I didn't get into this, the
15:09:43 7 light coming out of these light bulbs is not a single color.
15:09:49 8 As we know, if we take a prism, it will break that white
15:09:53 9 light into a range of colors. I'm not going to talk about
15:10:00 10 lasers.

15:10:03 11 Now similarly the x-rays coming out of the x-ray
15:10:06 12 tube are more like white light. They contain a whole range
15:10:11 13 of energies. See when the Planmeca system or any dental or
15:10:16 14 medical diagnostic machine shines x-rays through the person,
15:10:21 15 they are not of a single energy. They have a whole range of
15:10:26 16 energies. 40 keV is not a bad estimate for the lower end,
15:10:31 17 it could be lower, it could be down to 30 or 25. And at the
15:10:36 18 upper end, it may go up to 120 or than 140. So think of
15:10:41 19 that as a light beam that has colors that go from red to
15:10:46 20 violet. As the light goes through water, some of of you may
15:10:51 21 have an understanding of this an appreciation or have seen
15:10:56 22 it personally, as you go deeper in water, everything is
15:11:01 23 bluer. That's because the red light is absorbed at the
15:11:06 24 surface and very little red light goes down. If you're down
15:11:11 25 at 20 or 30 feet, there is very little red light getting

15:11:20 1 through.

15:11:20 2 The same thing happens with x-rays. So the
15:11:24 3 lower energy x-rays get attenuated much more easily than the
15:11:30 4 high energy x-rays. So why do I bring this up? Because
15:11:38 5 when you put the person's head in the scanner or any object,
15:11:40 6 different parts of the object are being probed by x-rays of
15:11:44 7 different energies. And what you need to do this
15:11:48 8 calculation is the mass attenuation coefficient for the
15:11:53 9 x-rays that gave you the measurement. And you don't know
15:11:57 10 what it is.

15:11:58 11 Q. So these, keV values are not determined by the energy
15:12:05 12 of the x-ray beam?

15:12:07 13 A. What do you mean by the energy of the x-ray beam.

15:12:10 14 Q. You said this was a different energy, I'm trying to
15:12:13 15 understand what you just said. This is a different energy
15:12:15 16 than what comes out, like you said the lights and all that?

15:12:18 17 A. Right. So with light, we talk about breaking it into
15:12:21 18 colors and each color has a wavelength. The same thing is
15:12:24 19 true of x-rays, the x-ray tube emits x-rays of a whole range
15:12:30 20 of wavelengths, a very broad range of wavelengths, actually
15:12:34 21 much broader than the range of wavelengths of visible light.
15:12:40 22 Instead of characterizing them which the wavelength, we
15:12:43 23 characterize them by the energy. And that I forget,
15:12:46 24 somebody at the beginning of the trial wondered whether we
15:12:52 25 would get into quantum mechanics.

15:12:54 1 Q. That was me?

15:12:55 2 A. Here we are. And the energy of the photon is related
15:12:58 3 to the wavelength in an inverse fashion. The wavelength
15:13:02 4 determines the energy precisely, and because there is a
15:13:06 5 whole range of wavelengths, there are also a whole range of
15:13:11 6 energies.

15:13:13 7 The way you operate the x-ray tube effects the
15:13:19 8 range of colors, but never gives you all photons of the
15:13:24 9 single color, never.

15:13:27 10 Q. Okay. Does it give you at least an average of the
15:13:32 11 photons?

15:13:34 12 A. The average depends on how much tissue you have gone
15:13:38 13 through.

15:13:39 14 Q. Okay. So when it comes to teeth, you know how much
15:13:44 15 tissue you have gone through because teeth generally have a
15:13:48 16 certain size, right?

15:13:49 17 A. You're missing the point.

15:13:51 18 Q. In a dental imaging system?

15:13:53 19 A. Yes.

15:13:54 20 Q. It's known how much tissue has been gone through?

15:13:57 21 A. No.

15:13:58 22 Q. Why not?

15:13:59 23 A. Because you also went through the back of the head
15:14:02 24 and all the tissue in between, it's not just the tooth. By
15:14:06 25 the time the x-rays have gone through the tooth, they have

15:14:09 1 already gone through a bunch of tissue, and oh, by the way,
15:14:13 2 before they get to your detector they are going to be going
15:14:16 3 through more tissue, so somehow you would have to compensate
15:14:19 4 for all of that, and there is nothing in the accused machine
15:14:22 5 that does that.

15:14:23 6 Q. This is related to the densitometry issue, the reason
15:14:28 7 you presented this, right?

15:14:29 8 A. No, this is related to -- no, it's related to the --
15:14:33 9 yes, the densitometry in the sense that densitometry is
15:14:36 10 supposed to be quantitatively calculated bone density.

15:14:41 11 Q. Can you go to slide 43. Right before this, you gave
15:15:05 12 these two examples, examples of ways of doing densitometry,
15:15:12 13 dual energy x-rays or QCT, right?

15:15:16 14 A. Yes, that's right. And I said that there is no
15:15:22 15 evidence of the ProMax 3D systems doing either.

15:15:25 16 Q. Have you ever tested a dental imaging device to
15:15:31 17 determine whether -- what was done for QCT meaning using a
15:15:36 18 reference density model as you described earlier, whether
15:15:38 19 that's needed in order to determine density, have you ever
15:15:42 20 tested that for a dental machine?

15:15:44 21 A. I have not done that, but there are papers analyzing
15:15:48 22 QCT, actually analyzing cone beam CT that say that the
15:15:52 23 grayscale values are not measures of bone density.

15:16:00 24 Q. I'm sorry, that's not what I asked. So let me just
15:16:03 25 try it again, make sure the answer is clear. I'm asking

15:16:07 1 whether you have ever tested a dental machine or read --
15:16:12 2 I'll give you, read about someone who tested a dental
15:16:16 3 machine who concluded one way or the other whether the
15:16:20 4 reference object was needed when it came to dental imaging
15:16:23 5 as opposed to say abdominal imaging or spinal imaging?

15:16:27 6 A. I have not.

15:16:28 7 Q. Were you here when Dr. Kia described his work at
15:16:35 8 sciences?

15:16:35 9 A. Yes.

15:16:35 10 Q. Were you paying attention when he discussed that he
15:16:37 11 did that exact test, did you listen to that?

15:16:40 12 A. Yes. What would be convincing would be, and what
15:16:41 13 scientists have done with respect to both DEXA and QCT, at
15:16:52 14 the end of the day, you need to show me a graph that says
15:16:54 15 that whatever you do is a measure of bone density. And I
15:17:02 16 have not seen the evidence that that is true.

15:17:05 17 Q. Okay. But you didn't work at Imaging Science with
15:17:08 18 Dr. Kia, right?

15:17:09 19 A. I did not.

15:17:15 20 Q. The first other type of method here, the dual energy
15:17:21 21 x-rays, the ProMax 3D systems use dual energy x-rays?

15:17:25 22 A. Yes.

15:17:26 23 Q. You testified several times about the court claim
15:17:31 24 construction order?

15:17:32 25 A. Yes.

15:17:32 1 Q. Do you remember whether the court was asked to
15:17:34 2 consider whether the Massie patents are limited in use of
15:17:37 3 dual energy x-rays?

15:17:38 4 A. Yes.

15:17:38 5 Q. Do you remember what the court said about that?

15:17:40 6 A. The court said that the claims are not limited to
15:17:45 7 dual energy methods, but they are limited to quantitatively
15:17:52 8 calculated bone density.

15:17:52 9 Q. In other words, as long as we could show that there
15:17:55 10 was a quantitatively calculated of bone density in some way,
15:17:58 11 it didn't have to be this way, dual energy x-rays?

15:18:01 12 A. That's correct. As long as what you show is that
15:18:04 13 it's quantitatively calculated bone density.

15:18:06 14 Q. And thank you for saying that, I don't have to pull
15:18:11 15 up the court's construction, I'm happy not to do that.

15:18:13 16 And you admit that even these two things are
15:18:17 17 just examples of ways of doing densitometry, you're not
15:18:20 18 saying these are the only two ways, right?

15:18:21 19 A. These are the two ways that are known in the field
15:18:25 20 currently.

15:18:27 21 Q. Except maybe by Imaging Sciences who has another way
15:18:30 22 that Dr. Kia did right?

15:18:32 23 A. Which as far as I know is not broadly accepted by the
15:18:40 24 community, there are other ways that are not x-ray based for
15:18:42 25 measuring quantitatively calculated bone density.

- 15:18:45 1 Q. But that's not relevant here because we're talking
15:18:48 2 about x-rays?
- 15:18:48 3 A. That's why I said there are only these two.
- 15:18:51 4 Q. Well, at least as examples, these are not the only
15:18:56 5 two, they're just examples?
- 15:18:57 6 A. The reason that I said examples is precisely because
15:19:01 7 the court said that the claims are not limited to DEXA, and
15:19:08 8 that it just has -- it is limited to quantitatively
15:19:12 9 calculated bone density.
- 15:19:14 10 Q. Let's move ahead to slide 56. This was a slide that
15:19:32 11 we used to address this issue of comparing, right, comparing
15:19:35 12 models?
- 15:19:36 13 A. I didn't.
- 15:19:37 14 Q. Now, these are images from Planmeca, I think Romexis
15:19:45 15 user manuals, right, is that where this came from?
- 15:19:49 16 A. I believe so, yes.
- 15:19:50 17 Q. I can't really see the -- anyway, thank you. PX-90.
15:20:00 18 So that's a Romexis user manual, that's been admitted into
15:20:04 19 evidence.
- 15:20:05 20 So you were making the point about the computer
15:20:08 21 not comparing, is that what this was here for?
- 15:20:13 22 A. That's right.
- 15:20:13 23 Q. ProMax 3D did not compare, right?
- 15:20:15 24 A. And that the comparison is not quantitative.
- 15:20:18 25 Q. Let's break that down. Let's start with just the

15:20:22 1

comparing part?

15:20:23 2

A. Sure.

15:20:24 3

Q. The portion of the manual says that the manual

15:20:27 4

fitting, it says volumes can be manually fitted by adjusting

15:20:32 5

the position and rotation?

15:20:34 6

A. Yes.

15:20:34 7

Q. Do you understand what that is saying is that the

15:20:37 8

user manually can sort of move these two models that they're

15:20:42 9

lined up in a way that he can do a comparison, is that what

15:20:45 10

manual fitting is?

15:20:47 11

A. Manual means that the user can move them until they

15:20:51 12

are registered is the word we use or aligned sufficient for

15:20:58 13

their need.

15:20:59 14

Q. The same word Dr. Kia used so let's stick with that.

15:21:04 15

So that's manually fitting. Then there is a second option,

15:21:09 16

automatic fitting. Do you see that?

15:21:11 17

A. Yes.

15:21:13 18

Q. The automatic fitting it says for automatic fitting

15:21:20 19

three common points must defined whether the dialogue is

15:21:22 20

first opened, the before volume is shown on the right,

15:21:25 21

select the after volume. It seems like there are more

15:21:28 22

instructions since this is number one, it goes to number

15:21:31 23

three, add three common points marked in red, green and blue

15:21:35 24

on the image and the surfaces in both volumes by clicking on

15:21:38 25

the right mouse, suitable points vary, so forth, do you see

15:21:44 1

that?

15:21:44 2

A. Yes.

15:21:45 3

Q. In this case, the user, this is the user putting red, green and blue on the image, right?

15:21:49 4

15:21:50 5

A. Yes.

15:21:51 6

Q. And what happens after that?

15:21:52 7

A. The computer takes the user input and aligns the

15:22:01 8

three points so that the three points overlap on the two

15:22:08 9

data sets, they end up in the same location in the two data

15:22:13 10

sets.

15:22:15 11

Q. So that's the computer doing something as part of the comparison?

15:22:19 12

15:22:20 13

A. Based on the operator's instruction of what the operator thinks is needed for alignment.

15:22:24 14

15:22:29 15

Q. Okay. Computers usually operate based on the operator's instruction, right, isn't that how they work? I mean, users tell computers to do things and then they do it, that's how they work?

15:22:31 16

15:22:34 17

15:22:39 18

15:22:40 19

A. No, some things computers do automatically without you asking them.

15:22:42 20

15:22:44 21

Q. Because someone told it to, a programmer, right?

15:22:47 22

A. Exactly.

15:22:49 23

Q. Okay. Let's go -- so you said there were two aspects of why you think there wasn't comparing. One was about what the computer was doing and then you also said something

15:22:52 24

15:22:54 25

15:23:00 1 about it not being quantitative, right?

15:23:03 2 A. So far we don't have any comparative, right, all we
15:23:06 3 did was attempt to align the two volumes. So we haven't
15:23:12 4 even gotten to comparing. But the comparing according to
15:23:15 5 the claim construction has to be quantitatively comparing.

15:23:19 6 Q. Where do you see that in the claim construction? If
15:23:22 7 it's helpful, I guess we're going to have to do it, but the
15:23:27 8 claim construction is behind Tab 5. And then in your
15:23:32 9 binder. And then the Court's opinion on it is behind Tab 6.

15:23:38 10 A. Thank you.

15:23:40 11 Q. And if it helps just to get through this a little
15:23:43 12 faster, I believe the section you're -- or the section we
15:23:47 13 were talking about on page 14 of the Court's ruling?

15:23:51 14 A. On page 14?

15:23:53 15 Q. 14, at least -- you can look anywhere you want,
15:23:56 16 that's where I think we're supposed to be looking.

15:24:00 17 A. Yes. So what I -- are you looking at the --

15:24:11 18 Q. I'm sorry?

15:24:11 19 A. Are you looking at the document, sir.

15:24:13 20 Q. Yes, I am?

15:24:14 21 A. And you can see that plaintiffs suggested one
15:24:18 22 definition, defendants suggested a different definition and
15:24:22 23 the court decided no construction is necessary.

15:24:25 24 Q. Right?

15:24:26 25 A. But -- but, what follows is -- Your Honor, can I read

15:24:32 1 from this?

15:24:33 2 THE COURT: That's between you two.

15:24:35 3 Q. Yes.

15:24:35 4 A. Yes, I can read from this?

15:24:38 5 MR. OSTROW: Your Honor, I'm just being careful
15:24:40 6 to abide by the pretrial order in aspect of not doing any
15:24:44 7 motions.

15:24:45 8 THE COURT: Okay.

15:24:46 9 THE WITNESS: And the court says, "the only
15:24:49 10 issue is I won't name, a request to insert a quantitative
15:24:51 11 element." In other words somebody said the comparison needs
15:24:54 12 to be quantitative.

15:25:01 13 Q. Can I just break in here for a second?

15:25:03 14 A. No. You asked me a question, I'm trying to give you
15:25:07 15 an answer.

15:25:07 16 Q. But you misread what's there, it's not somebody said,
15:25:12 17 it says the only issue is the defendants request, Planmeca
15:25:16 18 is the defendant?

15:25:16 19 A. Yeah.

15:25:19 20 Q. Planmeca asked the court in their proposed
15:25:21 21 construction to say that the comparison had to be
15:25:24 22 quantitative?

15:25:24 23 A. Yes.

15:25:24 24 Q. And the judge said the only issue is that, their
15:25:25 25 request, but he declined to put it in, and said the claim,

15:25:30 1 the word needs no construction, he does say this
15:25:34 2 quantitative element is already embodied in the Court's
15:25:37 3 construction of tomographic model and densitometry model.
15:25:43 4 In other words, the court is saying the models have to be
15:25:45 5 quantitative, but the comparison, did he not limit the
15:25:48 6 comparison to have to be quantitative. Right? There is no
15:25:52 7 construction that says the comparison has to be
15:25:55 8 quantitative, correct?

15:25:55 9 A. Well, so you and I disagree on this. You're right of
15:25:59 10 what the court said is this quantitative element is already
15:26:03 11 embodied in the Court's construction of tomographic model
15:26:07 12 and densitometry model. To me, this -- since the court
15:26:11 13 didn't go on to say the comparison need not be quantitative,
15:26:14 14 that's what you said, to me as a person of skill in the art,
15:26:19 15 this says that the comparison needs to be quantitative.

15:26:21 16 Q. But the judge never actually said that?

15:26:24 17 A. Nor did the judge say what you said.

15:26:27 18 Q. Okay. We can agree to disagree, I guess.

15:26:31 19

15:26:34 20 MR. OSTROW: Your Honor, I'm probably going to
15:26:38 21 move on to another subject, what do you want to do.

15:26:38 22 THE COURT: This is a good place to stop. Let's
15:26:42 23 take ten, ladies and gentlemen.

15:26:46 24 COURT CLERK: All rise.

15:26:49 25 (Jury leaving the courtroom at 3:26 p.m.)

Pelc - cross

15:26:51 1

(A brief recess was taken.)

15:38:53 2

COURT CLERK: All rise.

15:38:55 3

THE COURT: How long do you think you're going

15:38:57 4

to go?

15:38:57 5

MR. OSTROW: About another hour.

15:39:00 6

THE COURT: Then hen you have some follow-up

15:39:02 7

questions. So we may end the day with the doctor? All

15:39:06 8

right. If we're lucky.

15:39:09 9

MR. OSTROW: Trying to.

15:39:10 10

(Jury entering the courtroom at 3:39 p.m.)

15:39:11 11

THE COURT: Please be seated, ladies and

15:39:12 12

gentlemen. You may continue your examination, Mr. Ostrow.

15:39:31 13

MR. OSTROW: Thank you, Your Honor.

15:39:34 14

BY MR. OSTROW:

15:39:36 15

Q. John, put up slide 35.

15:39:42 16

Dr. Pelc, this is one of the slides you walked

15:39:45 17

through during your direct, and your theory as I understood

15:39:48 18

it was that what you call Osseo's interpretation or

15:39:54 19

misreading, whatever you want to call it of the claims and

15:39:57 20

the constructions, reads on prior art, that's the point of

15:40:00 21

this slide, right?

15:40:02 22

A. With respect to that element.

15:40:05 23

Q. With respect to that element? I see. So you're not

15:40:08 24

taking the position that you have done an analysis

15:40:12 25

comparing, doing an element by element comparison of the

15:40:16 1 claims of Dr. Massie's patents against say, the NewTom
15:40:20 2 system, correct?

15:40:20 3 A. That is correct.

15:40:20 4 Q. The way you did with Webber and Guenther
15:40:24 5 combinations?

15:40:25 6 A. That's correct.

15:40:26 7 Q. Thank you for clarifying that. If you go to slide
15:40:32 8 36. Same question here, this is another slide where you
15:40:41 9 have taken the position that Osseo's interpretations reads
15:40:44 10 on prior art and here you show the Klemetti article, same
15:40:49 11 question, so I just want to be clear, you're not -- you
15:40:54 12 didn't introduce an element by element analysis of how any
15:40:58 13 of Dr. Massie's claims would read on Klemetti, correct?

15:41:02 14 A. I did not. And again, the intent here was whether or
15:41:08 15 not with respect to the claim elements that I think you are
15:41:13 16 misinterpreting, it would read on the prior art, again with
15:41:20 17 respect to that element.

15:41:21 18 Q. With respect to that element?

15:41:23 19 A. That's right.

15:41:24 20 Q. But we don't know about whether the other, there is
15:41:26 21 nothing in your opinion about whether all the elements would
15:41:30 22 be met?

15:41:30 23 A. But given that that interpretation I think is
15:41:32 24 incorrect it would be fruitless to do an element by element
15:41:34 25 analysis.

15:41:36 1 Q. I'm not -- you don't have to answer that to me, I'm
15:41:39 2 just asking what you did. But I think it's clear now.

15:41:44 3 Thank you.

15:41:44 4 I think during, when I was asking you earlier,
15:41:48 5 you said that there was no evidence of the ProMax 3D system
15:41:55 6 doing any kind of densitometry; correct?

15:41:55 7 A. That's correct.

15:42:02 8 MR. OSTROW: Your Honor, I would like to hand
15:42:03 9 the witness an article for impeachment purposes.

15:42:04 10 THE COURT: You may.

15:42:20 11 BY MR. OSTROW:

15:42:20 12 Q. Dr. Pelc, I just handed you an article, I'm not going
15:42:24 13 to be able to introduce this into evidence and publish it to
15:42:28 14 the jury. Sorry about that. We'll read some relevant
15:42:30 15 portions, you see this is a published article called
15:42:31 16 technology transfer innovative solutions in medicine, 2019,
15:42:31 17 that's just the header where it came from?

15:42:40 18 A. Yes.

15:42:41 19 Q. And do you agree that the title of the article is
15:42:42 20 Delayed Union of Mandibular Fractures Analysis of 74
15:42:42 21 Clinical Cases?

15:42:42 22 A. Yes.

15:42:50 23 Q. And you see that it was written by someone named
15:42:50 24 Natalya Idashkina a Ph.D. professor, I can't even try to
15:43:00 25 pronounce this, but from the ministry, Academy of the

15:43:06 1 Ministry of the Health of Ukraine, do you see that?

15:43:08 2 A. Yes.

15:43:09 3 Q. Thank you. I'm going to ask you to take a look at --
15:43:13 4 under the column on the right where it says number two,
15:43:16 5 methods, I understand you haven't had a chance to see this
15:43:19 6 before, so if you feel you have to read more, I'm certainly
15:43:23 7 not going to block you, but I just --

15:43:26 8 MS. PESCHEL: Objection Your Honor, improper
15:43:29 9 impeachment. You can't read from the document without
15:43:32 10 asking the witness a question.

15:43:33 11 THE COURT: He can -- I agree. I think you can
15:43:36 12 summarize the issue and then ask him to review it and then
15:43:41 13 ask him for his comment, but I don't want you to read from
15:43:45 14 this.

15:43:45 15 MR. OSTROW: Fair enough, Your Honor.

15:43:49 16 THE COURT: The next thing is we need the mark
15:43:51 17 this for identification, so the last number on your, we'll
15:43:57 18 just mark it as number, where are we at?

15:44:00 19 COURT CLERK: 495.

15:44:02 20 THE COURT: So this is 495 or 496? This will be
15:44:10 21 495 just for the purposes of identification.

15:44:12 22 MR. OSTROW: Thank you, Your Honor.

15:44:15 23 THE COURT: Now you may continue, counsel.

15:44:20 24 BY MR. OSTROW:

15:44:22 25 Q. Dr. Pelc, again, I understood the reason I gave you

15:44:24 1 this is because I understood you to say that there is no
15:44:27 2 evidence, you have never seen evidence of the ProMax 3D
15:44:32 3 systems doing densitometry. And I'm asking you if you could
15:44:36 4 look under the column in the right where it says methods on
15:44:42 5 the right on the first page, if you go down a couple of
15:44:45 6 paragraphs, can you just to yourself, take a look at what it
15:44:48 7 says and tell me if you think that there is a statement here
15:44:52 8 that the ProMax 3D systems do densitometry?

15:44:56 9 A. (Witness reviewing document.)

15:45:42 10 Q. There is a question pending?

15:45:44 11 A. Please repeat the question.

15:45:45 12 Q. My question was whether having looked at it you see a
15:45:50 13 reference to the, by this Ph.D. professor in Ukraine to
15:45:55 14 using the Planmeca ProMax 3D system to conduct densitometry?

15:46:01 15 A. What she I think she conducted was images with the
15:46:12 16 ProMax 3D and it says that she is reporting Hounsfield
15:46:17 17 units, so the ProMax 3D calculated Hounsfield units, she is
15:46:21 18 interpreting these as Hounsfield units, so she says BMD more
15:46:29 19 than 850 Hounsfield units and then the sentence goes on.
15:46:32 20 While that sentence is -- doesn't make a lot of sense
15:46:38 21 because BMD is not measured in Hounsfield units. We have
15:46:41 22 that in evidence by other people this this trial.

15:46:45 23 Q. Okay. Since you're reading from it, I just want to
15:46:49 24 draw your attention to a couple of paragraphs above, right
15:46:52 25 where you read, she wrote, can I go ahead and read Your

15:46:57 1 Honor, it's directly related to what the witness just said?

15:46:59 2 THE COURT: Well, I think you have to summarize
15:47:01 3 it, without putting the article in evidence.

15:47:06 4 MR. OSTROW: Thank you, Your Honor.

15:47:08 5 BY MR. OSTROW:

15:47:09 6 Q. She also is specifically saying that she determined
15:47:12 7 BMD in Hounsfield units; right?

15:47:15 8 A. My comment stands, you cannot determine BMD in
15:47:19 9 Hounsfield units. That's like determining the weight of the
15:47:22 10 car in feet.

15:47:24 11 Q. But that's what this Ukrainian professor wrote, using
15:47:30 12 the ProMax 3D system, not just any system, right?

15:47:33 13 A. She is using the Planmeca ProMax 3D system, but her
15:47:40 14 misinterpretation or misinterpretation of her measurement is
15:47:48 15 not Planmeca's fault. That's her misunderstanding of what
15:47:50 16 the plan is doing.

15:47:52 17 Q. Okay. Thank you for that. I'm really putting this
15:47:58 18 in because you had made a statement about how I think you
15:48:02 19 had stated there is no evidence of ProMax 3D systems doing
15:48:05 20 densitometry, I just wanted to clarify, I wasn't blaming
15:48:08 21 Planmeca for this, it's clearly not their article, it's
15:48:12 22 Ukrainian professor, I understand that?

15:48:14 23 A. I'm sorry, you characterized this as evidence that
15:48:17 24 Planmeca does densitometry and I don't believe that that's
15:48:19 25 what this is.

15:48:21 1 Q. Okay. Thank you. You can put it aside. I'm done
15:48:25 2 with it.

15:48:26 3 A. Okay.

15:48:29 4 Q. Can you turn to slide 68. Dr. Pelc, let's turn now
15:48:38 5 away from infringement and more to your invalidity opinion.
15:48:41 6 So this as I understood it, it says it's a summary of your
15:48:45 7 opinions, right, your invalidity opinions and it says that
15:48:50 8 the asserted claims are obvious in light of the prior art,
15:48:54 9 including as evidenced by and then you list three things,
15:48:57 10 right correct?

15:48:58 11 A. Yes.

15:48:58 12 Q. Again, I know we did this before, I just totally want
15:49:01 13 to get this clear. Your opinions about invalidity are only
15:49:05 14 that the patents, the Massie patents are obvious, not that
15:49:08 15 they're anticipated by prior art, correct?

15:49:10 16 A. And that they lack written description and that they
15:49:14 17 lack enablement.

15:49:15 18 Q. Thank you for that. I was asking really just because
15:49:19 19 with respect to prior art. With respect to prior art,
15:49:21 20 you're only asserting that the patents are obvious, not
15:49:24 21 anticipated, right?

15:49:25 22 A. I did not present any anticipation argument.

15:49:28 23 Q. Just for the sake of the jury, what does anticipation
15:49:31 24 mean?

15:49:32 25 A. That's if one reference describes the entire patent.

15:49:40 1 You're the lawyer, did I do okay?

15:49:42 2 Q. I'll take it. Thank you.

15:49:44 3 So were you involved in doing searches for prior
15:49:50 4 art as part of the defense in this case?

15:49:54 5 A. I did my own search for prior art, yes.

15:49:58 6 Q. So you did -- you did some search, you did a search
15:50:02 7 for prior art, and if you had found a prior art reference
15:50:07 8 that anticipated, which means showed everything in
15:50:10 9 Dr. Massie's patents, you would have presented it today;
15:50:13 10 correct?

15:50:15 11 A. No, I wouldn't say that that's true.

15:50:19 12 Q. Well, isn't it easier to prove invalidity through
15:50:23 13 anticipation than obviousness?

15:50:26 14 A. You know, I don't want -- I am not a lawyer, and I am
15:50:30 15 not going to get -- I am not going to get into legal
15:50:34 16 strategy, but I don't think -- let me put it this way. My
15:50:38 17 not presenting an anticipation argument doesn't mean that
15:50:42 18 there is not one.

15:50:46 19 Q. But it means you don't have one; right?

15:50:50 20 A. It means I did not present one.

15:50:54 21 Q. And you looked, you looked for prior art and you did
15:50:58 22 not come today with a reference that says this is exactly
15:51:02 23 what Dr. Massie invented, right?

15:51:06 24 A. I did not present an anticipation argument.

15:51:10 25 Q. Now, you list here on this slide three bullets, one

15:51:13 1 is so-called admissions by Osseo right, and then you got the
15:51:19 2 Webber, Cann, Dimaxis, Guenther Mazess and Fontevraud, those
15:51:27 3 are the three theories listed here as obviousness, right?

15:51:30 4 A. No, no. I think admissions by Osseo goes into both
15:51:36 5 of the combinations.

15:51:41 6 Q. So you have not presented and you're not presenting a
15:51:45 7 separate theory of obviousness of any of the claims based
15:51:49 8 solely on the so-called Osseo admissions, right?

15:51:52 9 A. Based solely on the Osseo admissions, no.

15:51:56 10 Q. And your opinion presented today presented no
15:52:01 11 analysis of any reason to combine the so-called admissions
15:52:06 12 with respect to any claims, correct?

15:52:09 13 A. I view the admissions by Osseo as an image of some of
15:52:17 14 the things that a person of skill in the art would know.
15:52:20 15 The things that Osseo has admitted agree with my view of
15:52:25 16 what a person of skill in the art knew at the time. And
15:52:30 17 what I said in one of my slides was, I put up the entire
15:52:36 18 claim language of the asserted claims and all three patents
15:52:41 19 and I said if you map the admissions into the claim
15:52:47 20 language, almost everything is covered, but not everything.
15:52:53 21 And that's why I could not put an obviousness argument based
15:52:59 22 solely on the admissions by Osseo.

15:53:03 23 Q. Okay. Let's take a look at some of these admissions,
15:53:09 24 or what you call admissions.

15:53:12 25 A. Sure.

15:53:12 1 Q. Go to slide 73. All right. So this is a slide you
15:53:19 2 presented a statement, this is from one of the patents;
15:53:24 3 correct?

15:53:25 4 A. Yes, I don't think that this is admissions by Osseo.

15:53:34 5 Q. Okay. Why not, it's in Osseo's patents?

15:53:37 6 A. Yes. But my understanding of the list of admissions
15:53:43 7 by Osseo, as I understand it, there were meetings between
15:53:48 8 the parties and the parties agreed that certain things were
15:53:53 9 known. That's what is within admissions by Osseo.

15:53:57 10 This happens to be further statements by the
15:54:06 11 patent that characterize what was known.

15:54:09 12 Q. So, thank you for that clarification. Can you go to
15:54:13 13 slide 69.

15:54:14 14 Is this what you were just referring to, the
15:54:20 15 so-called agreements between the parties about what was
15:54:23 16 known?

15:54:23 17 A. Yes. And the heading is Osseo and Planmeca agree
15:54:27 18 these were known before 1999.

15:54:29 19 Q. So this -- when the previous slide and your testimony
15:54:32 20 when you said admissions, you're only talking about what's
15:54:36 21 on this slide, right?

15:54:36 22 A. Yes.

15:54:38 23 Q. And this slide has a list of different components or
15:54:42 24 features, hardware features, software functions, right?

15:54:45 25 A. Yes.

15:54:46 1 Q. There is no combination of these things together,
15:54:49 2 right?

15:54:49 3 A. That's correct.

15:54:49 4 Q. So this would be kind of like the soccer ball
15:54:53 5 example, I know you have been here this whole time so you
15:54:56 6 must have seen Planmeca's opening where they had the soccer
15:55:00 7 ball with the stitching and the leather, you could list
15:55:03 8 leather and stitching and compressed air a shopping list,
15:55:07 9 that doesn't make a patent claim, right?

15:55:10 10 A. I'm sorry, say that again.

15:55:13 11 Q. Sorry. I know you have been here, so I thought you
15:55:18 12 would remember the analogy, the analogy from Planmeca's
15:55:21 13 opening slide about this so-called hypothetical soccer ball
15:55:25 14 patent that has the claims consist of leather, and I asked
15:55:28 15 whether leather had to be invented, and I asked Dr. Massie
15:55:33 16 whether you had to invent leather to get this patent, right.
15:55:37 17 Do you agree that you did not have to invent leather,
15:55:40 18 compressed air, stitching or round size individually?

15:55:45 19 A. Right, the combination can be novel if you can show
15:55:50 20 that the combination is novel and not obvious.

15:55:53 21 Q. I understand.

15:55:54 22 So I'm just trying to understand. So this is
15:55:58 23 kind of like that in the sense it's a list of things but
15:56:00 24 it's not the invention, it's not the combination, it's just
15:56:05 25 a list?

15:56:06 1 A. That's correct.

15:56:06 2 Q. It's like having a shopping list and getting the
15:56:10 3 ingredients doesn't make a cake, you still have to do that
15:56:13 4 work, right?

15:56:14 5 Let's go back to slide 73. So this is not an
15:56:23 6 admission by Osseo. So this is a statement in Osseo's
15:56:27 7 patents, correct?

15:56:27 8 A. This is a statement in Osseo's patents, that's right.

15:56:29 9 Q. And in this it's in all three patents, right?

15:56:34 10 A. Yes.

15:56:35 11 Q. Okay. Just clarifying because the reference here is
15:56:39 12 to the '301 patent, I just make sure that we understand this
15:56:42 13 was in all three?

15:56:43 14 A. Yes, the line numbers vary, and that's why we have to
15:56:46 15 point to one.

15:56:47 16 Q. That's fine. I'm just clarifying.

15:56:50 17 So in this statement, this is Dr. Massie telling
15:56:54 18 the Patent Office that tomography and sectional radiographic
15:57:00 19 techniques using scanning x-ray beams were known and he
15:57:02 20 cites some things?

15:57:02 21 A. Yeah.

15:57:07 22 Q. This is Dr. Massie saying I know this was known,
15:57:10 23 tomography generally is known, right?

15:57:12 24 A. Yes.

15:57:12 25 Q. And this was in his application?

15:57:15 1

A. Yes.

15:57:15 2

Q. And so the Patent Office had that application and presumably read this?

15:57:18 3

15:57:19 4

A. Yes.

15:57:23 5

Q. Same thing with slide 74, this is -- relates to in the medical field, densitometry procedures are used for measuring bone morphology density, so forth, right, with some examples, including your patent. Right. This is a statement from Dr. Massie's three patents; correct?

15:57:31 6

15:57:34 7

15:57:39 8

15:57:42 9

15:57:45 10

A. Yes.

15:57:45 11

Q. So, again, this is Dr. Massie telling the Patent Office that he knows, he knows that in the medical field, densitometry is known, and he even gives examples so the Patent Office can go in case they can't find it themselves?

15:57:49 12

15:57:53 13

15:57:58 14

15:58:02 15

A. That's correct.

15:58:03 16

Q. So the patent office knew that tomography was known, right, from the previous slide, and that densitometry was known?

15:58:06 17

15:58:09 18

15:58:10 19

A. Yes.

15:58:11 20

Q. Okay. Nevertheless, the Patent Office granted him three patents; right? Factually, they gave him the three patents, so they knew because he told them that tomography was known and densitometry was known, there was no hiding anything, he told the Patent Office those two things were known, he had all the tomography stuff that you have gone

15:58:12 21

15:58:22 22

15:58:25 23

15:58:29 24

15:58:32 25

15:58:38 1 through, they had the densitometry, the Patent Office knew
15:58:41 2 that those two components were well-known and gave examples
15:58:44 3 including your patent; right?

15:58:46 4 A. Yes.

15:58:47 5 Q. And the Patent Office said okay, we think it's
15:58:51 6 nonobvious?

15:58:51 7 A. Not immediately.

15:58:53 8 Q. But eventually?

15:58:54 9 A. Yes, but in between if I may, the Patent Office says
15:58:58 10 the inventor appears to believe that the invention is the
15:59:04 11 bringing of these things into dentistry, and what the--
15:59:09 12 among the things that the Patent Office didn't have is the
15:59:12 13 fact that these things had been used in dentistry. And so
15:59:20 14 I'm left wondering, had the Patent Office known that these
15:59:25 15 -- that tomography was known in dentistry, that cone beam
15:59:31 16 tomography had been used in dentistry, that bone mineral
15:59:36 17 density measurements had been used in dentistry, I think
15:59:41 18 that Dr. Massie in fact testified he didn't know that bone
15:59:48 19 densitometry had been used in dentistry.

15:59:50 20 Q. But the Patent Office had to decide whether this
15:59:54 21 combination was obvious?

15:59:55 22 A. Yes.

15:59:58 23 Q. You're not using is the NewTom device in your
16:00:02 24 obviousness combination, it's not one of -- you're not
16:00:05 25 combining it with Webber, you're not combining it with

16:00:08 1 Cann, you're not using it at all, so just looking at the
16:00:12 2 combination that you -- the combinations that you are
16:00:15 3 presenting, you got the Webber, the Cann, the Dimaxis,
16:00:20 4 right, that's one set, and then you've got Guenther, sorry,
16:00:24 5 trying to do this from memory, I should call up the slide,
16:00:27 6 you have the Guenther, the Mazess, the other one, the
16:00:31 7 Fontevraud, those are the two sets, you're not using the
16:00:35 8 NewTom machine as part of your combination with those
16:00:40 9 references, right?

16:00:40 10 A. That's correct. But each one of those combination
16:00:42 11 includes references that were not before the examiner.

16:00:45 12 Q. We'll get to that, thank you.

16:00:48 13 But the examiner did know about tomography and
16:00:51 14 he did know about densitometry, so the fact that say Cann
16:00:55 15 teaches densitometry, well the examiner knew there was
16:00:58 16 densitometry, he knew because Dr. Massie told him, right?

16:01:02 17 A. Dr. Massie didn't tell them that the combination of
16:01:07 18 tomography and densitometry was known.

16:01:08 19 Q. And you're not using that in your obviousness
16:01:12 20 combination, right, you're not using it?

16:01:14 21 A. I am.

16:01:15 22 Q. The combination, you are making the combination of
16:01:19 23 those two things?

16:01:20 24 A. No.

16:01:22 25 Q. You're not using -- I asked you before whether the

16:01:23 1 NewTom reference is part of your obviousness combination and
16:01:26 2 you said no.

16:01:27 3 A. My statement was the Patent Office did not know that
16:01:31 4 the combination of densitometry and tomography was known.

16:01:36 5 Q. Right. And we don't know either because all we see
16:01:40 6 is a page of an article and we don't have any other
16:01:43 7 information.

16:01:43 8 A. I'm sorry, but I disclosed that in my reports and if
16:01:49 9 Dr. Kia disagreed, he should have said those references
16:01:52 10 don't show that?

16:01:53 11 Q. I'm sorry, you did not use it in your obviousness
16:01:58 12 combination which is the only thing that's relevant today?

16:02:00 13 A. But I did use it.

16:02:01 14 Q. The only thing that's relevant today is what you
16:02:04 15 testified to, you can't add to that now, you have given your
16:02:07 16 case, the case does not include the NewTom device.

16:02:11 17 A. I'm not talking about NewTom, I'm talking about Cann.

16:02:14 18 Q. Cann?

16:02:15 19 A. Cann.

16:02:15 20 Q. Why don't you just say that Cann anticipates the
16:02:19 21 claims?

16:02:20 22 A. Because I didn't make any anticipatory claim,
16:02:23 23 argument. What I said to you just now is Cann combines
16:02:26 24 tomography and densitometry. The Cann reference was not in
16:02:30 25 front of the examiner.

- 16:02:38 1 Q. Okay. And you're not using it now --
- 16:02:41 2 A. I did use it.
- 16:02:42 3 Q. You're not -- it's not one of the references that
- 16:02:46 4 you're combining with the other references, correct?
- 16:02:49 5 A. It is.
- 16:02:49 6 Q. The NewTom?
- 16:02:50 7 A. I didn't say anything about the NewTom you keep
- 16:02:53 8 coming back to NewTom.
- 16:02:54 9 Q. You said Cann?
- 16:02:55 10 A. Cann.
- 16:02:56 11 Q. We'll get to that. Using Cann for the purposes of
- 16:02:59 12 showing densitometry which the Patent Office knew about?
- 16:03:01 13 A. Combined with tomography.
- 16:03:03 14 Q. Which the Patent Office knew about?
- 16:03:05 15 And the Patent Office decided that combination
- 16:03:08 16 was not obvious, that's all I'm saying?
- 16:03:10 17 A. That's exactly my point, you're not listening to me,
- 16:03:13 18 I'm sorry, but Cann shows the combination, you don't need to
- 16:03:16 19 combine them, they are already combined in Cann and the Cann
- 16:03:20 20 reference which has the combination was not in front of the
- 16:03:22 21 examiner.
- 16:03:24 22 Q. Did that, what you walked through earlier, you showed
- 16:03:28 23 only everything the combination was in Cann, is that what
- 16:03:31 24 you walked through?
- 16:03:33 25 A. When I --

Pelc - cross

16:03:37 1 THE COURT: Wait a second, I have let this go on
16:03:39 2 for a while but you're both cutting each other off, and we
16:03:44 3 just can't tolerate that. For one thing, and then for
16:03:47 4 another my court reporter here at the end of the day is
16:03:50 5 going to come to my office and hit me over the head and said
16:03:53 6 I don't have any control. Because he only has one set of
16:03:57 7 hands. So slow down a little bit and let each other ask
16:04:00 8 your question, answer a question and request a question,
16:04:03 9 because your both stepping on each other.

16:04:05 10 THE WITNESS: I'm sorry, Your Honor.

16:04:07 11 Q. Let's move on to something more concrete and we can
16:04:10 12 engage in a more civil discourse.

16:04:12 13 THE COURT: It's not uncivil it's just hard for
16:04:15 14 a court reporter to get or for me to listen to.

16:04:19 15 MR. OSTROW: Okay.

16:04:21 16 BY MR. OSTROW:

16:04:23 17 Q. If we can go to slide 85. This is the first of the
16:04:26 18 obviousness combinations that you have given an opinion on,
16:04:29 19 correct, Webber, Cann and Dimaxis?

16:04:31 20 A. Yes.

16:04:33 21 Q. And the Webber patent, go to slide 86, this is the
16:04:36 22 information on the face of the Webber patent, the patent
16:04:39 23 number 5,214,686, right?

16:04:41 24 A. Yes.

16:04:43 25 Q. Can you pull up JX-1?

16:05:08 1 Q. I pulled up here exhibit JX-1 which is the '301
16:05:12 2 patent, Dr. Massie's patent, do you see it?

16:05:14 3 A. Yes.

16:05:15 4 Q. And do you know what this list here is where it says
16:05:18 5 references cited?

16:05:19 6 A. Yes.

16:05:20 7 Q. If it helps I'm using my laser pointer up here if
16:05:24 8 that's better.

16:05:26 9 So what does that mean, what does this list
16:05:29 10 mean, references cited?

16:05:30 11 A. Those are the references that the examiner
16:05:33 12 considered.

16:05:35 13 Q. And you see here that in that list there is the
16:05:40 14 Webber 5,214,686, right?

16:05:43 15 A. That's correct.

16:05:44 16 Q. The Patent Office considered this Webber patent
16:05:48 17 before it decided to allow the patent, right?

16:05:50 18 A. Yes.

16:05:51 19 Q. Now, I can show the same thing with respect to the
16:05:54 20 other two Massie patents, about you in the interest of time,
16:05:57 21 would you agree with me that if we looked at the other two
16:06:00 22 Massie patents, we would find the Webber '686 patent in
16:06:03 23 those lists, also?

16:06:07 24 A. Yes.

16:06:09 25 Q. Go to slide 87. In this slide, you've shown a

- 16:06:22 1 comparison between, I think I understand correctly on the
- 16:06:26 2 left side are figures from the Webber patent, on the right
- 16:06:31 3 side is the Figure 1 from Dr. Massie's patent, correct?
- 16:06:34 4 A. Yes.
- 16:06:34 5 Q. And then you color coded the items that matched;
- 16:06:39 6 right, from the two, that you felt were matched?
- 16:06:42 7 A. Well, they matched grossly, just to guide the eye,
- 16:06:45 8 yes.
- 16:06:47 9 Q. So like the purple, the detector array and the x-ray
- 16:06:51 10 and you colored this portion purple, the x-ray equipment
- 16:06:51 11 because you, your opinion is that that's the equivalent,
- 16:06:51 12 right?
- 16:06:51 13 A. They both have x-ray equipment and they're -- that's
- 16:07:05 14 right.
- 16:07:05 15 Q. Okay. And again, in green, red, what I'll call that
- 16:07:11 16 yellow, again, matches what's in Webber, right?
- 16:07:14 17 A. Yes.
- 16:07:15 18 Q. And then you left this merger component white; right?
- 16:07:20 19 A. The merger device.
- 16:07:22 20 Q. Thank you.
- 16:07:23 21 A. I'm sorry, no -- yes, I left that blank.
- 16:07:23 22 Q. And that's because that's not in Webber, right?
- 16:07:23 23 A. No, it actually is in Webber. But it isn't in any of
- 16:07:33 24 the claims.
- 16:07:33 25 Q. Isn't the Court's construction of the tomographic

16:07:44 1 densitometry model a merger?

16:07:45 2 A. In the Massie patent the word merge is used in two
16:07:49 3 different ways in different parts of the patent. He uses --
16:07:55 4 if you like, I can point to the text in the patent.

16:08:00 5 Q. I'm just -- we could --

16:08:02 6 A. That box is not where the merging of tomographic data
16:08:07 7 sets is happening.

16:08:08 8 Q. So in your opinion where is it happening then, is it
16:08:12 9 shown in Figure 1?

16:08:13 10 A. It's in 24.

16:08:15 11 Q. Okay. Which you also left white, right, because that
16:08:20 12 doesn't match up to anything in Webber?

16:08:21 13 A. That's right.

16:08:22 14 Q. Okay.

16:08:29 15 Q. Now, in Webber, do you see here -- first of all, the
16:08:36 16 controller 50 in Webber, it's between the x-ray source and
16:08:41 17 the detector; right?

16:08:42 18 A. No, it's.

16:08:43 19 Q. No?

16:08:44 20 A. It's connected to the two of them, that just says
16:08:46 21 that there is a connection from the controller -- you
16:08:50 22 wouldn't put the computer in the way of the x-ray beam. No.
16:08:53 23 That's just saying that there is a connection from the
16:08:56 24 controller to the x-ray tube and many connections from the
16:09:00 25 detector array to the controller.

- 16:09:02 1 Q. In the controller down here, it refers to
- 16:09:07 2 tomosynthesis, do you see that?
- 16:09:09 3 A. Yes.
- 16:09:10 4 Q. What is tomosynthesis again?
- 16:09:17 5 A. A form of tomography.
- 16:09:17 6 Q. Is there a difference between tomosynthesis and
- 16:09:19 7 computed tomography?
- 16:09:20 8 A. They're both forms of tomography.
- 16:09:23 9 Q. Is there a difference between tomosynthesis and
- 16:09:27 10 computed tomography?
- 16:09:27 11 A. Yes.
- 16:09:28 12 Q. What's the difference?
- 16:09:30 13 A. Tomosynthesis we generally don't view the -- well in
- 16:09:31 14 tomosynthesis, we don't view the object from all the way
- 16:09:41 15 around. In CT we do. And the reconstruction algorithms are
- 16:09:41 16 somewhat different.
- 16:09:51 17 Q. Can you use tomosynthesis to get bone density
- 16:09:57 18 densitometry data?
- 16:09:58 19 A. Yes.
- 16:09:59 20 Q. Even though you don't have a full model?
- 16:10:00 21 A. You do have a full model the way it's described in
- 16:10:05 22 the Massie patent. I may point out to you that the Massie
- 16:10:06 23 patents do not describe computed tomography.
- 16:10:13 24 Q. That's not what I asked. But okay, that's fine. I'm
- 16:10:17 25 asking about -- so what is the difference between

16:10:21 1 tomosynthesis in Webber and other types of tomography?

16:10:26 2 A. I tried to describe that in my venn diagram. There
16:10:33 3 are many kind of tomography. Tomosynthesis is one.
16:10:38 4 Panoramic images are another. Computed tomography is a
16:10:44 5 third. They are all tomography. And the claim requires
16:10:48 6 tomography.

16:10:50 7 Q. The claim requires tomographic densitometry model?

16:10:55 8 A. That's right.

16:10:55 9 Q. So is a panoramic image a tomographic densitometry
16:11:01 10 model?

16:11:02 11 A. The panoramic is tomographic.

16:11:05 12 Q. But it's not a tomographic model?

16:11:08 13 A. It is a tomographic model. It is not a tomographic
16:11:13 14 densitometry model. Unless you bring other things into it.
16:11:18 15 Just like a computed tomography image is not a densitometry
16:11:22 16 model unless you do something more.

16:11:51 17 Q. Pull up slide 130. So in addition to the combination
16:11:58 18 of Webber with Cann, which we may come back to, I just want
16:12:03 19 to try to do it at a high level there was also a combination
16:12:07 20 of Guenther with two other references, correct?

16:12:09 21 A. Yes.

16:12:10 22 Q. And Guenther was not disclosed, I think you testified
16:12:13 23 earlier that Guenther was not in the record, at least this
16:12:17 24 Guenther patent was not in the record in the prosecution of
16:12:20 25 the Massie patents?

16:12:21 1 A. That's correct.

16:12:22 2 Q. Is there any difference between what Guenther
16:12:25 3 discloses and what Webber discloses?

16:12:28 4 A. Yes.

16:12:30 5 Q. Is there any difference that's relevant to your
16:12:36 6 obviousness analysis between Guenther and Webber?

16:12:43 7 A. I would rather each one of my combinations stand on
16:12:48 8 their own. I did not try to do what you just described.

16:12:55 9 Q. Okay. What I'm going to try to do now is going
16:13:02 10 through a little exercise. I want to compare what you said
16:13:06 11 about Webber and what you said about Guenther and see if
16:13:09 12 there is any differences, are you willing to go along with
16:13:12 13 me on this?

16:13:13 14 A. Sure.

16:13:13 15 Q. So now we're going to jump back and forth to your
16:13:17 16 presentation. Now we go back to slide 93. So in slide 93
16:13:21 17 you said that Webber shows the controller and the
16:13:30 18 microprocessor and memory device, correct?

16:13:32 19 A. Yes.

16:13:32 20 Q. And then slide 139. Slide 139 you said Guenther
16:13:42 21 disclosed the controller, and is the computer, correct?

16:13:42 22 A. Yes.

16:13:42 23 Q. So they both have -- they both in your opinion meet
16:13:42 24 the controller L with the microprocessor and computer,
16:13:52 25 correct?

16:13:51 1 A. Yes.

16:13:54 2 Q. Go back to the table. Can we put something here to
16:13:57 3 indicate that, like yes or a check or something. Is that
16:14:01 4 fair?

16:14:01 5 A. Sure.

16:14:04 6 Q. All right. Let's go back to the presentation. Slide
16:14:18 7 96. Slide 96, the next element you showed in Webber was you
16:14:33 8 said that it showed the input device, correct?

16:14:37 9 A. Yes.

16:14:38 10 Q. That's what it shows. And then slide 142. So in
16:14:45 11 slide 142 you said they both showed, Guenther shows input
16:14:51 12 devices also, correct?

16:14:53 13 A. Yes.

16:14:54 14 Q. Let's go back to the table and see if we can fill
16:14:57 15 another row in. We got yes and yes, you agree?

16:15:00 16 A. Sure.

16:15:01 17 Q. Let's go back to the presentation, slide 99. Slide
16:15:10 18 99 now we're dealing with positioning motors. Do you
16:15:13 19 remember this?

16:15:13 20 A. Yes.

16:15:14 21 Q. So you said that Webber shows positioning motor;
16:15:17 22 correct?

16:15:18 23 A. Yes.

16:15:18 24 Q. Slide 145, can we go to that? Slide 145, you said
16:15:22 25 that Guenther shows positioning motors; correct?

16:15:29 1

A. Yes.

16:15:29 2

Q. All right. Now go back to the table. We can put

16:15:36 3

yes's here because you say they both show positioning

16:15:39 4

motors, right?

16:15:40 5

A. Yes.

16:15:40 6

Q. All right. Making progress. Let's go back to slide

16:15:45 7

102. Next element you said that Webber showed is the x-ray

16:15:52 8

equipment; right, the beam, the source, the beam device, all

16:15:57 9

that x-ray equipment is in Webber, you said, right?

16:16:01 10

A. Yes.

16:16:01 11

Q. In slide 147, you said Guenther shows all the x-ray

16:16:08 12

equipment; right?

16:16:08 13

A. Yes.

16:16:09 14

Q. Can we go back to the table and fill those two in.

16:16:13 15

You're okay filling this in, right, because they both show

16:16:16 16

the x-ray equipment.

16:16:17 17

A. Yes.

16:16:18 18

Q. All right. I think we're halfway home. Next go back

16:16:21 19

to the slide, slide 106. Slide 106 you moved on to the A to

16:16:32 20

D converter and you said Webber shows the A to D converter?

16:16:37 21

A. Yes.

16:16:37 22

Q. Slide 149. 147, sorry, no -- oh, boy. All right.

16:16:51 23

I'm a little bit off. Just move ahead in the slides. There

16:17:00 24

you go. 150. All right. So slide 150 you said Guenther

16:17:05 25

shows the A to D converter?

16:17:08 1 A. Yes.

16:17:08 2 Q. Go back to the table and fill those in.

16:17:14 3 All right. Let's go to slide 109. Slide 109

16:17:22 4 you said Webber shows the output devices, correct?

16:17:26 5 A. Yes.

16:17:26 6 Q. Slide 153, I hope. You said Guenther shows output

16:17:35 7 devices?

16:17:36 8 A. Yes.

16:17:36 9 Q. Go back to the table, you okay filling in a yes here

16:17:40 10 and here because they both show an output devices?

16:17:44 11 A. Maybe you should spell yes correctly.

16:17:48 12 Q. All right. He's doing the best he can. Slide 114.

16:17:51 13 This is where you showed that Webber has the imaging

16:17:58 14 software, correct?

16:18:00 15 A. Yes.

16:18:01 16 Q. All right. Slide 156. This is where you showed that

16:18:07 17 -- well, Guenther and Mazess, Guenther shows the imaging,

16:18:13 18 you said discloses imaging software, correct?

16:18:15 19 A. Yes. Guenther displays imaging software and Mazess

16:18:19 20 also.

16:18:20 21 Q. But Guenther does, you have both?

16:18:23 22 A. Yes.

16:18:24 23 Q. So let's go back to the table. We're almost done.

16:18:32 24 All right. Let's go back to slide 120. All right. Maybe

16:18:42 25 it's 119. Hang on. Let's go to slide 121 then. Here we

16:18:54 1 go. Slide 121 where you said that Webber discloses models,
16:19:01 2 right?

16:19:08 3 A. Yes.

16:19:08 4 Q. And slide 161, this is where you said that, you claim
16:19:16 5 that panoramic tomogram is a model, this is where Guenther
16:19:22 6 showed models, correct?

16:19:23 7 A. No.

16:19:24 8 Q. Okay?

16:19:25 9 A. What I said is Guenther is tomographic.

16:19:29 10 Q. Tomographic. But you said model also up here?

16:19:32 11 A. But what I said is Guenther is tomographic, and
16:19:37 12 that's okay for tomographic models. Guenther is not
16:19:43 13 sufficient for 3D models.

16:19:45 14 Q. I think we're asking about 3D models, just
16:19:49 15 tomographic models, that's what's the claim says?

16:19:52 16 A. Some claims.

16:19:53 17 Q. Okay. So what do you want to do about Guenther do
16:19:58 18 you want to say that it discloses models or not?

16:20:02 19 A. I would say tomography.

16:20:05 20 Q. All right?

16:20:06 21 A. Yes as to tomography.

16:20:13 22 Q. Go back to the table. We want to fix this and have
16:20:15 23 it say tomography?

16:20:16 24 A. No, you can just put in a yes under Webber and for
16:20:20 25 Guenther put in yes as to tomography.

16:20:27 1 Q. Is that good enough?

16:20:28 2 A. Sure.

16:20:28 3 Q. We're all here, we'll all remember.

16:20:32 4 And then the storing and comparing, go to slide

16:20:36 5 124. This is where you claim that Webber discloses storing

16:20:45 6 and comparing, right?

16:20:47 7 A. This is the storing.

16:20:51 8 Q. Okay. Let's go to the next one, maybe there is

16:20:55 9 another one. Is this comparing?

16:21:02 10 A. Yes.

16:21:02 11 Q. Okay. So can we go now to slide 163. Is this where

16:21:13 12 you're saying that Guenther discloses storing and comparing?

16:21:14 13 A. No, this is talking about -- oh, yeah, this discloses

16:21:20 14 storing. It can't be doing digital imaging processing

16:21:25 15 without storing.

16:21:26 16 Q. This is Mazess, so does Guenther disclose comparing

16:21:31 17 according to you?

16:21:31 18 A. I don't believe so.

16:21:33 19 Q. Go back to the table. We got storing and comparing,

16:21:34 20 yes for Webber, and what do you want to do here, yes as to

16:21:40 21 storing?

16:21:40 22 A. Yes as to storing.

16:21:42 23 Q. We got one more thing if we can scroll down a little

16:21:51 24 on the table. Densitometry. Can you go to -- well, maybe I

16:21:52 25 don't need to go to any slides. It's your opinion that

16:21:59 1 neither Webber or Guenther disclosed densitometry, correct?

16:22:03 2 A. That's correct.

16:22:04 3 Q. Just put no there. Now this exercise is finished.

16:22:09 4 Now I'm going to ask you -- bring it down, get the whole

16:22:13 5 thing in view if you can, I don't know. All right. So

16:22:16 6 would you agree that according to you, what Webber discloses

16:22:20 7 is more than what Guenther discloses?

16:22:24 8 A. With respect to these things.

16:22:25 9 Q. Well these are the relevant things in the claims that

16:22:27 10 you analyzed right?

16:22:29 11 A. I'm not willing to say that any other differences

16:22:31 12 between Webber and Guenther are irrelevant, but I don't know

16:22:33 13 where you're going.

16:22:35 14 Q. What I'm saying is the Patent Office had the Webber

16:22:37 15 reference; correct?

16:22:41 16 A. Yes.

16:22:43 17 Q. And according to you, it already disclosed all those

16:22:45 18 things where there is a yes?

16:22:51 19 A. Yes.

16:22:53 20 Q. And accept for densitometry which you admit it

16:22:55 21 doesn't disclose, right? The Patent Office did not have

16:22:57 22 Guenther but Guenther doesn't have all the things that

16:23:01 23 Webber had; right?

16:23:03 24 A. I would reserve the right to modify that, but from

16:23:05 25 what we have talked about here, I would agree with you.

16:23:13 1 Q. So, the Patent Office had an even better reference
16:23:16 2 with Webber than Guenther, so who cares if the Patent Office
16:23:21 3 didn't have Guenther, they had Webber, they had the best
16:23:24 4 reference of these options of the primary references that
16:23:28 5 you chose, they had the better one of those; right?

16:23:35 6 A. They had the Webber reference.

16:23:38 7 Q. And according to the analysis we just went through,
16:23:41 8 and I let you decide what you agreed to put stuff in here,
16:23:45 9 right, Guenther doesn't even have everything that Webber has
16:23:48 10 according to you, right?

16:23:49 11 A. According to this list, from this list.

16:23:51 12 Q. This is the list of relevant things from the claims,
16:23:54 13 you went through, is there anything from the claims that is
16:23:57 14 not here that you think Guenther has that Webber doesn't
16:24:01 15 have?

16:24:01 16 A. At this point I can't think of it but I'm not going
16:24:05 17 to agree to it absolutely.

16:24:06 18 Q. And you agree that the Patent Office had Webber each
16:24:09 19 time that it allowed Dr. Massie's patents; correct?

16:24:12 20 A. Yes.

16:24:12 21 Q. And can you pull up JX-1 again do you see here, this
16:24:35 22 was the face of Dr. Massie's '301 patent, right?

16:24:40 23 A. Yes.

16:24:41 24 Q. So do you see where it says primary examiner it says
16:24:45 25 Drew Dunn, did you know, do you see that?

- 16:24:46 1 A. Yes.
- 16:24:47 2 Q. Do you understand what that is referring to?
- 16:24:50 3 A. That Drew Dunn was the primary examiner.
- 16:24:53 4 Q. Andrew Dunn being a person who works at the Patent
16:24:57 5 Office?
- 16:24:57 6 A. That's correct.
- 16:24:58 7 Q. Who examined Dr. Massie's '301 patent, right?
- 16:25:01 8 A. Can you scroll down?
- 16:25:04 9 Q. Do you want to-
- 16:25:11 10 A. Yes.
- 16:25:11 11 Q. Now, I am going to write down drew did you know so I
16:25:12 12 don't forget. Let's pull up JTX-0002. Zoom in here, the
16:25:13 13 examiner's name of, this is Dr. Massie's '262 patent, do you
16:25:23 14 see it?
- 16:25:24 15 A. Yes.
- 16:25:24 16 Q. So if we just go even further, pull it up. The
16:25:29 17 primary examiner, do you see it says the person's name is
16:25:37 18 Edward J. Glick. Do you see that?
- 16:25:37 19 A. Yes.
- 16:25:37 20 Q. And then it says assistance examiner is Hoon Song,
16:25:38 21 right?
- 16:25:38 22 A. Yes.
- 16:25:42 23 Q. Again it's the same question, do you understand who
16:25:43 24 these people were with respect to this patent?
- 16:25:45 25 A. They were involved in the examination.

- 16:25:47 1 Q. So these were the examiners that examined
16:25:49 2 Dr. Massie's '262 patent, right?
- 16:25:52 3 A. Yes.
- 16:25:54 4 Q. And these are different people than Drew Dunn we
16:25:57 5 assume unless they had a name change or something?
- 16:26:01 6 A. That's correct.
- 16:26:02 7 Q. Pull up JX-3. Zoom in, you know where to go, I don't
16:26:11 8 know. This is Dr. Massie's '374 patent, do you agree?
- 16:26:14 9 A. Yes.
- 16:26:18 10 Q. Let's see who examined this one, primary examiner
16:26:21 11 Irakli Kiknakze. I apologize if he or she is in the room.
16:26:30 12 This would be the examiner who examined the '374 patent,
16:26:34 13 correct?
- 16:26:34 14 A. Yes.
- 16:26:35 15 Q. So in each of Dr. Massie's patents, it's a different
16:26:38 16 examiner, would you agree just based on looking at this?
- 16:26:44 17 A. Yes.
- 16:26:44 18 Q. So three different sets of examiners considered
16:26:45 19 Webber, they considered densitometry and they each time
16:26:49 20 allowed his patents to issue; right?
- 16:26:52 21 A. Yes.
- 16:27:05 22 Q. Give me a second to get oriented here.
- 16:27:10 23 Can we go to slide 168, please. You also
16:27:53 24 expressed an opinion about whether the written description
16:27:57 25 standard and enablement standard were satisfied by the

16:28:00 1 comparison claims; correct?

16:28:01 2 A. Yes.

16:28:02 3 Q. And those comparison claims, I don't know go to 169.

16:28:09 4 So you were dealing with the claim one of the '262 patent,

16:28:13 5 right? And claim six, dependent claim six of the '374;

16:28:20 6 right?

16:28:22 7 A. Yes.

16:28:22 8 Q. So your opinions about -- your opinions about whether

16:28:25 9 there was enablement or lack of written description don't

16:28:28 10 apply to any of the other three claims in the suit, correct?

16:28:31 11 I just want to clarify?

16:28:34 12 MS. PESCHEL: Objection.

16:28:41 13 THE COURT: You may proceed.

16:28:48 14

16:28:48 15 Q. There is three other claims in the suit, these are

16:28:50 16 two, right?

16:28:51 17 A. Yes.

16:28:52 18 Q. You got claim one of the '262 and claim six, claim

16:28:55 19 one is shown, but claim six is the one that you gave the

16:28:58 20 opinion about, right?

16:29:01 21 A. Yes.

16:29:01 22 Q. So you're not giving an opinion about whether claim

16:29:05 23 one of the '374 is invalid due to lack of description and

16:29:08 24 lack of enablement, right?

16:29:12 25 A. That's true.

16:29:14 1 Q. So even if the jury were to agree with you about
16:29:18 2 these two claims, the other claim one of the '374 and the
16:29:22 3 other two claims not shown, those are unaffected by this
16:29:27 4 aspect of your opinion, correct?

16:29:28 5 A. That's correct.

16:29:31 6 Q. Now, let's take a look at what you've thought was
16:29:34 7 inadequate. So let's look at-- let's start with the '262
16:29:45 8 patent. So, I don't know, let's go to slide 174.

16:29:55 9 Do you see, this is a reference from the '262
16:29:59 10 patent; right? And you highlighted where it says the
16:30:03 11 computer also includes comparison software 118 which is
16:30:08 12 adapted for digitally comparing baseline and
16:30:12 13 patient-specifics dental and orthopedic densitometry models,
16:30:16 14 do you see that?

16:30:16 15 A. Yes.

16:30:16 16 Q. Why in your opinion would one of ordinary skill in
16:30:19 17 the art not have some understanding about how to do this
16:30:23 18 comparison in software?

16:30:24 19 A. Because it doesn't describe what the adaptation is.

16:30:31 20 Q. What do you mean by adaptation?

16:30:34 21 A. What this says is it includes comparison software,
16:30:42 22 which is adapted, in other words, designed, programmed, to
16:30:48 23 digitally compare baseline in patient-specific dental
16:30:52 24 orthopedic densitometry models. Now, if you go to a
16:30:56 25 programmer and you say I want you to program this computer

16:31:01 1 to digitally compare one number versus another number, they
16:31:09 2 will know how to do that. That's easy, right. But if you
16:31:13 3 go to them in 1999 and you say write me a piece of software
16:31:19 4 to digitally compare this three dimensional densitometry
16:31:23 5 model with this other 3D densitometry model, they would not
16:31:30 6 know how to do that. And you can't just say program it, you
16:31:34 7 would have to tell them program it, implementing this
16:31:40 8 method.

16:31:42 9 Q. Do you have any background in software development?

16:31:45 10 A. Yes.

16:31:46 11 Q. Have you written any software programs?

16:31:50 12 A. Yes.

16:31:51 13 Q. What languages are you proficient in?

16:31:53 14 A. Older ones, I was most comfortable in Fortran and
16:32:00 15 Basic.

16:32:01 16 Q. Were you doing programing in the 1990's?

16:32:03 17 A. Yes.

16:32:04 18 Q. During your deposition, when I asked you with your
16:32:07 19 proficiency with programing, I'm not sure you said these
16:32:11 20 answers. We can look at that if we have to.

16:32:13 21 Paragraph so did you ever develop imaging
16:32:16 22 software for like tomographic models?

16:32:20 23 A. Yes.

16:32:20 24 Q. So you have written the code yourself?

16:32:23 25 A. Yes.

16:32:24 1 Q. Okay. And you're saying that you -- would you
16:32:28 2 consider yourself someone of ordinary skill in the art in
16:32:31 3 the programing field in that time frame?

16:32:36 4 A. Probably, yes, in that time frame, I was probably a
16:32:41 5 person of ordinary skill in the art in programing.

16:32:43 6 Q. You gave an opinion in this case about what someone
16:32:47 7 qualifies as ordinary skill in the art, right?

16:32:51 8 A. I gave an opinion as to the qualifications of someone
16:32:55 9 of ordinary skill in the art with respect to this set of
16:33:00 10 patents, yes.

16:33:00 11 Q. And did it include any programing skills?

16:33:04 12 A. No.

16:33:06 13 Q. Well, how is it you're giving an opinion about what
16:33:10 14 someone of ordinary skill in the art would do with respect
16:33:13 15 to programing if you didn't even account for that in your
16:33:17 16 own definition?

16:33:18 17 A. Because computer programing is something you can --
16:33:21 18 first of all, as I said, I actually know how to program and
16:33:25 19 have done it. My issue here is as a person of ordinary
16:33:28 20 skill in the art, I don't have to know how to program, when
16:33:32 21 I know that I need to tell the programmer what to program.
16:33:35 22 And the patent does not tell you what to tell the programmer
16:33:40 23 to program.

16:33:42 24 Q. Your definition of what someone of ordinary skill in
16:33:45 25 the art would need, for the purposes of this case included

16:33:51 1

no programing skills, correct?

16:33:54 2

A. That's correct. Well --

16:33:57 3

Q. I can pull it up if you want?

16:33:59 4

A. Other than what the person, programing skills that

16:34:01 5

the person would know given their graduate degree in the

16:34:07 6

field that I mentioned. And they would have some programing

16:34:11 7

skills undoubtedly.

16:34:13 8

Q. But you have never expressed that, you didn't say

16:34:16 9

that today, right?

16:34:16 10

A. I just did.

16:34:17 11

Q. You didn't say it in direct nor did you say it in

16:34:21 12

your expert report, right?

16:34:22 13

A. I don't know that it's relevant. There are many

16:34:25 14

courses in the field of tomography and densitometry, in my

16:34:35 15

view someone who has experience in those fields in 1999

16:34:40 16

probably would have some programing skills, but that's not

16:34:43 17

relevant to my point.

16:34:45 18

Q. If we go in this excerpt, a couple of lines, do you

16:34:50 19

see there is a reference to the computer, beginning of the

16:34:54 20

paragraph, the computer includes a memory, I'm skipping the

16:34:57 21

reference numbers and so forth, and then it says four lines

16:35:00 22

down, imaging software is provided for converting the

16:35:03 23

digital data into images which are adapted for visual

16:35:08 24

inspection by displaying same on a monitor, right, do you

16:35:12 25

see that?

16:35:12 1

A. Yes.

16:35:13 2

Q. You're not expressing any opinion that one of

16:35:16 3

ordinary skill in the art would not know how to make imaging

16:35:19 4

software in 1999; right?

16:35:21 5

A. This is not just imaging software, this says imaging

16:35:25 6

software for converting the digital at that time to images

16:35:29 7

which are adapted for visual inspection by displaying on a

16:35:34 8

monitor, that was well-known.

16:35:36 9

Q. So that was enough information in your opinion, just

16:35:40 10

that alone was enough information for one of ordinary skill

16:35:44 11

to know how to make that imaging software, right?

16:35:46 12

A. You can buy that software.

16:35:50 13

Q. Okay. And if we go down a little, then it says such

16:35:54 14

images, a few lines down can also be transmitted by a

16:36:02 15

suitable transmission device, do you see that?

16:36:05 16

A. Yes.

16:36:09 17

Q. So that-he you're not expressing an opinion about

16:36:13 18

that being lack of enablement or not meeting in written

16:36:17 19

description requirement, right?

16:36:21 20

A. With respect to that -- that's right, with respect to

16:36:25 21

that statement, the person of ordinary skill in the art in

16:36:29 22

1999 knew how to use a fax machine.

16:36:33 23

Q. Is that -- that's -- again, get rid of the --go back

16:36:37 24

to the original text. Even though those aspects are

16:36:41 25

described, at the same level of detail, the computer, the

16:36:46 1 comparison software, those are okay, but the comparison
16:36:49 2 software is not enough, is that your opinion?

16:36:52 3 A. With respect to comparing three dimensional
16:36:56 4 densitometry models, that's correct.

16:36:58 5 Q. Okay. Let's go to slide 180?

16:37:11 6 THE COURT: Before you ask anymore questions.
16:37:14 7 People are having a hard time, so I'm just going to give you
16:37:18 8 one minute, if you want to stand and stretch, now is to time
16:37:21 9 to do it. Okay. Because I notice some people are having a
16:37:25 10 hard time focusing. All right. I'm just going to tell
16:37:30 11 everybody, I want you all to stand up, move around a little
16:37:34 12 bit. You can do the hokey pokey. So if I was in the army,
16:37:41 13 smoke them in you got them. All right. You may continue.

16:37:50 14 BY MR. OSTROW:

16:38:00 15 Q. You testified that the '262 patent, the second of
16:38:04 16 Dr. Massie's three patents, was a continuation in part of
16:38:08 17 the '301 patent, correct?

16:38:13 18 A. Yes.

16:38:13 19 Q. I think you explained what it was on direct, but just
16:38:16 20 again to remind everybody, what's your understanding of what
16:38:19 21 that means?

16:38:20 22 A. It means that the if descriptive portion of the
16:38:23 23 patent was supplemented and additional material was added to
16:38:31 24 the specification of the patent, and then also new claims.

16:38:32 25 Q. And in supplementing what was from the original

16:38:41 1 patent, did it delete anything from the original patent?

16:38:44 2 A. I don't believe so, no.

16:38:45 3 Q. So in the '301 patent, again, you can call them up,
16:38:49 4 you have them in your book, but just for the sake of time,
16:38:52 5 in the '301 patent there is a discussion of an x-ray source
16:38:56 6 and an x-ray sensor and detector, right?

16:39:00 7 A. Yes.

16:39:00 8 Q. X-rays are energy, right, a form of energy?

16:39:03 9 A. Yes.

16:39:03 10 Q. So the '262 patent still had in it that same
16:39:09 11 disclosures of an x-ray source and an x-ray detector that
16:39:12 12 was in the '301 patent; correct?

16:39:15 13 A. Yes.

16:39:16 14 Q. Okay. And that x-ray source you said is an -- could
16:39:20 15 be considered an energy source?

16:39:23 16 A. Yes.

16:39:23 17 Q. Okay. And the detector, the x-ray detector could be
16:39:27 18 an energy sensor, right?

16:39:29 19 A. Yes.

16:39:29 20 Q. So claim one of the '262 patent, the language that
16:39:33 21 you're highlighting as not being enabled, it a dental
16:39:40 22 orthopedic input device including an energy source and an
16:39:43 23 energy detector, correct?

16:39:45 24 A. Yes, an energy sensor.

16:39:46 25 Q. Sorry, energy sensor, yes?

16:39:49 1

A. Yes.

16:39:50 2

Q. Okay. That claim is enabled if you understand the

16:39:53 3

energy source and energy sensor to be referring to the x-ray

16:39:57 4

source and the x-ray sensor, correct?

16:39:59 5

A. But the scope of the claim includes electron beam

16:40:03 6

sources. And what you said in my opinion was the claim is

16:40:08 7

not enabled with respect to the electron beam.

16:40:13 8

Q. Who said the scope of the claim includes the electron

16:40:17 9

beam source?

16:40:18 10

A. I am reading that as a person of ordinary skill in

16:40:21 11

the art, given the specification which describes two energy

16:40:24 12

sources, it describes x-ray sources and it describes

16:40:31 13

electron beam sources. So when I -- given I agree with you,

16:40:34 14

both x-rays and electrons are energy beams, and so when the

16:40:41 15

claim says energy source, and the specification describes

16:40:44 16

both electron beams and x-ray beams, to me an electron

16:40:51 17

source--he I'm sorry, an energy source can be either.

16:40:57 18

Q. Except, that if one of ordinary skill in the art

16:41:01 19

according to you would know that the electron beam source

16:41:05 20

wouldn't work, then he would not include that as part of the

16:41:08 21

energy source, right, he would just include, this must be

16:41:11 22

referring too the x-ray source because it's the only thing

16:41:14 23

that will work, according to you, that's how one of ordinary

16:41:17 24

skill in the art would understand this, right?

16:41:20 25

A. But as I understand how we are to interpret the

16:41:24 1 claims, what you just did is not correct. You're supposed
16:41:27 2 to look at the full scope and then ask the question, is this
16:41:32 3 full scope enabled. And I believe strongly that the full
16:41:38 4 scope of this claim is not enabled because the person of
16:41:43 5 ordinary skill in the art does not know how to do this with
16:41:46 6 electrons. Now perhaps Dr. Massie knew how to do it with
16:41:51 7 electrons and he didn't describe it, but the person of
16:41:55 8 ordinary skill in the art in 1999 did not know how to do
16:42:00 9 densitometry with electron beams.

16:42:03 10 Q. Are you aware that one of the principles of claim
16:42:06 11 construction is to read a claim to preserve its validity?

16:42:11 12 A. Yes, I have heard that.

16:42:12 13 Q. So if we read this claim as the energy source meets
16:42:16 14 the x-ray source, that preserves the validity?

16:42:20 15 A. In the an --

16:42:21 16 THE COURT: Just a second your objection is.

16:42:23 17 MS. PESCHEL: Objection, Your Honor. He is
16:42:26 18 proposing a claim construction that has not been entered by
16:42:29 19 the court in his question.

16:42:32 20 THE COURT: We can take that up if we have to in
16:42:35 21 the instruction conference. So I am going to overrule the
16:42:38 22 objection and the doctor can answer the question.

16:42:42 23 THE WITNESS: So what I was going to say is
16:42:45 24 you're deleting language from the claim.

16:42:48 25

16:42:49 1

Q. Sorry, what?

16:42:49 2

A. You are deleting language from the claim, the claim

16:42:53 3

as written includes both electron beams and x-ray beams, and

16:42:58 4

you're saying well let's just pretend it didn't have

16:43:01 5

electron beams so as to preserve validity. That to me is

16:43:06 6

equivalent to removing a claim element if the claim element

16:43:09 7

would make the claim invalid.

16:43:11 8

Q. I'm sorry, sir. The claim does not refer to x-ray

16:43:14 9

beams or electron beams, does it, the claim, the thing on

16:43:18 10

the right?

16:43:19 11

A. That's right, the claim says energy source.

16:43:21 12

Q. So your statement that it refers to those x-rays and

16:43:24 13

electron beams is not accurate, that's just your

16:43:28 14

interpretation of it, correct?

16:43:29 15

A. Fair enough.

16:43:30 16

Q. But if your interpretation is wrong and it's only

16:43:35 17

x-rays, then there is no enablement problem with this?

16:43:38 18

A. That is correct, if the court would have said an

16:43:41 19

energy source is an electron source, I would not have an

16:43:45 20

issue.

16:43:49 21

Q. Okay. Move on to the final subject of your testimony

16:43:52 22

today. This is the apportionment issue, right?

16:44:11 23

A. Yes.

16:44:18 24

Q. Can we pull up slide 191?

16:44:22 25

So I think you testified on direct that you

16:44:31 1 understood -- Dr. Pelc?

16:44:37 2 A. Yes. Actually can you point me to where in these
16:44:41 3 binders is the '262 patent?

16:44:47 4 Q. There is no question pending about the '262 patent
16:44:50 5 right now.

16:44:56 6 A. You were just asking me questions about the '262
16:44:58 7 patent.

16:44:59 8 Q. I understood that we were done?

16:45:01 9 THE COURT: He asked you a question, you
16:45:03 10 answered it, I thought you were finished with your question,
16:45:06 11 if you want to come back to it, we can come back to it, but
16:45:10 12 right now we're talking about apportionment.

16:45:13 13 THE WITNESS: Thank you.

16:45:14 14 THE COURT: You're welcome.

16:45:16 15 BY MR. OSTROW:

16:45:16 16 Q. So we put up slide 191. Do you see it?

16:45:20 17 A. Yes.

16:45:21 18 Q. This is one of the slides you used to explain your
16:45:24 19 opinion about Dr. Kia's apportionment analysis, right?

16:45:28 20 A. Yes.

16:45:28 21 Q. Now, the first element on the list which you have X'd
16:45:32 22 out here in this slide is the 3D cone beam computed
16:45:35 23 tomography and then the 3D CBCT model scan, right?

16:45:40 24 A. Yes.

16:45:42 25 Q. First you expressed an opinion that because it said

16:45:46 1 model scan that you understood that that's not referring to
16:45:49 2 like the actual Planmeca device?

16:45:51 3 A. Yes, but I understand that Dr. Kia is not viewing
16:45:55 4 that only as the model scan.

16:45:57 5 Q. Okay. Thank you for clarifying that. I think you
16:46:01 6 had said earlier it's just referring to taking a sample or
16:46:04 7 something. So you do understand that this line is referring
16:46:07 8 to really the CBCT, the 3D CBCT functionality of the
16:46:13 9 Planmeca ProMax 3D models as sold, right?

16:46:17 10 A. Yes.

16:46:18 11 Q. And one of your issues is that this, you view this as
16:46:25 12 being a contribution from the prior art or something;
16:46:29 13 correct?

16:46:30 14 A. Yes.

16:46:31 15 Q. That this is in the prior art?

16:46:33 16 A. At least a large fraction of whatever the weight of
16:46:36 17 this figure, the weight of this feature belongs to the prior
16:46:43 18 art and not to Dr. Massie.

16:46:45 19 Q. Did you testify during direct that you understood for
16:46:49 20 purposes of this analysis you were assuming the patents are
16:46:52 21 valid?

16:46:51 22 A. Yes.

16:46:52 23 Q. So for the patents to be valid, we put aside the
16:46:56 24 arguments you have made about Webber with other things and
16:46:59 25 Guenther with other things, you just put that aside and we

16:47:02 1 assume that a 3D cone beam computed tomography system that
16:47:07 2 measures bone density is Dr. Massie's invention; correct?

16:47:12 3 A. No. The claim is Dr. Massie's invention.

16:47:17 4 Q. Okay. And that claim as we've shown in the
16:47:24 5 infringement analysis covers the 3D, the 3D CBCT components
16:47:30 6 of the Planmeca system; correct?

16:47:35 7 A. Since -- it covers the Planmeca system if we assume
16:47:43 8 that the claim is valid and infringed.

16:47:46 9 Q. Which is the underlying assumption when engaging in
16:47:50 10 this analysis, correct?

16:47:51 11 A. Yes.

16:47:51 12 Q. So we have -- I know it's hard, doctor, because you
16:47:54 13 think it's not infringed and you think it's invalid, for
16:48:00 14 purposes of this analysis, you have to put that aside and
16:48:03 15 live in that other world with the claim is valid and
16:48:06 16 infringed. That world the 3D cone bottom computed
16:48:12 17 tomography system using in in the Planmeca system is covered
16:48:14 18 by Dr. Massie's patents, correct?

16:48:17 19 A. Yes.

16:48:18 20 Q. Okay. So in that world, would you not agree with
16:48:21 21 Dr. Kia that some weight should be, you can't just X that
16:48:22 22 out, there has to be some weight apportioned to the fact
16:48:32 23 that Dr. Massie's patents cover the Planmeca CBCT device,
16:48:34 24 the ProMax and the reconstruction server?

16:48:42 25 A. As I understand the exercise, if there is validity

16:48:48 1 and infringement, there has to be some value to Dr. Massie's
16:48:53 2 contribution. But there doesn't necessarily have to be
16:48:56 3 value in that line. As I understand the exercise, we're
16:49:04 4 supposed to look at the element and say first, what is the
16:49:11 5 inventive element of Dr. Massie's patent, and then say where
16:49:18 6 is that inventive element affecting the value of the
16:49:23 7 machine.

16:49:23 8 My feeling is the inventive element of
16:49:28 9 Dr. Massie's invention is not there.

16:49:32 10 Q. And that's because you think the combination of
16:49:38 11 computed tomography, CBCT with densitometry is in the prior
16:49:42 12 art? I'm trying to understand how you come to that, because
16:49:46 13 then we're not assuming the patent is valid anymore. Do you
16:49:52 14 understand what I'm asking?

16:49:53 15 A. So do you think that no aspect -- you think -- do you
16:50:11 16 think -- I'm not supposed to be asking questions.

16:50:15 17 THE COURT: If you want to clarify.

16:50:17 18 THE WITNESS: I would like to clarify the
16:50:19 19 question. Are you asking me to -- whether I think that the
16:50:22 20 prior art deserves no credit for the claim of --the claim in
16:50:32 21 Dr. Massie's invention?

16:50:32 22

16:50:32 23 Q. No. Can you answer my previous question now?

16:50:42 24 A. And so then if the prior art is entitled to some
16:50:42 25 credit for the claim in Dr. Massie's invention, with respect

16:50:57 1 to this claim element, then that 55 should not be on the
16:51:03 2 right-hand column and that is exactly my feeling. When I X
16:51:06 3 it out, I don't necessarily mean that it goes to 0, although
16:51:11 4 I actually do think it goes to 0, but it could be something
16:51:15 5 else. I just disagree with Dr. Kia that Dr. Massie's
16:51:19 6 invention deserves a hundred percent of the value of cone
16:51:27 7 beam computed tomography.

16:51:31 8 Q. Okay. Let me try to break that down a bit. But let
16:51:36 9 me first start by asking, have you proposed an opinion today
16:51:40 10 about what the alternative number would be to what Dr. Kia
16:51:45 11 said?

16:51:45 12 A. Yes.

16:51:45 13 Q. Where is that?

16:51:47 14 A. What I ended up was a number of ten percent total.

16:51:52 15 Q. I'm sorry, I may have missed it. I wasn't paying
16:51:57 16 attention. Is that on any of the slides?

16:51:59 17 A. It's maybe 5 or 10 slides later.

16:52:02 18 Q. Okay. Hang on. Why don't we just progress through
16:52:31 19 the slides, because I don't know what slide that is.

16:52:32 20 Slower, John. I want to look at what's happening here?

16:52:42 21 A. I'll help you, advance the slide.

16:52:45 22 Q. It's not on this one?

16:52:46 23 A. Not that one.

16:52:47 24 Q. On this one?

16:52:48 25 A. No.

Pelc - cross

- 16:52:48 1 Q. Still Xing stuff out. Okay?
- 16:52:51 2 A. No. No.
- 16:52:52 3 Q. Next?
- 16:52:53 4 A. No.
- 16:52:53 5 Q. Is it here?
- 16:52:54 6 A. No.
- 16:52:56 7 Q. Go to the next?
- 16:52:57 8 A. Yes.
- 16:52:58 9 Q. Where is it?
- 16:53:07 10 A. The next slide.
- 16:53:09 11 Q. Okay. Next?
- 16:53:20 12 A. So I think I neglected to put it in there. In my
- 16:53:24 13 written opinion --
- 16:53:27 14 Q. I'm asking you what you testified to today. Today,
- 16:53:31 15 did you give a number to replace Dr. Kia's proposed number?
- 16:53:40 16 A. I don't recall, apparently not, I would have to look
- 16:53:42 17 at the transcript. In my written testimony the number was
- 16:53:46 18 ten percent.
- 16:53:49 19 Q. Okay. In today's testimony, I'm asking about today,
- 16:53:52 20 at the trial, did you give any alternative numbers, just put
- 16:54:00 21 up again 194, did you give any alternative numbers for any
- 16:54:11 22 of the things you X'd out?
- 16:54:13 23 A. I thought I did, but perhaps I didn't.
- 16:54:17 24 Q. Let's go to slide 195. I'm almost done, Your Honor.
- 16:54:22 25 I know it's about time.

Pelc - cross

- 16:54:23 1 In this slide -- no, I'm sorry, this is 195.
- 16:54:33 2 You expressed an opinion that Dr. Kia omitted some things,
- 16:54:37 3 correct? From his apportionment analysis?
- 16:54:41 4 A. Yes.
- 16:54:43 5 Q. Do you recall what you felt he omitted?
- 16:54:48 6 A. Well, the table that Dr. Kia put up is not an
- 16:54:57 7 exhaustive list of all of the features of the Planmeca
- 16:55:04 8 ProMax 3D product, so the ones he didn't include are the
- 16:55:07 9 ones that are not there.
- 16:55:10 10 Q. Did you testify as to what you felt was not included?
- 16:55:21 11 A. Can we go back to Dr. Kia's table?
- 16:55:21 12 Q. Sure. Slide 194. Is this one good?
- 16:55:31 13 A. No, go forward. So for example the flat panel
- 16:55:50 14 sensor, the column and AINO noise removal were not included
- 16:56:00 15 in his analysis, the ROI reconstruction function was not in
- 16:56:04 16 his analysis.
- 16:56:08 17 Q. What is the flat panel sensor?
- 16:56:10 18 A. That's the detector that makes the whole thing work.
- 16:56:13 19 Q. The x-ray detector?
- 16:56:15 20 A. Yes.
- 16:56:15 21 Q. Isn't that part of the CBCT machine?
- 16:56:18 22 A. That's exactly my point.
- 16:56:20 23 Q. But he listed the CBCT machine, so wouldn't that just
- 16:56:24 24 be part of it?
- 16:56:25 25 A. And did Dr. Massie invent flat panel sensors?

- 16:56:31 1 Q. Well, for the hypothetical situation that we're
16:56:35 2 supposed to be in for purposes of this analysis, Dr. Massie
16:56:38 3 invented a system for tomographically modeling dental
16:56:43 4 structures with bone density information, densitometry,
16:56:46 5 right, that system includes a number of components like in
16:56:50 6 this claims, including an x-ray beam and sensor. So the
16:56:55 7 flat panel sensor would be one of the claim components of
16:56:58 8 the combined patented system, correct?
- 16:57:01 9 A. But what is the inventive element?
- 16:57:04 10 Q. For purposes of this analysis, somehow you're now
16:57:11 11 asking me the questions, I'm testifying.
- 16:57:12 12 A. Because you're missing that key point. What we are
16:57:16 13 supposed to value is the impact, the nexus due to inventive
16:57:21 14 element. So we have to find what that inventive element is.
- 16:57:25 15 Q. Okay.
- 16:57:26 16 A. And it's certainly not the flat panel sensor.
- 16:57:29 17 Q. The flat panel sensor would be part of the CBCT
16:57:33 18 apparatus, would you agree with that?
- 16:57:35 19 A. Yes.
- 16:57:38 20 Q. Okay. So Dr. Kia did not omit it he just included it
16:57:42 21 as part of the CBCT apparatus, you don't agree with his
16:57:44 22 number, I understand that, but he didn't omit the device,
16:57:46 23 correct?
- 16:57:48 24 A. That's right. But he gave it -- you're right.
- 16:57:52 25 Q. It's like pulling teeth?

16:57:54 1 A. Fine, I'll give you that with respect to the flat
16:57:56 2 panel sensor, but if you agree with me that the flat panel
16:58:01 3 sensor is in the prior art then Dr. Kia should not have
16:58:05 4 given a hundred percent of the weight to Dr. Massie's
16:58:07 5 invention.

16:58:07 6 Q. I understand, I'm not here to agree with you, I'm
16:58:10 7 just trying to get your testimony clear. So now we have
16:58:14 8 concluded that Dr. Kia did not omit the flat panel sensor,
16:58:18 9 it was included in the CBCT. We got that. Do you know
16:58:23 10 whether Dr. Kia has answered questions about other
16:58:27 11 components that were part of this, that he considered part
16:58:29 12 of the CBCT?

16:58:31 13 A. Yes.

16:58:32 14 Q. Where did he do that?

16:58:35 15 A. Where did he give that testimony?

16:58:38 16 Q. Where did he provide that information?

16:58:41 17 A. He used as I understand it, he used that top entry as
16:58:47 18 a bucket into which everything except the other features
16:58:54 19 belonged, but then he didn't do an analysis of which of
16:58:57 20 those is Dr. Massie entitled to.

16:59:02 21 THE COURT: You find a place to break.

16:59:05 22 MR. OSTROW: We can stop now, Your Honor, I
16:59:08 23 don't what else to do, I'm going to go past five otherwise,
16:59:12 24 not much past five but I feel bad.

16:59:14 25 THE COURT: I'm not going to let you do that.

16:59:18 1 We're just going to wait and we're going to break for the
16:59:21 2 day. And I'll just remind you of what I said before, and
16:59:26 3 that is you need to wait to make any decision until you have
16:59:30 4 heard all the evidence, we still have some more evidence
16:59:33 5 you'll hear tomorrow. And we have to keep your own counsel,
16:59:37 6 and not do any research or talk to anybody about the case.
16:59:41 7 We'll see you tomorrow morning at 9 o'clock, ladies and
16:59:45 8 gentlemen.

16:59:45 9 COURT CLERK: All rise.

16:59:46 10 (Jury leaving the courtroom at 4:59 p.m.)

17:00:18 11 THE COURT: So have a seat. I have a couple of
17:00:20 12 questions outside the presence of the jury. So if you would
17:00:24 13 put up the defendant presentation number 19. There you go.
17:00:37 14 So doctor, I have been reading CT scans since 1974, okay.

17:00:45 15 THE WITNESS: I'm sorry, you have been.

17:00:47 16 THE COURT: Yes, because I used to represent the
17:00:49 17 doctors that did it for whatever that's worth. So this
17:00:54 18 looks familiar to me, okay. Because back when the original
17:00:58 19 technology was done, the resolution was bad. You can see
17:01:00 20 why it is not perfectly symmetrical because the resolution
17:01:00 21 in the imaging was bad and that had to do with the detection
17:01:10 22 array I assume, correct?

17:01:12 23 THE WITNESS: Everything in that scanner was
17:01:14 24 designed to produce an image that was 80 by 80.

17:01:20 25 THE COURT: Right. So if we move to panel

17:01:31 1 number 102, so now we're looking at newer technology,
17:01:40 2 certainly not today's technology but newer technology, and
17:01:43 3 we see that the array can either be set up like that or it
17:01:48 4 can be set up in linear arrays?

17:01:52 5 THE WITNESS: Yes.

17:01:53 6 THE COURT: And these arrays, these arrays are
17:01:55 7 vertical arrays?

17:01:57 8 THE WITNESS: Yes.

17:01:57 9 THE COURT: And this one does theoretically both
17:02:01 10 because Figure 6(B) is, looks like pixels.

17:02:07 11 THE WITNESS: The detector in a flat panel you
17:02:10 12 can think of as pixels.

17:02:14 13 THE COURT: But whether the x-ray source is,
17:02:16 14 when the collimator works for the x-ray source it has to
17:02:21 15 have, it shoots basically a vertical beam correct.

17:02:25 16 THE WITNESS: No. Tell me the width of the beam
17:02:28 17 if you know.

17:02:28 18 THE WITNESS: It's different in the tube. So in
17:02:31 19 the left one.

17:02:32 20 THE COURT: Figure 5.

17:02:32 21 THE WITNESS: In Figure 5, for patient's safety
17:02:41 22 sake you would collimate the beam to be no wider than the
17:02:45 23 detector array when the beam lands there.

17:02:47 24 THE COURT: On the other side.

17:02:49 25 THE WITNESS: On the other side. And-it could

17:02:51 1 be say a millimeter.

17:02:52 2 THE COURT: So the collimator is arranged
17:02:55 3 vertically, in other words it makes a vertical beam that
17:03:00 4 puts x-ray images on the vertical detector array.

17:03:04 5 THE WITNESS: It puts a fan shaped beam that's
17:03:07 6 in a vertical direction. But when you put the detector 6(B)
17:03:12 7 in.

17:03:14 8 THE COURT: My question is now how is the -- how
17:03:19 9 does the collimator work on 6(B).

17:03:21 10 THE WITNESS: It would look more like the
17:03:23 11 collimator in a normal x-ray machine that just has a wide
17:03:26 12 opening that illuminates the whole detector. Or if you
17:03:30 13 wanted to, you could still illuminate sheets and do the same
17:03:34 14 technique that Webber was doing with the linear arrays, it
17:03:40 15 can do both, but you can certainly open it up to a cone and
17:03:50 16 then it turns it into a cone beam system.

17:03:53 17 THE COURT: Okay. So just out of curiosity when
17:03:58 18 you were working on the machine back at GE, what was the
17:04:01 19 resolution, was it one millimeter or more?

17:04:04 20 THE WITNESS: Among the things that I did was I
17:04:08 21 improved the resolution of that machine to well below a
17:04:13 22 millimeter.

17:04:13 23 THE COURT: But before it was more than a
17:04:16 24 millimeter.

17:04:17 25 THE WITNESS: On the machines by the time we got

17:04:21 1 to the late '80's, they were 1 to 2 millimeters.

17:04:25 2 THE COURT: Okay. All right. That's the only
17:04:28 3 questions I have. It's more of a curiosity than anything
17:04:32 4 else. Thank you, doctor.

17:04:33 5 THE WITNESS: No problem.

17:04:34 6 THE COURT: Yes, counsel.

17:04:36 7 MS. PESCHEL: Your Honor, I was not expecting
17:04:37 8 him to still be in cross-examination at this point in the
17:04:40 9 day, can I tell him in open court that we're not going to be
17:04:44 10 able to talk to you and we're not avoiding you.

17:04:46 11 THE WITNESS: I understand.

17:04:47 12 THE COURT: All right. So Ms. Grimes, if you
17:04:52 13 will give this back. Thank you very much. So ladies and
17:04:54 14 gentlemen, let's take ten for my court reporter's sake and
17:04:59 15 then we'll come back and talk about jury instructions.

17:05:05 16 MR. QURESHI: Your Honor, I'm going to leave,
17:05:07 17 may I be excused.

17:05:10 18 THE COURT: Yes, you may. Are you coming back
17:05:11 19 tomorrow?

17:05:12 20 MR. QURESHI: I will be back tomorrow, that's
17:05:15 21 why I'm leaving now.

17:05:17 22 THE COURT: Sorry about that counsel, sorry you
17:05:18 23 have to come back. So we'll see you in ten minutes.

17:05:22 24 THE WITNESS: While we're still here and
17:05:24 25 everybody can hear what I'm saying, can someone get my

17:05:28 1 briefcase out of the lawyer room and put it outside so that
17:05:30 2 I can take my things. Thank you.

17:05:32 3 (A brief recess was taken.)

17:15:16 4 COURT CLERK: All rise.

17:15:17 5 THE COURT: Please be seated.

17:15:55 6 All right. Let's start with jury instructions.

17:15:58 7 So does anyone have any objections to the initial jury
17:16:02 8 instructions that they would like to interpose now. I know
17:16:06 9 that everybody agreed on them, but if there is something
17:16:09 10 changed that somebody wants to change the initial, speak now
17:16:13 11 or forever hold your peace. For the plaintiff?

17:16:18 12 MR. OSTROW: I don't think so, Your Honor.

17:16:21 13 We're just quickly checking, but we weren't expecting that
17:16:24 14 question.

17:16:25 15 THE COURT: All right. For the defense.

17:16:28 16 MR. CRAVEY: Defense doesn't have any objection,
17:16:31 17 Your Honor.

17:16:31 18 THE COURT: Okay. Because you agreed on what
17:16:35 19 they were, so I just want to be sure that there is no
17:16:38 20 disagreement now. Okay. So let's -- so you have given me a
17:16:41 21 set of jury instructions that you all agreed upon except for
17:16:44 22 some red line issues. So I'm just going to go through what
17:16:47 23 you have agreed on and when we get to the ones you don't
17:16:50 24 agree on it. We'll talk about it. 17, 18, 19, 20, 21, 22,
17:17:03 25 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35.

17:17:25 1 Everybody agrees to those; correct?

17:17:30 2 MR. OSTROW: There is too many pages, I don't
17:17:32 3 think so.

17:17:32 4 THE COURT: I'm talking about instruction
17:17:34 5 numbers. So you didn't change the numbers, the page
17:17:42 6 numbers, did you? So now I have your version so we're all
17:17:50 7 talking about the same thing. Okay. So we're going to get
17:17:54 8 to -- oh, boy. Okay. The instruction -- I'm going to the
17:18:07 9 instruction on infringement generally -- let me just tell
17:18:14 10 you this, okay, up front. Somebody is going to make a
17:18:19 11 motion for a directed verdict on willfulness and I am going
17:18:24 12 to sustain it. Okay. So I'm just telling you we're not
17:18:28 13 going to talk about instructions on willfulness because I'm
17:18:31 14 not going to instruct on willfulness. And you guys make
17:18:35 15 your argument, make your record, but there is no reason for
17:18:38 16 me to waste my time on an instruction on willfulness because
17:18:42 17 I know I'm not going to do it. All right. So we'll start
17:18:45 18 with that. So, you want to object to that?

17:18:50 19 MR. CRAVEY: No, I was going to say with Your
17:18:53 20 Honor's invitation I'm happy to make that motion.

17:18:56 21 THE COURT: No, we should do it after the
17:18:59 22 evidence is closed, but I have heard enough evidence at this
17:19:02 23 point to say that there is no willfulness, because the
17:19:05 24 plaintiff has already presented all its evidence on
17:19:08 25 willfulness and you've presented an expert and based on that

17:19:13 1 expert's testimony, that I have heard to this point, there
17:19:17 2 is not going to be anymore testimony on willfulness that I
17:19:20 3 am aware of. Would you agree with that, Mr. Ostrow?

17:19:24 4 MR. OSTROW: Yes, Your Honor.

17:19:25 5 THE COURT: So when the time comes, somebody is
17:19:27 6 going to make the motion and I'm going to sustain it because
17:19:31 7 I've heard enough. But you don't need to do it now. Let's
17:19:34 8 just take care of this business.

17:19:36 9 I don't know where the willfulness instruction
17:19:44 10 is in here.

17:19:45 11 MR. OSTROW: Page 28.

17:19:46 12 THE COURT: Okay.

17:19:47 13 MR. CRAVEY: I don't know if Your Honor is going
17:19:48 14 to jump to that or if you want to march through the
17:19:51 15 instructions.

17:19:52 16 THE COURT: I want to march through the next
17:19:54 17 once. Any instruction on willfulness has been deleted. So
17:19:57 18 until we get to page infringement generally, and
17:20:04 19 infringement generally, is on.

17:20:10 20 MR. CASSONE: 25.

17:20:11 21 THE COURT: Yes. 25. That sounds right.
17:20:12 22 Page 25. Here we go. And it's my understanding that the
17:20:22 23 dispute on page 25 -- no, that's not a dispute. The next
17:20:27 24 one is open ended or compromising claims. No, that's not
17:20:32 25 right, either.

17:20:47 1 MR. CRAVEY: Your Honor, I think the first
17:20:49 2 dispute, and the plaintiff can tell me if I'm talking out of
17:20:54 3 school is going to be the one directed to patent invalidity,
17:20:58 4 prior art, not considered by the Patent Office.

17:20:59 5 THE COURT: No, the first one is direct
17:21:02 6 infringement by literal infringement. And the question is
17:21:07 7 whether I should -- whether we should add the language *i.e.*,
17:21:11 8 that it is more likely than not. Let me find your edition.

17:21:21 9 MR. FEINLAND: Your Honor, we have no issue with
17:21:23 10 that.

17:21:25 11 THE COURT: I'm striking that, I'm not going to
17:21:27 12 use it.

17:21:28 13 MR. FEINLAND: That's fine, Your Honor.

17:21:29 14 THE COURT: The next one that I see is an issue
17:21:31 15 on the second page of the instruction invalidity generally.
17:21:33 16 And the question is you believe this should be removed
17:21:35 17 because Planmeca did not present any argument or evidence
17:21:37 18 during the trial related to the lack of [^]I know /-L
17:21:39 19 /HREUPBLG able subject matter. So that is element number
17:21:41 20 three, apparently. And by adding element number four,
17:21:43 21 because the asserted claim lacks patent [^]he will /HREUPBL
17:21:45 22 able subject matter, talk to me about this, who is doing
17:21:47 23 this for Osseo.

17:22:01 24 MR. OSTROW: I will, Your Honor. It's pretty
17:22:03 25 much what the footnote says Your Honor, they had their

17:22:16 1 expert had done his direct testimony, did he not assert
17:22:20 2 invalidity based on 101, patent ineligible subject matter.
17:22:24 3 Technically defense hasn't rested, I guess something could
17:22:29 4 happen, as of now it does not appear that they have put in
17:22:32 5 any evidence of that defense.

17:22:33 6 THE COURT: What's your response to that?

17:22:35 7 MR. CRAVEY: The response to that would be, Your
17:22:37 8 Honor, is that the evidence in this case shows that the only
17:22:41 9 arguably novel or difference between what was in the art
17:22:45 10 with Dr. Massie was known technology from one field over to
17:22:51 11 the other, that's pretty classic 101 patent eligibility
17:22:56 12 subject matter taking known existing technology and moving
17:22:59 13 it from one field to the other doesn't meet the threshold
17:23:03 14 standard for 101.

17:23:05 15 THE COURT: That's your obviousness defense,
17:23:08 16 your obviousness for invalidity.

17:23:10 17 MR. CRAVEY: It applies to both, Your Honor,
17:23:12 18 there has been cases, I know Your Honor said the federal
17:23:18 19 circuit has lots of different cases.

17:23:20 20 THE COURT: If they could speak with one voice
17:23:22 21 it would be very helpful but go ahead.

17:23:25 22 MR. CRAVEY: But the argument there Your Honor
17:23:27 23 is that taking known admittedly existing conventional
17:23:31 24 technology importing it from one application to another
17:23:34 25 application doesn't meet the subject matter eligibility

17:23:38 1 threshold for patentability under 101.

17:23:40 2 THE COURT: And we have a 101 instruction in
17:23:43 3 here?

17:23:43 4 MR. CRAVEY: We do, Your Honor.

17:23:44 5 THE COURT: Where is that?

17:23:57 6 MR. FEINLAND: Page 51, Your Honor.

17:24:01 7 MR. CRAVEY: Page 51 of the version that we
17:24:07 8 provided the court.

17:24:07 9 THE COURT: That's one that there is no dispute
17:24:09 10 on.

17:24:10 11 MR. FEINLAND: There is a footnote.

17:24:11 12 THE COURT: There is a dispute on 51.

17:24:14 13 MR. CRAVEY: Osseo disputes presenting the issue
17:24:17 14 to the court, Your Honor.

17:24:18 15 THE COURT: Altogether. And I can't remember,
17:24:21 16 did Dr. Pelc site 101 in all of the stuff -- I don't
17:24:31 17 remember seeing a 101.

17:24:37 18 MR. OSTROW: No, he did not Your Honor,
17:24:39 19 certainly not the way this instruction, it's not there at
17:24:42 20 all, and there is nothing that relates to this instruction
17:24:45 21 at all, abstract idea, element not transformed, claim
17:24:48 22 dependence, there is nothing that is in this instruction
17:24:52 23 that's been mentioned in this trial.

17:24:54 24 THE COURT: So he didn't put 101 in his
17:24:55 25 analysis, is that correct.

17:25:00 1 MR. CRAVEY: That's correct, Your Honor, 101
17:25:02 2 wasn't explicitly presented to the jury, I'm not aware of
17:25:06 3 any case law that says you have to have an expert offer
17:25:09 4 opinion testimony on the issue.

17:25:10 5 THE COURT: On the issue of 101.

17:25:12 6 MR. CRAVEY: Right. Dr. Pelc can offer hours of
17:25:16 7 testimony today that the technology was known and
17:25:18 8 conventional and the only inventive aspect was for medical,
17:25:25 9 I'm fairly certain that's the exact same thing that Dr. Kia
17:25:27 10 said on the stand as will.

17:25:29 11 THE COURT: Is what.

17:25:29 12 MR. CRAVEY: That the idea of the invention at
17:25:32 13 issue this this case with respect to Dr. Massie is taking
17:25:35 14 known densitometry techniques for medical and using them in
17:25:38 15 the field of dental.

17:25:39 16 THE COURT: And let me see, show me the
17:25:42 17 instruction again for 101.

17:25:45 18 MR. CRAVEY: Page Number 51.

17:25:47 19 THE COURT: 51. Okay. And the plaintiff
17:25:52 20 disagreed with the instruction ought to be given all
17:25:52 21 together, but if it's given, do you have any objection to
17:26:01 22 the information in it? The way it's constructed.

17:26:05 23 MR. OSTROW: Our objection is that it's asking
17:26:07 24 the jury to do this two-step, so-called two step test of
17:26:12 25 patent eligibility, nobody has said anything about this.

17:26:15 1 THE COURT: No, no, I understand that your
17:26:17 2 objecting to the instruction as a whole. But if it's given,
17:26:21 3 do you have any objection to the language, in other words, I
17:26:25 4 assume that this comes out of some book on 101 subject
17:26:32 5 matter eligibility, right.

17:26:34 6 MR. OSTROW: Honestly, we have -- Your Honor, we
17:26:36 7 have to look at this based on current case law and see if
17:26:39 8 it's really an accurate statement.

17:26:41 9 THE COURT: Okay. All right. That's fine. Let
17:26:43 10 me look at it first.

17:27:38 11 You can talk to me about, Mr. Cravey, right,
17:27:45 12 talk to me about why you think there is an 101 issue here.

17:27:49 13 MR. CRAVEY: The 101 issue, Your Honor, is what,
17:28:00 14 what I was trying to characterize and obviously not doing a
17:28:01 15 very good job is that taken known existing technology and
17:28:03 16 moving it from one field to the other doesn't meet the
17:28:06 17 threshold standard for patent eligible subject matter. I
17:28:12 18 understand that that same set of facts and circumstances are
17:28:15 19 also applicable to obviousness, but the Federal Circuit for
17:28:20 20 better or worse has also given us articulated another avenue
17:28:24 21 of invalidity and that's 101 patent eligible subject matter.

17:28:29 22 And so the argument would be that the known
17:28:42 23 existing technology is the abstract idea, transform it and
17:28:47 24 importing it over to another form doesn't transform it from
17:28:52 25 that abstract idea on the patent eligible subject matter,

17:28:55 1 that alone is insufficient.

17:29:00 2 THE COURT: You know, I just don't feel
17:29:02 3 comfortable giving this based on the state of the evidence.
17:29:05 4 I mean, you've clearly established an obviousness argument
17:29:11 5 for invalidity and you have got one for written description
17:29:14 6 and you have got one for, I can't remember where I'm going,
17:29:20 7 but you got those three and I don't have a problem with
17:29:22 8 that. Now we're introducing a whole new lexicon to the jury
17:29:27 9 with 101 about an abstract idea. And I haven't heard any
17:29:31 10 testimony from your expert on abstract ideas and what it
17:29:35 11 means, or whether it transforms the nature of the claim into
17:29:41 12 a patent eligibility application.

17:29:44 13 I understand the argument that this might be an
17:29:48 14 abstract idea because the doctor never reduced his patent to
17:29:53 15 practice, but I don't think I have enough evidence in here
17:29:57 16 to do a 101 based on the state of the expert testimony back
17:30:03 17 and forth between the parties. And I understand that the
17:30:03 18 jury could do this without an expert, but I think given the
17:30:07 19 complicated nature of the litigation here, that I don't want
17:30:12 20 to introduce a wild card. So I am going to sustain their
17:30:16 21 objection.

17:30:16 22 MR. CRAVEY: Understood, Your Honor.

17:30:18 23 THE COURT: To the language adding number four
17:30:21 24 asserting a claim that lacks patent eligible subject matter
17:30:25 25 on page 28 to this instruction that's captured in invalidity

17:30:31 1 generally. And then I'm not going to give the instruction
17:30:35 2 on subject matter I know eligibility for the reasons that I
17:30:39 3 just stated.

17:30:43 4 MR. CRAVEY: Given Your Honor's ruling I think
17:30:45 5 that means on page 31 we would get rid of Item Number 4.

17:30:52 6 THE COURT: That's correct.

17:30:55 7 MR. CRAVEY: And then we would also get rid of
17:30:57 8 the instruction on page 51.

17:31:00 9 THE COURT: Correct. All right. So the next
17:31:07 10 issue I see is the instruction on patent invalidity, prior
17:31:13 11 art not considered by the Patent Office.

17:31:20 12 MR. CRAVEY: Your Honor, defendant's issue on
17:31:23 13 that instruction is the language that we obviously moved out
17:31:29 14 with red line and the issue there is it seems to go to the
17:31:33 15 issue of cumulative and whether the art is materially
17:31:36 16 different and cumulative. I'm not aware of Osseo having
17:31:41 17 made that argument in this case, and certainly that that
17:31:47 18 portion of your instruction was not given in the Boston
17:31:51 19 scientific case that we've cited nor was it given in the ESW
17:31:57 20 holding that we cited by the the honorable Alan Albright in
17:32:02 21 Texas. So I mean given that that background and where we
17:32:10 22 are with the, I don't think the jury needs to be instructed
17:32:13 23 on that. It makes it needlessly complicated. The idea
17:32:18 24 behind the instruction is that art that the Patent Office
17:32:22 25 didn't consider may be weighed more heavily by the jury,

17:32:26 1 that's sort of the principal for eye for eye. And that's
17:32:30 2 the way it's been articulated in other cases, for example
17:32:33 3 the ones that we cited in our footnote, I don't think it
17:32:36 4 should be included in the instruction here.

17:32:38 5 THE COURT: Let me just read this first.

17:32:58 6 All right, counsel.

17:33:00 7 MR. OSTROW: Your Honor, I just spent an hour
17:33:03 8 making that table, the whole point of the exercise was to
17:33:06 9 get Dr. Pelc to admit which I think he pretty much did or at
17:33:10 10 least he came pretty close that the Guenther reference is no
17:33:15 11 better than Webber, Webber was in front of the Patent
17:33:19 12 Office, that was the whole point of that exercise, I don't
17:33:23 13 see how we take this out, that's the whole point.

17:33:30 14 MR. QURESHI: Even given that Mr. Ostrow --

17:33:34 15 THE COURT: Just let me look at this for one
17:33:40 16 minute.

17:33:44 17 Yeah, you know, I'm just looking at this and
17:33:48 18 Microsoft court is pretty much -- I'm not sure that this
17:33:55 19 language that the plan wants to add really changes the way
17:34:01 20 the jury thinks is appropriate, the plaintiff can certainly
17:34:05 21 argue the issues that you argued to me, but I don't need to
17:34:10 22 over emphasize one over the other, I'm just going to let the
17:34:14 23 jury decide based on the arguments and the evidence
17:34:18 24 presented, so I'm going to strike the line that the
17:34:22 25 defendant wants me to strike.

17:34:22 1 Okay. So the next one is the instruction on
17:34:29 2 obviousness. So the defendant objects to what part of this?

17:34:38 3 MR. CRAVEY: It's the instruction on secondary
17:34:44 4 considerations, Your Honor. And --

17:34:47 5 THE COURT: Just a second.

17:34:49 6 MR. CRAVEY: We presented a motion in limine on
17:34:51 7 that issue that plaintiffs failed to articulate during
17:34:56 8 discovery and the response to interrogatories.

17:34:57 9 THE COURT: Secondary considerations?

17:35:02 10 Where is the language on secondary
17:35:11 11 considerations?

17:35:13 12 MR. CRAVEY: It is on page 43.

17:35:21 13 THE COURT: Okay. All right. Mr. Ostrow.

17:36:15 14 MR. OSTROW: Your Honor, this has basically been
17:36:18 15 briefed already in the motion in limine which Your Honor
17:36:21 16 denied. We recognize that Dr. Kia could not get into
17:36:24 17 specific opinions about these issues, but as long as there
17:36:30 18 were facts, we just want to be able to present them to the
17:36:33 19 jury. For example, Dr. Massie testified that he recognized
17:36:36 20 the need for, for better imaging technology, so that would
17:36:40 21 be, you know, for example, number two, there was -- you
17:36:43 22 know, we're going to argue commercial success, the
17:36:50 23 \$266 million that Planmeca made, and I thought there was at
17:36:53 24 least one other factor here that I felt we could argue on,
17:36:57 25 the statement by others appraising the invention, we think

17:37:01 1 we had introduced some letters from Dr. Christensen and
17:37:05 2 others that's a good idea, we should do that, we would to be
17:37:08 3 able to give that to the jury and show them the relevance of
17:37:11 4 the facts, if it's not enough for them, the defendant can
17:37:14 5 certainly make the argument it's not sufficient, but that's
17:37:17 6 what we want to do.

17:37:18 7 THE COURT: Let me look at this.

17:38:17 8 Mr. Cravey, which part of this, you're objecting
17:38:22 9 not to the whole instruction are you.

17:38:24 10 MR. CRAVEY: I am, Your Honor, I am objecting to
17:38:26 11 the whole instruction and the reason being there was more to
17:38:30 12 the motion in limine than Osseo's failure to provide the
17:38:33 13 basis during discovery. We looked at the factors here, the
17:38:37 14 first one whether the invention was commercially successful.
17:38:40 15 We know Osseo hasn't made a machine they haven't done
17:38:43 16 anything, the only thing they have pointed to is the accused
17:38:46 17 product, Planmeca's device. If you remember we argued in
17:38:49 18 our motion in limine that there was no evidence that we've
17:38:53 19 multifunction, a multifunction component machine like the
17:38:56 20 accused product in this case the law requires you to show
17:39:00 21 the commercial success is attributable to the patented
17:39:04 22 invention and they haven't done that here. You look at
17:39:07 23 whether the, there was copying of the invention, well there
17:39:10 24 was no product, the undisputed evidence is that Planmeca
17:39:14 25 designed, built, manufactured this device before they knew

17:39:17 1 about Osseo and its patents. You know, above and beyond
17:39:24 2 them not disclosing any basis of secondary considerations
17:39:28 3 during discovery there just really isn't any evidence on
17:39:31 4 this case on which they can rely on that the jury needs
17:39:35 5 instructed.

17:39:35 6 THE COURT: This has nor to do -- this
17:39:38 7 instruction is all secondary considerations as far as you're
17:39:41 8 concerned, but I see something in here about prior art, what
17:39:45 9 part of this is objectionable.

17:39:48 10 MR. CRAVEY: I might have created some confusion
17:39:51 11 by dropping the footnote on both places. The only part that
17:39:54 12 we would argue needs to be removed Your Honor, is the
17:39:58 13 portion on page 43.

17:39:58 14 THE COURT: That starts.

17:40:01 15 MR. CRAVEY: Objective evidence of
17:40:04 16 nonobviousness.

17:40:51 17 THE COURT: All right. So we're talking about
17:40:54 18 two different things is the problem. There is an
17:41:01 19 instruction on-- alright. There is an instruction on
17:41:04 20 obviousness at page 36. And I must have misunderstood, I
17:41:07 21 thought there was an issue on the instruction on page 36.
17:41:10 22 Is there no issue on instruction on page 36?

17:41:13 23 MR. CRAVEY: No issue, Your Honor, I
17:41:16 24 inadvertently created that confusion.

17:41:19 25 THE COURT: All right. So that construction is

17:41:50 1 okay. I'm starting in the wrong place. I was having a hard
17:41:55 2 time understanding how you --

17:41:59 3 MR. CRAVEY: I certainly don't want to remove
17:42:00 4 the instruction on obviousness.

17:42:01 5 THE COURT: All right. So the next issue that
17:42:04 6 is the objective evidence of nonobviousness, and that's what
17:42:09 7 you're talking about. All right. Now I understand what
17:42:13 8 you're saying. Okay. All right. So Mr. Ostrow, you're
17:42:36 9 basically saying that you have enough evidence on the record
17:42:43 10 to meet -- for the jury to consider the objective evidence
17:42:49 11 of nonobviousness.

17:42:51 12 MR. OSTROW: Yes, especially factor 1, 2 and 6,
17:42:55 13 at least those.

17:43:00 14 THE COURT: Which ones, one, what.

17:43:02 15 MR. OSTROW: 1, 2 and 6. And seven -- no, not
17:43:15 16 seven.

17:43:21 17 THE COURT: No, not seven. Did you say seven?

17:43:29 18 MR. OSTROW: No. 1, 2 and 6.

17:43:33 19 THE COURT: 1, 2, and 6.

17:43:52 20 THE COURT: So Mr. Cravey, there was some
17:44:00 21 testimony by Dr. Pelc about the nonobviousness, objective
17:44:02 22 evidence of nonobviousness, and he didn't -- I think as I
17:44:12 23 recall, he didn't address it because he didn't think that
17:44:14 24 Dr. Kia addressed it, is that correct?

17:44:18 25 MR. CRAVEY: Are you talking about today with

17:44:21 1 Dr. Pelc?

17:44:22 2 THE COURT: Yes.

17:44:23 3 MR. CRAVEY: It's definitely our view that
17:44:26 4 Dr. Kia did not address secondary considerations of
17:44:30 5 nonobviousness.

17:44:30 6 THE COURT: How about Dr. Massie.

17:44:32 7 MR. CRAVEY: Well Dr. Massie, we're going to go
17:44:35 8 through these three elements, the only arguably thing that
17:44:41 9 he might have argued was the commercial success of our
17:44:44 10 product, not what he did, what our product does. And he
17:44:47 11 hasn't tied the success of our product to the patented
17:44:51 12 invention.

17:44:52 13 THE COURT: Okay. All right. Well,
17:44:55 14 Dr. Massie's testimony is what it is, and I think the jury
17:45:01 15 is going to have to assess his credibility. But I think
17:45:04 16 that he did talk about the in -- he thought the invention
17:45:08 17 would be successful if the patent is valid and you infringed
17:45:13 18 it, then, you know, he can equate your success to what his
17:45:17 19 success would have been if he had the money to do it. He
17:45:21 20 believes that it satisfied a long felt need and it obviously
17:45:24 21 did because you built it and marketed it, and it was
17:45:28 22 successful, and whether others in the field praised the
17:45:32 23 invention, I'm not sure. But I did hear evidence that your
17:45:37 24 system is a great system.

17:45:42 25 MR. CRAVEY: I definitely agree with that.

17:45:43 1 THE COURT: So if there is infringement, then
17:45:45 2 that does apply. So I'm going to give this objective
17:45:49 3 evidence of nonobviousness instruction. But only as to 1,
17:45:54 4 2, and 6. And we'll of course renumber them.

17:46:03 5 All right. So the next issue is the instruction
17:46:16 6 is the subject matter ineligibility.

17:46:26 7 MR. CRAVEY: 51 Your Honor, I think you already
17:46:28 8 ruled on that one.

17:46:28 9 THE COURT: I already ruled on that one, okay.
17:46:31 10 All right. Now we have a complete set of instructions as
17:46:34 11 far as everybody is concerned. Correct?

17:46:37 12 MR. OSTROW: Yes, Your Honor.

17:46:39 13 MR. QURESHI: Yes.

17:46:40 14 THE COURT: All right. Okay. So thank you very
17:46:43 15 much, gentlemen. And the ladies that worked on it. I did
17:46:48 16 note though that throughout the course of this trial, one of
17:46:51 17 my staff said to me, it's odd that there are no female
17:46:55 18 dentists.

17:46:59 19 (Discussion off the record.)

17:47:27 20 THE COURT: We know what we're going to do. You
17:47:29 21 need to number these beginning number 17, I believe. So if
17:47:32 22 you want me to -- so my clerk has done a version with all
17:47:45 23 the changes, she will send it to you.

17:47:48 24 MR. CRAVEY: And Your Honor, I would be remiss
17:47:52 25 if before we left here today I made that invited motion for

17:47:55 1 willfulness to move as a judgment of matter of law for
17:47:59 2 willfulness. Or is that just going to be --

17:48:02 3 THE COURT: I would prefer to do that at the
17:48:04 4 close of your case. Okay. I just don't think, I don't feel
17:48:08 5 comfortable about it. I might change my mind but I doubt
17:48:12 6 it.

17:48:13 7 MR. CRAVEY: I misunderstood, Your Honor.

17:48:15 8 THE COURT: You didn't misunderstand, that's the
17:48:19 9 way I think I'm going to rule. And I think I'm going to
17:48:21 10 rule that way, not enough to do in the instructions. But
17:48:27 11 you're still going to have to make a motion at the close of
17:48:30 12 your evidence, or at the close of all the evidence however
17:48:36 13 you want to do.

17:48:37 14 MR. FLYNN: Your Honor, an oral motion is fine.

17:48:39 15 THE COURT: You don't need a written one?

17:48:41 16 MR. FLYNN: I don't need a written motion, just
17:48:43 17 an oral motion.

17:48:44 18 THE COURT: But I need to have the motion made
17:48:48 19 orally and I need the other party to respond so that when I
17:48:52 20 get appealed there is a record on why you believe I made a
17:48:56 21 mistake or that I was a /TKPWAOEPB /KWROUS, either way.

17:49:02 22 MR. FLYNN: You know, Your Honor one procedural
17:49:04 23 issue, does Your Honor prefer to read the instructions prior
17:49:06 24 to closing arguments.

17:49:08 25 THE COURT: That's completely up to you. So

17:49:11 1 this is the plaintiff's lawsuit, I'll ask you, do you want
17:49:14 2 me to read them ahead of time or do you want me to read them
17:49:17 3 afterwards?

17:49:20 4 MR. OSTROW: We're prefer go that you read them
17:49:23 5 after.

17:49:23 6 THE COURT: I think that's a good idea because
17:49:25 7 if we run out of time, I can eat the clock and take the
17:49:31 8 blame and not any of the parties.

17:49:34 9 MR. CRAVEY: I missed, what order.

17:49:36 10 THE COURT: What we're going to I do is you can
17:49:38 11 argue the case, you can refer to my instructions if you like
17:49:41 12 to because we know what they are, but I'll instruct the jury
17:49:43 13 after our closing arguments.

17:49:46 14 MR. CRAVEY: Okay.

17:49:50 15 THE COURT: Okay. And I just want to be sure,
17:49:53 16 we get into this argument all the time and I didn't rereview
17:49:56 17 the pretrial order, but the plaintiff is going to give a
17:50:00 18 closing argument, the defendant will give a closing
17:50:03 19 argument, plaintiffs have have a cans to give a rebuttal, I
17:50:06 20 just as soon that's the end of it, but I know that there is
17:50:10 21 some lawyers that don't like to do that, because if you're
17:50:13 22 arguing invalidity, so where are you on that Mr. Cravey.

17:50:20 23 MR. CRAVEY: If Your Honor would indulge us a
17:50:23 24 brief show after plaintiff gives theirs, we're happy to talk
17:50:26 25 about invalidity.

17:50:33 1 THE COURT: What is the plaintiff's position?

17:50:44 2 MR. CASSONE: Your Honor, it's my understanding
17:50:47 3 is the plaintiff should have the last word whether there is
17:50:50 4 affirmative defense or not.

17:50:52 5 THE COURT: I generally agree with that, that's
17:50:54 6 what we'll do.

17:50:55 7 MR. FLYNN: I'm sorry Your Honor.

17:50:56 8 THE COURT: What we're going to do is plaintiff
17:50:58 9 gets the last word. Okay. So you'll get to argue
17:51:02 10 invalidity and non-infringement and then they'll get the
17:51:06 11 last word.

17:51:06 12 MR. FLYNN: And their rebuttal has to be limited
17:51:09 13 to invalidity.

17:51:10 14 THE COURT: No their rebuttal is their rebuttal.
17:51:13 15 I'll just give you the time. You're going to tell me how
17:51:17 16 much time you both want, okay, the plaintiff is going to
17:51:21 17 tell me how much time they're going to use in rebuttal and
17:51:24 18 then they got to stick to that, and I'm not letting them
17:51:27 19 take anymore rebuttal than roughly a third or a quarter or
17:51:31 20 something less of what their opening argument was. So if
17:51:34 21 you want -- nobody has formulated their argument yet so you
17:51:40 22 can't tell me how long you're going to go.

17:51:42 23 MR. CRAVEY: It's in the pretrial order Your
17:51:44 24 Honor that each side will get 45 minutes.

17:51:47 25 THE COURT: Are you going to all take the

17:51:49 1 45 minutes, do you think.

17:51:51 2 MR. CRAVEY: I think most likely.

17:51:53 3 THE COURT: How time does the plaintiff want out
17:51:55 4 of that 45 minutes for rebuttal.

17:51:57 5 MR. OSTROW: Ten.

17:51:58 6 THE COURT: All right. And then that's how
17:52:01 7 we'll do it. I used to have, when I was practicing criminal
17:52:05 8 law there was a prosecutor that would stand up in front of
17:52:09 9 the jury and say you have heard the evidence, the defendant
17:52:12 10 is guilty, and sit down. And then I would have to argue my
17:52:14 11 whole case and then he of course would get up and basically
17:52:16 12 do his argument. So I don't like that. So that's why I'm
17:52:18 13 going to limit you and as soon as you say ten minutes, I
17:52:20 14 don't care how much time is left on your 45 minutes you're
17:52:22 15 only getting ten minutes.

17:52:34 16 MR. OSTROW: That's fine.

17:52:35 17 MR. CRAVEY: I guess the other open issue would
17:52:38 18 be the verdict form, we have one percolating.

17:52:41 19 THE COURT: The verdict form. If you would
17:52:43 20 prepare a verdict form, the two of you would try to work out
17:52:45 21 a verdict form that does not include willfulness I'll look
17:52:51 22 at it first thing in morning.

17:52:52 23 MR. FEINLAND: You shall, and subject matter
17:52:54 24 eligibility, correct.

17:52:56 25 THE COURT: Yes, that won't be included. So if

17:52:59 1 you two can work out a verdict form, do you think you can
17:53:03 2 get it to me in the morning.

17:53:04 3 MR. FEINLAND: It's pretty close to being done.

17:53:07 4 THE COURT: Show it to me in the morning and
17:53:09 5 then we'll review it sometime before closing arguments. I
17:53:15 6 mean, preferably you would like to see it before you do your
17:53:19 7 closing argument. So if you have it in the morning and I
17:53:23 8 have it in the morning by 8:30, then we'll talk about it at
17:53:28 9 8:30 so that you have the verdict forms so that when you
17:53:32 10 argue the case you know what --

17:53:34 11 MR. CRAVEY: I'm optimistic that we'll be able
17:53:37 12 to agree on it.

17:53:38 13 THE COURT: If you can't, we'll see if we can
17:53:42 14 work it out in the morning.

17:53:44 15 All right. Thank you, gentlemen.

17:53:46 16 MR. CASSONE: Thank you, Your Honor.

17:53:48 17 THE COURT: We're in recess, we're adjourned for
17:53:50 18 the day.

19 (Court adjourned at 5:53 p.m.)

20

21

22

23

24

25

\$	' 445 [3] - 868:17, 869:16, 875:15	1016:21, 1017:9, 1017:16	147 [3] - 878:5, 977:11, 977:22	1964 [2] - 774:22, 870:24
\$266 [1] - 1020:23	' 686 [3] - 837:12, 837:15, 970:22	102 [3] - 855:14, 977:7, 1006:1	148 [2] - 878:8, 878:16	1967 [1] - 787:21
'	' 76 [1] - 777:18	103 [2] - 855:20, 856:17	149 [1] - 977:22	1971 [1] - 788:17
'080 [10] - 781:6, 783:2, 783:5, 783:21, 836:15, 836:16, 838:1, 838:3, 839:16, 911:6	' 765 [1] - 838:2	104 [2] - 856:17, 888:16	15 [11] - 881:6, 884:6, 929:18, 929:21, 929:25, 930:24, 930:25, 931:2, 931:25, 932:1	1973 [1] - 788:2
'262 [38] - 812:21, 821:6, 821:9, 821:25, 828:16, 833:5, 833:8, 840:13, 852:1, 852:22, 854:18, 858:9, 859:19, 864:11, 881:14, 886:6, 887:25, 888:3, 888:5, 888:7, 888:12, 889:13, 890:14, 890:17, 891:2, 892:6, 983:13, 984:2, 985:4, 985:18, 986:7, 986:9, 991:15, 992:10, 992:20, 996:3, 996:4, 996:6	' 79 [1] - 777:18	105 [1] - 857:7	150 [7] - 776:18, 776:22, 776:23, 872:9, 879:6, 977:24	1974 [1] - 916:20
	/	106 [5] - 762:1, 762:6, 857:7, 977:19	153 [2] - 880:6, 978:6	1977 [1] - 791:18
	/-L [1] - 1012:18	107 [1] - 857:24	154 [1] - 880:6	1978 [2] - 791:18
	/HREUPBL [1] - 1012:21	108 [2] - 857:24, 858:16	156 [5] - 763:24, 764:1, 764:17, 764:19, 978:16	1979 [1] - 789:3
	/HREUPBLG [1] - 1012:19	109 [3] - 858:16, 978:3	158 [1] - 881:23	1980 [17] - 789:15, 790:9, 791:2, 791:9, 846:3, 846:14, 846:18, 846:22, 847:25, 861:5, 861:13, 861:19, 862:6, 862:12, 863:10, 865:15, 871:8
	/KWROUS [1] - 1026:21	10:24 [1] - 807:20	159 [1] - 882:12	1980's [1] - 796:19
	/TKPWAOEPB [1] - 1026:21	10:40 [1] - 810:18	16 [3] - 769:4, 878:17, 912:2	1984 [1] - 873:4
	/WAFPLT [1] - 758:14	11 [4] - 783:20, 790:1, 839:8, 911:9	161 [1] - 979:4	1985 [1] - 871:3
	0	114 [2] - 860:15, 978:12	163 [2] - 884:13, 980:11	1990's [1] - 987:16
	0 [6] - 768:20, 907:1, 907:6, 939:18, 1000:3, 1000:4	117 [1] - 861:4	164 [2] - 884:13	1991 [3] - 792:22, 793:24, 844:18
	0013 [1] - 827:22	118 [2] - 862:10, 986:11	168 [2] - 885:22, 984:23	1993 [2] - 794:7, 844:20
	1	119 [2] - 862:10, 978:25	169 [2] - 886:4, 985:3	1995 [3] - 782:6, 835:6, 867:18
	1 [24] - 755:13, 775:18, 775:23, 775:25, 797:15, 813:3, 837:18, 837:22, 845:6, 855:5, 867:18, 867:25, 869:5, 878:17, 911:23, 911:24, 971:3, 972:9, 1008:1, 1023:12, 1023:15, 1023:18, 1023:19, 1025:3	11:47 [1] - 850:3	17 [7] - 765:19, 769:4, 839:11, 854:7, 861:12, 1009:24, 1025:21	1996 [3] - 782:8, 835:6, 867:19
	1.4 [1] - 938:2	12 [3] - 784:22, 792:16, 922:6	17-1386(JFB) [1] - 753:5	1998 [4] - 796:6, 841:2, 847:13, 925:1
	10 [13] - 762:6, 781:1, 839:8, 849:10, 853:8, 853:9, 854:7, 860:16, 865:4, 865:9, 911:9, 929:18, 1000:17	120 [2] - 940:18, 978:24	170 [3] - 765:14, 765:17, 886:22	1999 [43] - 792:24, 794:10, 795:25, 830:25, 831:5, 831:7, 831:19, 831:24, 832:8, 833:12, 833:14, 833:21, 838:9, 838:21, 839:5, 841:1, 841:5, 841:11, 841:13, 841:16, 847:16, 849:7, 849:13, 862:4, 869:6, 873:5, 873:8, 874:6, 874:15, 880:14, 880:21, 882:19, 883:12, 887:20, 890:7, 892:5, 961:18, 987:3, 989:15, 990:4, 990:22, 994:8
	101 [18] - 854:13, 1013:2, 1013:11, 1013:14, 1014:1, 1014:2, 1014:16, 1014:17, 1014:24, 1015:1, 1015:5, 1015:17, 1016:4, 1016:12, 1016:13,	121 [2] - 978:25, 979:1	173 [1] - 888:10	1999's [1] - 987:16
	1013 [1] - 837:18, 837:22, 845:6, 855:5, 867:18, 867:25, 869:5, 878:17, 911:23, 911:24, 971:3, 972:9, 1008:1, 1023:12, 1023:15, 1023:18, 1023:19, 1025:3	122 [1] - 864:7	174 [1] - 986:8	1999's [1] - 987:16
	1014 [1] - 837:18, 837:22, 845:6, 855:5, 867:18, 867:25, 869:5, 878:17, 911:23, 911:24, 971:3, 972:9, 1008:1, 1023:12, 1023:15, 1023:18, 1023:19, 1025:3	123 [1] - 864:7	175 [1] - 888:11	1999's [1] - 987:16
	1015 [1] - 837:18, 837:22, 845:6, 855:5, 867:18, 867:25, 869:5, 878:17, 911:23, 911:24, 971:3, 972:9, 1008:1, 1023:12, 1023:15, 1023:18, 1023:19, 1025:3	124 [2] - 865:2, 980:5	176 [1] - 889:5	1999's [1] - 987:16
	1016 [1] - 837:18, 837:22, 845:6, 855:5, 867:18, 867:25, 869:5, 878:17, 911:23, 911:24, 971:3, 972:9, 1008:1, 1023:12, 1023:15, 1023:18, 1023:19, 1025:3	125 [2] - 865:7, 865:8	178 [1] - 890:4	1999's [1] - 987:16
	1017 [1] - 837:18, 837:22, 845:6, 855:5, 867:18, 867:25, 869:5, 878:17, 911:23, 911:24, 971:3, 972:9, 1008:1, 1023:12, 1023:15, 1023:18, 1023:19, 1025:3	126 [1] - 865:14	179 [1] - 890:11	1999's [1] - 987:16
	1018 [1] - 837:18, 837:22, 845:6, 855:5, 867:18, 867:25, 869:5, 878:17, 911:23, 911:24, 971:3, 972:9, 1008:1, 1023:12, 1023:15, 1023:18, 1023:19, 1025:3	128 [1] - 866:12	18 [4] - 839:9, 880:9, 882:13, 1009:24	1999's [1] - 987:16
	1019 [1] - 837:18, 837:22, 845:6, 855:5, 867:18, 867:25, 869:5, 878:17, 911:23, 911:24, 971:3, 972:9, 1008:1, 1023:12, 1023:15, 1023:18, 1023:19, 1025:3	12:34 [1] - 850:21	180 [2] - 890:12, 991:5	1999's [1] - 987:16
	1020 [1] - 837:18, 837:22, 845:6, 855:5, 867:18, 867:25, 869:5, 878:17, 911:23, 911:24, 971:3, 972:9, 1008:1, 1023:12, 1023:15, 1023:18, 1023:19, 1025:3	13 [5] - 794:1, 827:25, 828:1, 828:4, 914:23	182 [1] - 890:24	1999's [1] - 987:16
	1021 [1] - 837:18, 837:22, 845:6, 855:5, 867:18, 867:25, 869:5, 878:17, 911:23, 911:24, 971:3, 972:9, 1008:1, 1023:12, 1023:15, 1023:18, 1023:19, 1025:3	130 [1] - 974:17	188 [1] - 892:22	1999's [1] - 987:16
	1022 [1] - 837:18, 837:22, 845:6, 855:5, 867:18, 867:25, 869:5, 878:17, 911:23, 911:24, 971:3, 972:9, 1008:1, 1023:12, 1023:15, 1023:18, 1023:19, 1025:3	131 [1] - 867:15	189 [1] - 894:6	1999's [1] - 987:16
	1023 [1] - 837:18, 837:22, 845:6, 855:5, 867:18, 867:25, 869:5, 878:17, 911:23, 911:24, 971:3, 972:9, 1008:1, 1023:12, 1023:15, 1023:18, 1023:19, 1025:3	132 [3] - 928:19, 928:20, 928:25	1895 [1] - 786:19	1999's [1] - 987:16
	1024 [1] - 837:18, 837:22, 845:6, 855:5, 867:18, 867:25, 869:5, 878:17, 911:23, 911:24, 971:3, 972:9, 1008:1, 1023:12, 1023:15, 1023:18, 1023:19, 1025:3	133 [1] - 871:21	19 [5] - 788:13, 849:11, 917:19, 1005:13, 1009:24	1999's [1] - 987:16
	1025 [1] - 837:18, 837:22, 845:6, 855:5, 867:18, 867:25, 869:5, 878:17, 911:23, 911:24, 971:3, 972:9, 1008:1, 1023:12, 1023:15, 1023:18, 1023:19, 1025:3	134 [1] - 872:19	191 [2] - 995:24, 996:16	1999's [1] - 987:16
	1026 [1] - 837:18, 837:22, 845:6, 855:5, 867:18, 867:25, 869:5, 878:17, 911:23, 911:24, 971:3, 972:9, 1008:1, 1023:12, 1023:15, 1023:18, 1023:19, 1025:3	137 [1] - 874:18	192 [1] - 895:22	1999's [1] - 987:16
	1027 [1] - 837:18, 837:22, 845:6, 855:5, 867:18, 867:25, 869:5, 878:17, 911:23, 911:24, 971:3, 972:9, 1008:1, 1023:12, 1023:15, 1023:18, 1023:19, 1025:3	139 [3] - 875:9, 975:20	194 [2] - 1001:21, 1002:12	1999's [1] - 987:16
	1028 [1] - 837:18, 837:22, 845:6, 855:5, 867:18, 867:25, 869:5, 878:17, 911:23, 911:24, 971:3, 972:9, 1008:1, 1023:12, 1023:15, 1023:18, 1023:19, 1025:3	13th [1] - 844:17	195 [3] - 897:13, 1001:24, 1002:1	1999's [1] - 987:16
	1029 [1] - 837:18, 837:22, 845:6, 855:5, 867:18, 867:25, 869:5, 878:17, 911:23, 911:24, 971:3, 972:9, 1008:1, 1023:12, 1023:15, 1023:18, 1023:19, 1025:3	14 [8] - 764:19, 796:2, 796:4, 860:16, 863:2, 949:13, 949:14, 949:15		1999's [1] - 987:16
	1030 [1] - 837:18, 837:22, 845:6, 855:5, 867:18, 867:25, 869:5, 878:17, 911:23, 911:24, 971:3, 972:9, 1008:1, 1023:12, 1023:15, 1023:18, 1023:19, 1025:3	140 [2] - 875:14, 940:18		1999's [1] - 987:16
	1031 [1] - 837:18, 837:22, 845:6, 855:5, 867:18, 867:25, 869:5, 878:17, 911:23, 911:24, 971:3, 972:9, 1008:1, 1023:12, 1023:15, 1023:18, 1023:19, 1025:3	142 [3] - 876:10, 976:10, 976:11		1999's [1] - 987:16
	1032 [1] - 837:18, 837:22, 845:6, 855:5, 867:18, 867:25, 869:5, 878:17, 911:23, 911:24, 971:3, 972:9, 1008:1, 1023:12, 1023:15, 1023:18, 1023:19, 1025:3	143 [1] - 876:10		1999's [1] - 987:16
	1033 [1] - 837:18, 837:22, 845:6, 855:5, 867:18, 867:25, 869:5, 878:17, 911:23, 911:24, 971:3, 972:9, 1008:1, 1023:12, 1023:15, 1023:18, 1023:19, 1025:3	145 [2] - 976:24		1999's [1] - 987:16

2	<p>2^[9] - 791:15, 813:3, 855:6, 1008:1, 1023:12, 1023:15, 1023:18, 1023:19, 1025:4</p> <p>2.8^[1] - 866:1</p> <p>20^[10] - 788:22, 839:9, 882:13, 884:14, 912:9, 912:11, 912:12, 937:22, 940:25, 1009:24</p> <p>2000^[2] - 869:5, 921:22</p> <p>2009^[2] - 755:9, 829:19</p> <p>2011^[2] - 766:20, 766:24</p> <p>2019^[3] - 776:5, 902:11, 954:16</p> <p>2020^[2] - 766:21, 766:24</p> <p>2022^[1] - 753:9</p> <p>20th^[1] - 799:13</p> <p>21^[6] - 881:6, 884:7, 917:24, 929:13, 929:14, 1009:24</p> <p>21st^[1] - 829:22</p> <p>22^[8] - 875:21, 876:14, 880:10, 886:23, 912:2, 918:19, 1009:24</p> <p>220^[3] - 782:13, 905:21, 906:1</p> <p>23^[5] - 795:5, 839:12, 865:4, 924:12, 1009:25</p> <p>238^[1] - 911:23</p> <p>24^[9] - 765:20, 796:25, 855:11, 882:13, 924:24, 929:13, 929:14, 972:10, 1009:25</p> <p>25^[14] - 753:9, 767:22, 767:25, 769:7, 769:24, 771:10, 860:17, 929:17, 940:17, 1009:25, 1011:20, 1011:21, 1011:22, 1011:23</p> <p>25th^[1] - 844:20</p> <p>26^[6] - 798:4, 827:17, 849:11, 853:9, 884:15, 1009:25</p> <p>2683^[1] - 937:10</p> <p>27^[6] - 829:11, 829:13, 925:23, 925:24, 925:25, 1009:25</p>	<p>28^[3] - 1009:25, 1011:11, 1017:25</p> <p>29^[2] - 800:20, 1009:25</p> <p>298^[1] - 773:5</p> <p>2:11^[1] - 901:18</p> <p>2D^[4] - 769:2, 807:7, 820:13, 855:18</p> <p>2nd^[1] - 782:8</p>	<p>818:19, 818:25, 819:16, 819:19, 820:3, 822:3, 822:6, 822:12, 825:24, 826:16, 826:18, 826:25, 828:22, 828:25, 830:16, 840:7, 841:4, 843:23, 887:10, 887:12, 887:22, 895:9, 895:10, 895:16, 895:17, 895:19, 896:4, 897:14, 898:18, 898:19, 927:2, 943:15, 944:21, 946:23, 954:5, 956:2, 956:8, 956:14, 956:16, 956:17, 957:12, 957:13, 957:19, 979:13, 979:14, 987:5, 996:22, 996:23, 997:8, 997:9, 998:1, 998:5, 998:16, 1002:8</p> <p>3D/S^[1] - 764:10</p>	<p>485(A)^[1] - 809:21</p> <p>49^[3] - 819:15, 821:4, 855:25</p> <p>495^[4] - 861:13, 955:19, 955:20, 955:21</p> <p>496^[1] - 955:20</p> <p>4:59^[1] - 1005:10</p>	<p>61^[3] - 837:18, 837:19, 879:7</p> <p>63^[2] - 882:14, 884:15</p> <p>6315;445^[1] - 869:25</p> <p>64^[1] - 877:1</p> <p>66^[1] - 855:25</p> <p>67^[5] - 831:1, 837:18, 837:20, 860:16, 879:12</p> <p>68^[1] - 958:4</p> <p>69^[1] - 961:13</p>				
	3	<p>3^[10] - 778:6, 791:15, 829:18, 829:19, 835:16, 836:11, 839:8, 878:6, 900:9</p> <p>30^[5] - 855:11, 869:6, 940:17, 940:25, 1009:25</p> <p>31^[3] - 834:12, 1009:25, 1018:5</p> <p>32^[4] - 855:8, 882:13, 886:23, 1009:25</p> <p>322^[1] - 878:17</p> <p>33^[3] - 803:21, 845:12, 1009:25</p> <p>34^[4] - 805:16, 880:10, 886:6, 1009:25</p> <p>35^[6] - 773:5, 773:6, 860:17, 877:5, 952:15, 1009:25</p> <p>36^[9] - 774:16, 868:13, 875:11, 877:5, 953:8, 1022:20, 1022:21, 1022:22</p> <p>360^[3] - 782:14, 905:22, 906:1</p> <p>37^[1] - 870:2</p> <p>38^[5] - 771:14, 771:18, 774:16, 811:20, 879:12</p> <p>3:26^[1] - 951:25</p> <p>3:39^[1] - 952:10</p> <p>3:53^[1] - 899:12</p> <p>3D^[85] - 764:6, 764:10, 766:19, 766:21, 767:1, 767:21, 767:24, 768:4, 769:2, 769:10, 769:25, 786:12, 795:23, 807:4, 811:14, 811:15, 811:18, 812:10, 812:14, 812:16, 813:10, 814:15, 815:2, 817:15, 817:19, 818:4, 818:11,</p>	4	<p>4^[8] - 753:4, 781:12, 781:16, 836:11, 839:11, 844:22, 902:16, 1018:5</p> <p>4-A^[1] - 891:2</p> <p>40^[4] - 816:17, 817:6, 937:9, 940:16</p> <p>40-year^[1] - 782:11</p> <p>400^[2] - 768:25, 927:4</p> <p>42^[1] - 813:21</p> <p>43^[8] - 814:13, 814:14, 855:8, 878:6, 879:7, 943:11, 1020:12, 1022:13</p> <p>438^[3] - 809:15, 810:1, 810:3</p> <p>438(A)^[1] - 809:21</p> <p>44^[1] - 815:19</p> <p>45^[8] - 815:19, 815:20, 817:22, 932:7, 1028:24, 1029:1, 1029:4, 1029:14</p> <p>46^[2] - 817:22, 882:13</p> <p>47^[2] - 819:2, 917:6</p> <p>48^[5] - 774:15, 819:2, 875:13, 880:4, 917:6</p> <p>485^[3] - 809:15, 810:2, 810:3</p>	<p>5</p> <p>5^[15] - 762:6, 790:10, 790:13, 790:17, 854:5, 855:7, 860:16, 865:8, 865:15, 911:16, 929:17, 949:8, 1000:17, 1006:20, 1006:21</p> <p>5,214,686^[2] - 969:23, 970:14</p> <p>50^[4] - 788:18, 821:4, 917:3, 972:16</p> <p>500^[1] - 768:25</p> <p>51^[9] - 822:2, 878:6, 1014:6, 1014:7, 1014:12, 1015:18, 1015:19, 1018:8, 1025:7</p> <p>53^[2] - 822:15</p> <p>54^[5] - 823:10, 858:20, 858:23, 877:1</p> <p>5464^[1] - 860:15</p> <p>55^[3] - 823:24, 939:25, 1000:1</p> <p>56^[3] - 825:3, 830:12, 946:10</p> <p>57^[1] - 825:4</p> <p>58^[1] - 833:10</p> <p>580^[1] - 906:2</p> <p>59^[2] - 826:20, 833:11</p> <p>5:53^[1] - 1030:19</p>	5	<p>6</p> <p>6^[14] - 770:25, 780:12, 797:15, 860:15, 860:16, 875:17, 878:10, 880:9, 949:9, 1023:12, 1023:15, 1023:18, 1023:19, 1025:4</p> <p>6(A)^[1] - 887:25</p> <p>6(B)^[3] - 887:25, 1006:10, 1007:6</p> <p>6(B)^[1] - 1007:9</p> <p>60^[2] - 816:17, 826:20</p> <p>602^[2] - 873:2, 881:24</p> <p>604^[1] - 874:19</p>	6	<p>7</p> <p>7^[16] - 770:25, 836:8, 845:9, 853:7, 853:8, 854:5, 854:7, 858:20, 868:1, 868:21, 868:25, 875:10, 876:5, 876:25, 880:4, 929:3</p> <p>71^[1] - 836:5</p> <p>72^[2] - 860:16, 878:13</p> <p>73^[3] - 837:17, 961:1, 963:5</p> <p>74^[3] - 837:21, 954:20, 964:5</p> <p>75^[1] - 838:5</p> <p>76^[1] - 838:23</p> <p>77^[1] - 839:11</p> <p>78^[1] - 840:9</p> <p>7800^[2] - 848:8, 866:3</p> <p>79^[1] - 840:10</p>
			7	<p>8</p> <p>8^[14] - 834:22, 835:1, 835:16, 837:22, 845:10, 845:14, 853:7, 853:8, 858:20, 867:16, 870:10, 870:14, 876:5, 880:5</p> <p>80^[4] - 816:17, 840:20, 1005:24</p> <p>80's^[1] - 1008:1</p> <p>82^[2] - 842:14, 878:12</p> <p>83^[1] - 842:14</p> <p>84^[2] - 878:12, 879:11</p> <p>844^[1] - 753:11</p> <p>85^[5] - 770:10, 770:19, 770:22, 816:12, 969:17</p> <p>850^[1] - 956:19</p> <p>86^[2] - 845:4, 969:21</p> <p>87^[2] - 845:4, 970:25</p> <p>88^[1] - 846:1</p> <p>884^[1] - 834:16</p> <p>89^[2] - 847:3, 860:16</p> <p>8:30^[3] - 753:9,</p>	8				

1030:8, 1030:9 8th [1] - 782:6	absorbed [1] - 940:23 absorptiometry [4] - 787:16, 787:24, 788:3, 814:7 absorption [1] - 787:17 abstract [7] - 881:8, 1014:21, 1016:23, 1016:25, 1017:9, 1017:10, 1017:14 abstracts [1] - 870:25 academics [2] - 778:8, 778:9 Academy [1] - 954:25 academy [1] - 784:13 accept [1] - 981:20 acceptance [1] - 843:10 accepted [2] - 814:6, 945:23 according [10] - 865:12, 949:4, 980:17, 981:6, 981:17, 982:7, 982:10, 982:11, 993:19, 993:23 account [2] - 895:13, 988:15 accuracy [8] - 881:11, 908:25, 909:3, 909:16, 909:17, 909:18, 910:5, 910:6 accurate [10] - 909:4, 909:6, 909:11, 909:13, 909:21, 909:24, 910:12, 910:18, 995:13, 1016:8 accused [11] - 761:11, 762:18, 772:14, 772:17, 812:10, 812:24, 843:16, 895:5, 943:4, 1021:16, 1021:20 achievement [1] - 784:16 acquisition [1] - 784:3 activities [1] - 784:2 actual [6] - 767:18, 769:9, 769:15, 871:12, 912:17, 997:2 adaptable [1] - 839:15 adaptation [2] - 986:19, 986:20 adapted [12] - 821:14, 839:2, 839:18, 858:4, 859:3, 864:18, 864:19, 888:17, 986:12,	986:22, 989:23, 990:7 adapter [1] - 871:15 adapting [2] - 888:19, 888:20 add [8] - 846:23, 885:15, 898:3, 898:4, 947:23, 967:15, 1012:7, 1019:19 added [6] - 888:5, 893:1, 898:10, 898:23, 991:23 adding [3] - 846:25, 1012:20, 1017:23 addition [13] - 823:7, 823:9, 823:17, 835:18, 861:21, 865:23, 866:2, 876:12, 885:19, 896:15, 905:1, 906:1, 974:17 additional [7] - 815:12, 829:8, 874:9, 888:4, 888:5, 890:17, 991:23 address [4] - 772:13, 946:11, 1023:23, 1024:4 addressed [1] - 1023:24 adequate [1] - 888:8 adjoined [2] - 1030:17, 1030:19 adjust [2] - 824:14, 825:1 adjusting [1] - 947:4 adjustment [1] - 877:6 admission [1] - 963:6 admissions [17] - 832:18, 840:2, 892:13, 960:1, 960:4, 960:8, 960:9, 960:11, 960:13, 960:19, 960:22, 960:23, 960:24, 961:4, 961:6, 961:9, 961:20 admit [4] - 838:5, 945:16, 981:20, 1019:9 admits [1] - 838:8 admitted [14] - 776:23, 781:16, 790:17, 793:6, 794:17, 796:14, 811:7, 828:4, 835:1, 844:21, 868:25, 870:14, 946:18, 960:15	admittedly [1] - 1013:23 advance [2] - 811:4, 1000:21 advanced [1] - 874:22 advantage [1] - 918:3 advantageous [1] - 884:7 advantages [2] - 783:9, 783:13 adverse [4] - 756:6, 756:23, 756:24, 757:24 advisor [2] - 788:1, 869:21 affect [2] - 937:2, 937:3 affecting [1] - 999:6 affects [1] - 937:2 afternoon [6] - 808:25, 851:3, 851:6, 899:9, 902:1, 902:2 afterwards [2] - 910:25, 1027:3 age [1] - 838:18 ago [4] - 771:22, 788:18, 902:9, 917:3 agree [44] - 758:4, 758:7, 760:13, 792:13, 802:15, 803:23, 803:25, 804:21, 815:4, 828:15, 829:23, 858:25, 893:24, 894:9, 913:1, 913:4, 930:6, 933:22, 951:18, 954:19, 955:11, 960:15, 961:17, 962:17, 970:21, 976:15, 981:6, 981:25, 982:17, 982:18, 984:8, 984:16, 986:1, 993:13, 998:20, 1003:18, 1003:21, 1004:2, 1004:6, 1009:24, 1011:3, 1024:25, 1028:5, 1030:12 agreed [16] - 833:14, 833:16, 833:17, 833:25, 834:6, 834:8, 840:16, 901:2, 901:5, 961:8, 982:8, 1009:9, 1009:18, 1009:21, 1009:23 agreement [1] - 810:23	agreements [1] - 961:15 agrees [1] - 1010:1 ahead [8] - 758:15, 759:17, 782:25, 946:10, 956:25, 977:23, 1013:21, 1027:2 AINO [2] - 897:14, 1002:14 air [3] - 843:3, 962:8, 962:18 Aires [1] - 774:21 airplane [1] - 903:22 airport [1] - 899:16 Alan [2] - 789:1, 1018:20 Albright [1] - 1018:20 Alexander [1] - 784:20 algorithm [15] - 804:21, 804:22, 806:3, 806:9, 820:1, 820:5, 820:6, 820:10, 820:11, 820:18, 860:7, 860:13, 898:16, 930:5, 931:2 algorithms [5] - 818:4, 860:7, 894:18, 894:20, 973:15 align [1] - 949:3 aligned [1] - 947:12 alignment [5] - 824:13, 824:17, 824:25, 948:14 aligns [1] - 948:7 alive [1] - 869:23 alleged [2] - 897:20, 898:8 allocated [1] - 896:21 allow [2] - 783:5, 970:17 allowed [4] - 779:21, 847:7, 982:19, 984:20 allowing [1] - 865:22 allows [2] - 823:15, 824:2 almost [6] - 840:17, 902:12, 917:3, 960:20, 978:23, 1001:24 alone [7] - 789:17, 921:16, 923:14, 925:19, 935:21, 990:10, 1017:1 alright [2] - 875:1, 1022:19 alternate [1] - 855:15 alternative [6] -
9	9 [6] - 764:19, 860:16, 863:2, 865:8, 878:17, 1005:7 9000 [3] - 806:13, 840:24, 899:5 92 [1] - 851:15 93 [6] - 796:10, 796:13, 796:14, 852:7, 975:16 95 [5] - 906:15, 906:17, 906:23, 907:8, 907:11 96 [3] - 853:2, 976:7 98 [2] - 793:2, 793:6 9800 [7] - 779:18, 872:2, 872:10, 872:13, 872:22, 872:24, 873:5 99 [4] - 854:1, 873:17, 976:17, 976:18 9:00 [1] - 754:14			
A				
a.m [5] - 753:9, 754:14, 807:20, 810:18, 850:3 abbreviated [2] - 784:12, 814:11 abbreviation [3] - 768:7, 793:16, 793:17 abdomen [1] - 912:6 abdominal [1] - 944:5 abide [1] - 950:6 ability [2] - 824:14, 875:18 able [24] - 756:7, 760:10, 769:6, 789:17, 800:18, 808:8, 814:9, 817:2, 836:19, 880:16, 891:19, 892:5, 901:3, 909:14, 909:22, 918:9, 921:16, 954:13, 1008:10, 1012:19, 1012:22, 1020:18, 1021:3, 1030:11 abnormal [1] - 919:19 absence [1] - 889:23 absolutely [6] - 759:12, 808:14, 863:12, 863:22, 866:22, 982:17				

<p>758:12, 831:11, 855:17, 1000:10, 1001:20, 1001:21</p> <p>alternatives [3] - 898:25, 899:4, 899:6</p> <p>altogether [1] - 1014:15</p> <p>alveolar [1] - 794:5</p> <p>America [1] - 784:18</p> <p>American [3] - 784:16, 785:1, 785:4</p> <p>amount [7] - 774:25, 889:22, 891:22, 894:17, 900:17, 937:20, 938:15</p> <p>amounts [1] - 891:24</p> <p>analog [4] - 784:4, 833:19, 857:10, 879:18</p> <p>analogy [2] - 962:12</p> <p>analysis [46] - 807:2, 812:7, 825:24, 827:7, 829:14, 831:25, 834:18, 842:8, 842:15, 844:10, 848:2, 849:19, 851:18, 858:22, 863:3, 868:18, 889:20, 893:22, 894:3, 894:7, 894:9, 894:11, 894:13, 895:25, 897:1, 897:19, 897:23, 898:7, 952:24, 953:12, 953:25, 960:11, 975:6, 982:7, 996:19, 997:20, 998:5, 998:10, 998:14, 1002:3, 1002:15, 1002:16, 1003:2, 1003:10, 1004:19, 1014:25</p> <p>Analysis [1] - 954:20</p> <p>analyze [2] - 786:13, 843:17</p> <p>analyzed [1] - 981:10</p> <p>analyzing [2] - 943:21, 943:22</p> <p>anatomy [3] - 824:10, 824:11, 935:18</p> <p>and-it [1] - 1006:25</p> <p>Andrew [1] - 983:4</p> <p>angle [2] - 767:20, 930:13</p> <p>angular [1] - 927:13</p> <p>angulation [1] - 918:8</p> <p>anniversary [1] - 902:13</p>	<p>answer [23] - 757:12, 757:14, 762:11, 907:1, 913:4, 921:22, 922:19, 928:15, 929:10, 929:17, 929:24, 930:9, 930:11, 932:3, 932:4, 938:9, 943:25, 950:15, 954:1, 969:8, 994:22, 999:23</p> <p>answered [3] - 763:20, 996:10, 1004:10</p> <p>answers [2] - 929:2, 987:20</p> <p>anticipate [1] - 924:17</p> <p>anticipated [5] - 923:21, 925:8, 958:15, 958:21, 959:8</p> <p>anticipates [2] - 923:16, 967:20</p> <p>anticipation [12] - 850:25, 923:17, 923:23, 924:3, 924:7, 924:10, 924:19, 958:22, 958:23, 959:13, 959:17, 959:24</p> <p>anticipatory [1] - 967:22</p> <p>anyway [2] - 935:6, 946:17</p> <p>apologize [5] - 802:8, 805:4, 806:6, 890:21, 984:11</p> <p>apparatus [6] - 845:2, 881:7, 884:8, 911:18, 1003:18, 1003:21</p> <p>apparent [1] - 894:16</p> <p>appealed [1] - 1026:20</p> <p>appear [1] - 1013:4</p> <p>appearance [1] - 907:13</p> <p>APPEARANCES [2] - 753:16, 754:1</p> <p>appeared [1] - 871:1</p> <p>Apples [1] - 885:2</p> <p>applicable [1] - 1016:19</p> <p>application [9] - 869:7, 913:22, 913:25, 914:2, 963:25, 964:2, 1013:24, 1013:25, 1017:12</p> <p>applications [3] -</p>	<p>828:21, 837:7, 846:19</p> <p>Applied [1] - 778:4</p> <p>applied [6] - 841:14, 841:15, 862:6, 890:22, 905:7, 929:11</p> <p>applies [3] - 913:4, 939:2, 1013:17</p> <p>apply [10] - 812:9, 830:15, 830:20, 831:25, 842:7, 859:12, 890:21, 899:4, 985:10, 1025:2</p> <p>apportioned [2] - 895:24, 998:22</p> <p>apportionment [11] - 892:23, 893:2, 893:16, 893:17, 893:19, 898:6, 995:22, 996:12, 996:19, 1002:3</p> <p>appraising [1] - 1020:25</p> <p>appreciate [6] - 769:8, 847:21, 886:20, 900:22, 916:5, 918:18</p> <p>appreciation [1] - 940:21</p> <p>approach [3] - 755:24, 775:14, 898:1</p> <p>appropriate [2] - 760:8, 1019:20</p> <p>appropriately [2] - 849:23, 895:24</p> <p>Aptos [1] - 774:15</p> <p>ARA [1] - 897:15</p> <p>area [10] - 760:8, 760:15, 797:11, 835:23, 874:15, 878:15, 878:22, 883:25, 912:5, 920:4</p> <p>Argentina [3] - 774:21, 774:24, 775:1</p> <p>arguably [2] - 1013:9, 1024:8</p> <p>argue [9] - 888:7, 1019:21, 1020:22, 1020:24, 1022:12, 1027:11, 1028:9, 1029:10, 1030:10</p> <p>argued [3] - 1019:21, 1021:17, 1024:9</p> <p>argues [2] - 766:9, 769:23</p> <p>arguing [2] - 931:20, 1027:22</p>	<p>argument [25] - 890:25, 915:15, 924:19, 925:13, 925:17, 958:22, 959:17, 959:24, 960:21, 967:23, 1010:15, 1012:17, 1013:22, 1016:22, 1017:4, 1017:13, 1018:17, 1021:5, 1027:16, 1027:18, 1027:19, 1028:20, 1028:21, 1029:12, 1030:7</p> <p>arguments [10] - 915:17, 923:17, 923:23, 924:11, 924:22, 997:24, 1019:23, 1026:24, 1027:13, 1030:5</p> <p>arm [4] - 787:23, 836:20, 854:5, 896:12</p> <p>arms [5] - 912:8, 912:11, 912:12, 912:13, 912:14</p> <p>army [1] - 991:12</p> <p>arranged [1] - 1007:2</p> <p>array [29] - 801:6, 819:24, 845:12, 845:14, 845:15, 845:18, 853:4, 853:6, 853:9, 854:16, 854:25, 855:13, 855:18, 855:24, 856:5, 856:24, 856:25, 857:3, 857:4, 857:10, 864:25, 877:19, 887:10, 971:9, 972:25, 1005:22, 1006:3, 1006:23, 1007:4</p> <p>arrays [7] - 855:10, 856:6, 1006:4, 1006:6, 1006:7, 1007:14</p> <p>arrested [1] - 831:20</p> <p>arrow [1] - 856:7</p> <p>ARSHT [1] - 754:3</p> <p>art [113] - 785:25, 806:1, 814:21, 818:16, 830:22, 830:24, 831:3, 831:5, 831:6, 832:1, 832:4, 832:9, 832:15, 832:16, 832:20, 834:9, 836:25, 838:7, 840:3, 840:19,</p>	<p>841:5, 841:17, 841:23, 842:3, 842:5, 842:17, 842:18, 842:20, 844:8, 846:22, 847:17, 848:2, 848:16, 848:21, 848:22, 849:7, 858:24, 861:8, 862:4, 862:8, 863:9, 873:8, 873:16, 873:24, 874:1, 874:2, 874:6, 880:14, 880:17, 882:19, 883:11, 883:16, 885:19, 886:2, 886:20, 887:21, 889:10, 889:25, 890:1, 890:7, 892:4, 892:13, 893:4, 896:14, 897:20, 898:5, 923:9, 925:5, 951:14, 952:20, 953:10, 953:16, 958:8, 958:15, 958:19, 959:4, 959:5, 959:7, 959:21, 960:14, 960:16, 986:17, 988:2, 988:5, 988:7, 988:9, 988:14, 988:20, 988:25, 990:3, 990:21, 993:11, 993:18, 993:24, 994:5, 994:8, 997:12, 997:15, 997:18, 999:12, 999:20, 999:24, 1004:3, 1012:4, 1013:9, 1018:11, 1018:15, 1018:24, 1022:8</p> <p>article [46] - 790:22, 790:25, 793:11, 793:13, 794:4, 795:7, 796:16, 797:2, 797:14, 797:16, 806:12, 844:6, 846:2, 846:4, 846:14, 846:18, 846:22, 847:5, 847:25, 861:5, 861:13, 861:20, 862:6, 862:12, 863:10, 865:15, 871:5, 871:24, 872:16, 881:24, 918:20, 918:22, 918:25, 923:8, 923:11, 923:15,</p>
---	---	---	--	---

924:13, 924:25,
953:10, 954:9,
954:12, 954:15,
954:19, 957:3,
957:21, 967:6
articles [8] - 782:14,
793:19, 905:20,
905:22, 906:6,
924:13, 924:16,
924:17
articulate [1] - 1020:7
articulated [2] -
1016:20, 1019:2
artifacts [2] - 860:13,
909:12
artificially [1] - 931:6
ascertain [2] - 824:5,
930:20
aside [5] - 783:13,
958:1, 997:23,
997:25, 998:14
aspect [6] - 893:17,
909:17, 950:6,
986:4, 999:15,
1015:8
aspects [3] - 838:19,
948:23, 990:24
assert [1] - 1013:1
asserted [23] - 785:12,
786:12, 811:16,
812:5, 812:17,
813:21, 814:24,
818:21, 819:20,
821:5, 832:14,
840:13, 844:11,
847:14, 857:21,
862:16, 885:11,
892:12, 896:2,
896:7, 958:8,
960:18, 1012:21
asserting [2] - 958:20,
1017:24
asserts [1] - 818:14
assess [2] - 830:13,
1024:15
assessment [4] -
830:15, 830:19,
845:19, 921:17
assigned [3] - 782:3,
788:8, 835:9
assignee [1] - 781:22
assist [2] - 777:2,
777:11
assistance [1] -
983:20
assisted [1] - 871:2
associate [1] - 904:3
associated [2] -
859:21, 881:9
association [2] -

784:16, 785:1
Association [1] -
785:5
assume [9] - 757:10,
893:22, 894:3,
900:12, 984:5,
998:1, 998:7,
1005:22, 1016:4
assuming [2] -
997:20, 999:13
assumption [2] -
898:21, 998:9
assured [1] - 886:2
attempt [2] - 898:7,
949:3
attempts [1] - 843:7
attention [5] - 770:9,
868:13, 944:10,
956:24, 1000:16
attenuated [1] - 941:3
attenuation [43] -
798:20, 801:14,
801:15, 801:19,
802:20, 815:5,
815:25, 816:1,
816:3, 816:4, 816:5,
816:6, 816:9,
816:12, 816:15,
816:18, 816:20,
816:21, 816:24,
817:3, 817:5, 818:1,
909:10, 920:17,
920:18, 921:2,
921:5, 921:9, 923:1,
932:9, 933:6, 935:7,
935:9, 935:13,
935:14, 935:20,
936:19, 937:3,
937:4, 937:9,
939:20, 941:8
attorney [8] - 755:9,
758:14, 764:13,
764:18, 765:16,
767:14, 902:14,
917:16
attorney/client [1] -
772:18
attorneys [6] - 755:3,
755:7, 755:14,
763:18, 902:3,
902:15
attributable [2] -
893:6, 1021:21
attributed [1] - 896:6
attribution [1] -
895:12
August [1] - 753:9
author [6] - 782:13,
793:20, 793:22,
794:7, 905:21,

905:22
author's [1] - 796:6
authority [3] - 758:15,
759:18, 772:10
authors [5] - 790:25,
806:22, 871:5,
871:6, 871:8
automatic [3] -
947:16, 947:18
automatically [1] -
948:19
automobile [2] -
893:8, 893:10
available [11] - 838:9,
838:21, 839:1,
874:15, 896:17,
896:18, 914:4,
915:16, 918:11,
933:10
avenue [1] - 1016:20
average [4] - 791:21,
838:17, 942:10,
942:12
aviation [1] - 903:20
avoiding [1] - 1008:10
avoids [1] - 845:2
award [1] - 789:3
awards [3] - 784:11,
784:12, 784:15
aware [11] - 792:14,
829:8, 843:1,
873:16, 873:19,
914:16, 914:18,
994:10, 1011:3,
1015:2, 1018:16

B

Bachelor [1] - 777:15
bachelors [1] - 832:6
background [11] -
777:14, 831:22,
887:2, 902:23,
902:25, 903:2,
923:9, 925:4,
925:21, 987:9,
1018:21
bad [6] - 908:18,
924:21, 940:16,
1004:24, 1005:19,
1005:21
bag [3] - 918:2, 918:5,
918:6
balance [1] - 768:20
ball [4] - 927:6, 962:4,
962:7, 962:13
bar [5] - 761:4, 763:9,
771:21, 771:24,
791:21
based [20] - 760:18,

769:11, 796:21,
808:6, 815:3,
893:23, 935:20,
945:24, 948:13,
948:15, 960:7,
960:9, 960:21,
984:16, 1010:25,
1013:2, 1016:7,
1017:3, 1017:16,
1019:23
baseline [3] - 888:17,
986:12, 986:23
Basic [1] - 987:15
basic [2] - 897:3,
897:4
basis [5] - 849:23,
885:9, 916:1,
1021:13, 1022:2
BATAILLON [1] -
753:13
BAYARD [1] - 753:18
beam [70] - 795:24,
795:25, 796:18,
796:22, 797:10,
797:11, 801:25,
833:9, 836:18,
840:25, 841:4,
841:6, 855:1, 855:9,
856:15, 856:16,
878:18, 878:20,
878:21, 878:23,
878:24, 889:14,
890:11, 890:13,
890:19, 891:3,
891:4, 891:7, 891:9,
891:10, 891:12,
891:15, 891:17,
891:24, 892:1,
892:7, 894:23,
895:9, 895:10,
896:4, 898:18,
911:21, 913:18,
921:11, 926:4,
926:6, 940:19,
941:12, 941:13,
943:22, 965:15,
972:22, 977:8,
993:5, 993:7, 993:9,
993:13, 993:19,
996:22, 998:1,
1000:7, 1003:6,
1006:15, 1006:16,
1006:22, 1006:23,
1007:3, 1007:5,
1007:16
beams [14] - 833:18,
837:6, 838:1,
963:19, 993:14,
993:16, 994:9,
995:3, 995:5, 995:9,

995:13
beating [1] - 780:10
became [1] - 778:13
become [1] - 845:7
BEFORE [1] - 753:13
began [1] - 929:3
begin [1] - 755:2
beginning [7] - 777:5,
821:9, 850:16,
851:8, 941:24,
989:19, 1025:21
begun [1] - 834:16
behalf [1] - 755:20
behind [12] - 755:13,
762:2, 775:18,
775:23, 797:3,
902:15, 905:6,
911:8, 921:3, 949:8,
949:9, 1018:24
believable [1] - 892:2
believes [1] - 1024:20
bell [1] - 907:15
belonged [1] -
1004:19
belongs [1] - 997:17
below [3] - 855:16,
888:15, 1007:21
Bemse [3] - 757:23,
759:3, 760:2
benefit [2] - 788:3,
853:3
benefits [2] - 893:3,
893:4
Berms [1] - 756:23
best [9] - 762:11,
762:19, 763:3,
763:6, 765:22,
766:3, 898:22,
978:12, 982:3
better [10] - 760:17,
800:18, 898:1,
924:3, 970:8, 982:1,
982:5, 1016:20,
1019:11, 1020:20
between [39] - 766:20,
799:5, 822:8, 824:5,
826:8, 827:8, 829:8,
833:22, 836:1,
841:22, 842:2,
842:19, 843:13,
843:20, 843:23,
849:3, 853:24,
854:22, 857:17,
878:1, 891:5,
900:21, 934:11,
939:25, 942:24,
950:2, 961:7,
961:15, 965:9,
971:1, 972:16,
973:6, 973:9,

<p>973:25, 975:2, 975:6, 981:12, 1013:9, 1017:17 beyond [1] - 1022:1 big [3] - 769:3, 817:12, 855:18 biggest [1] - 766:3 binder [15] - 755:13, 775:19, 781:1, 790:1, 792:16, 794:1, 796:2, 827:17, 829:11, 834:13, 868:2, 868:14, 870:3, 911:9, 949:9 binders [3] - 775:15, 902:14, 996:3 Bioengineering [1] - 778:11 biological [1] - 785:3 bit [31] - 771:6, 771:8, 777:1, 777:13, 778:22, 781:25, 783:1, 786:16, 790:24, 795:21, 797:17, 813:19, 815:15, 823:3, 827:5, 832:5, 835:14, 851:20, 870:17, 871:4, 872:14, 875:5, 886:12, 888:11, 905:12, 905:13, 937:15, 969:7, 977:23, 991:12, 1000:8 bite [1] - 894:25 black [3] - 756:5, 758:7, 758:9 blades [2] - 903:21 BLAKE [1] - 754:7 blame [1] - 1027:8 blaming [1] - 957:20 blank [1] - 971:21 block [3] - 836:7, 857:14, 955:7 Blok [1] - 893:21 blood [7] - 780:9, 816:16, 933:7, 937:3, 937:6, 939:13 blow [2] - 767:8, 767:13 blue [7] - 755:13, 762:4, 798:25, 799:2, 928:5, 947:23, 948:4 bluer [1] - 940:23 BMD [10] - 837:25, 838:11, 838:15, 887:3, 887:4,</p>	<p>956:18, 956:21, 957:7, 957:8 Bob [1] - 766:9 bodies [2] - 791:14, 912:14 body [6] - 781:9, 873:14, 882:3, 911:25, 912:13 bone [155] - 779:3, 779:6, 780:2, 781:8, 781:9, 783:11, 783:12, 783:14, 783:15, 787:21, 788:5, 788:7, 789:9, 789:11, 789:17, 789:22, 789:24, 789:25, 791:8, 791:11, 791:22, 792:2, 792:3, 792:4, 792:11, 792:20, 794:4, 794:22, 794:24, 795:1, 795:12, 802:21, 802:24, 802:25, 803:3, 803:9, 803:10, 803:12, 803:13, 803:16, 803:18, 803:19, 804:13, 806:24, 807:6, 813:15, 813:18, 814:6, 814:9, 814:19, 815:1, 815:8, 816:16, 817:4, 817:9, 817:13, 817:20, 818:5, 818:7, 831:18, 837:25, 840:6, 846:9, 861:10, 861:17, 864:1, 864:3, 865:21, 867:2, 870:21, 871:22, 872:7, 872:11, 872:16, 881:11, 881:24, 882:3, 882:5, 882:10, 882:15, 884:19, 887:15, 895:21, 897:11, 908:7, 908:9, 908:10, 908:13, 908:15, 908:17, 908:21, 910:11, 910:12, 910:19, 913:17, 918:22, 919:5, 919:9, 920:11, 920:18, 920:19, 920:21, 920:22, 920:23, 921:3, 921:6, 921:8, 921:13, 921:17,</p>	<p>933:8, 933:22, 933:24, 934:19, 934:20, 934:21, 935:24, 936:4, 937:20, 937:21, 937:22, 937:23, 938:8, 938:12, 938:13, 938:14, 938:16, 938:18, 938:19, 939:10, 939:13, 939:17, 943:10, 943:23, 944:15, 945:8, 945:10, 945:13, 945:25, 946:9, 964:7, 965:16, 965:18, 973:17, 998:2, 1003:4 bones [5] - 795:3, 866:4, 919:16, 939:1, 939:9 bony [4] - 783:6, 908:22, 937:11, 938:3 book [7] - 762:2, 781:2, 808:16, 902:16, 902:20, 992:4, 1016:4 born [1] - 774:21 Boston [1] - 1018:18 bottom [11] - 767:13, 767:15, 790:10, 791:13, 796:7, 798:16, 836:18, 929:13, 930:10, 930:11, 998:16 box [7] - 797:3, 797:23, 798:24, 798:25, 799:2, 799:3, 972:6 boxes [1] - 845:8 boy [2] - 977:22, 1010:8 break [13] - 763:18, 807:14, 807:18, 810:14, 849:22, 850:8, 900:8, 940:8, 946:25, 950:13, 1000:8, 1004:21, 1005:1 breakdown [1] - 840:5 breaking [2] - 931:20, 941:17 breath [4] - 886:17, 887:23, 889:3, 890:2 bridge [2] - 761:1, 824:20 brief [6] - 810:16, 816:12, 899:21, 952:1, 1009:3,</p>	<p>1027:24 briefcase [1] - 1009:1 briefed [1] - 1020:15 briefly [4] - 782:9, 807:25, 867:12, 898:24 briefs [1] - 785:23 bright [1] - 922:15 bring [11] - 759:18, 792:11, 816:2, 850:20, 859:10, 861:8, 880:19, 883:17, 941:4, 974:14, 981:4 bringing [1] - 965:11 broad [2] - 886:16, 941:20 broader [1] - 941:21 broadly [1] - 945:23 brought [3] - 883:22, 890:18, 918:12 Brummer [1] - 892:14 bucket [1] - 1004:18 Bueno [1] - 774:21 build [2] - 779:23, 796:20 built [3] - 787:20, 1021:25, 1024:21 bulbs [1] - 940:7 bullet [2] - 779:8, 814:12 bullets [1] - 959:25 bunch [1] - 943:1 burden [2] - 842:10, 842:12 business [3] - 850:12, 850:19, 1011:8 businesses [1] - 768:24 butcher [1] - 935:5 buy [1] - 990:12 BY [38] - 753:18, 753:21, 753:21, 753:22, 753:22, 754:3, 754:6, 754:6, 754:7, 754:7, 754:24, 761:7, 763:16, 770:8, 774:12, 775:17, 776:24, 781:19, 785:20, 790:21, 793:10, 794:21, 796:15, 811:12, 828:5, 828:8, 835:2, 851:14, 869:1, 870:15, 901:25, 952:14, 954:11, 955:24, 957:5, 969:16, 991:14, 996:15</p>	<p style="text-align: center;">C</p> <p>C.A [1] - 753:5 cake [1] - 963:3 Calcis [2] - 884:21 calcius [1] - 882:3 calculate [11] - 800:14, 815:22, 817:20, 861:9, 861:17, 867:1, 884:19, 920:11, 935:24, 936:2, 936:4 calculated [31] - 794:24, 802:21, 802:23, 803:13, 803:19, 804:13, 806:24, 807:6, 813:14, 814:9, 814:17, 815:1, 815:8, 817:13, 846:11, 846:16, 846:23, 862:5, 865:22, 865:24, 872:6, 882:21, 920:19, 920:21, 943:10, 945:8, 945:10, 945:13, 945:25, 946:9, 956:17 calculates [1] - 887:15 calculating [1] - 882:14 calculation [7] - 801:13, 802:19, 818:2, 935:25, 936:8, 936:9, 941:8 calculations [7] - 795:19, 813:17, 814:7, 835:20, 874:7, 881:22, 933:11 calibrated [1] - 803:10 calibration [3] - 779:19, 862:2, 865:25 California [3] - 774:15, 789:10, 871:10 calm [1] - 897:15 calvary [1] - 899:15 camera [6] - 876:13, 878:14, 879:11, 879:13, 879:15, 879:20 Cameron [2] - 779:1, 787:18 canal [1] - 766:2 Cann [58] - 789:13, 790:24, 795:16, 814:11, 832:22,</p>
--	--	--	--	--

844:6, 846:3,
846:14, 846:18,
846:22, 847:1,
847:25, 848:8,
861:5, 861:8,
861:13, 861:19,
861:21, 862:6,
862:12, 863:10,
864:2, 864:4,
865:15, 865:18,
865:23, 866:9,
866:16, 866:20,
870:7, 871:7, 871:8,
874:21, 887:14,
918:20, 918:22,
923:11, 923:15,
960:2, 966:1, 966:3,
966:14, 967:17,
967:18, 967:19,
967:20, 967:23,
967:24, 968:9,
968:10, 968:11,
968:18, 968:19,
968:23, 969:19,
974:18
cannot [3] - 873:17,
893:12, 957:8
cans [1] - 1027:19
capabilities [1] -
847:10
capability [1] - 825:7
capable [1] - 835:20
caption [1] - 882:1
capture [2] - 819:24,
927:18
captured [1] - 1017:25
car [20] - 893:7,
893:13, 921:21,
921:22, 921:23,
921:24, 922:4,
922:9, 922:10,
922:16, 922:21,
922:22, 922:24,
922:25, 936:6,
936:16, 936:21,
936:22, 957:10
card [1] - 1017:20
care [5] - 903:7,
934:23, 936:13,
1011:8, 1029:14
careful [1] - 927:21
career [2] - 782:12,
784:10
careful [3] - 773:16,
865:11, 950:5
carefully [3] - 803:6,
805:10, 821:8
cares [1] - 982:2
caring [1] - 934:25
carried [2] - 786:25,

808:5
cart [1] - 875:20
case [66] - 756:23,
757:5, 757:7,
757:23, 758:9,
758:23, 759:4,
759:7, 759:12,
760:2, 760:24,
766:9, 769:22,
775:8, 775:11,
783:4, 785:21,
786:9, 786:17,
787:14, 800:5,
808:7, 814:15,
815:6, 823:9, 827:7,
829:15, 830:9,
830:13, 831:25,
834:19, 839:21,
842:8, 842:23,
844:25, 848:6,
848:7, 875:21,
886:13, 892:18,
899:4, 924:3, 924:7,
934:18, 934:23,
934:25, 948:3,
959:4, 964:14,
967:16, 988:6,
988:25, 1005:6,
1013:8, 1015:3,
1015:13, 1016:7,
1018:17, 1018:19,
1021:20, 1022:4,
1026:4, 1027:11,
1029:11, 1030:10
cases [7] - 758:21,
776:11, 900:18,
930:12, 1013:18,
1013:19, 1019:2
Cases [1] - 954:21
CASSONE [14] -
753:21, 756:16,
756:19, 759:4,
759:6, 759:10,
772:1, 772:5,
772:12, 772:25,
773:9, 1011:20,
1028:2, 1030:16
catch [1] - 918:9
category [2] - 768:23,
915:4
cathode [5] - 849:12,
849:13, 858:19,
859:8, 863:5
cavity [1] - 933:18
CBCT [14] - 797:7,
897:14, 996:23,
997:8, 998:5,
998:23, 999:11,
1002:21, 1002:23,
1003:17, 1003:21,

1004:9, 1004:12
CCD [1] - 876:13
CDD [5] - 877:23,
878:14, 879:9,
879:10, 879:20
cells [1] - 908:10
center [1] - 840:13
centered [1] - 882:2
centimeter [4] -
872:12, 872:17,
881:25, 882:4
century [1] - 799:13
cephalometry [1] -
895:1
certain [4] - 768:17,
942:16, 961:8,
1015:9
certainly [16] - 874:1,
876:24, 904:18,
916:24, 918:3,
918:9, 937:20,
955:6, 1003:16,
1006:2, 1007:15,
1014:19, 1018:17,
1019:20, 1021:5,
1023:3
cetera [2] - 772:11,
850:10
chaired [1] - 778:14
chance [1] - 955:5
change [8] - 818:11,
825:10, 929:24,
932:5, 984:5,
1009:10, 1010:5,
1026:5
changed [3] - 824:5,
890:16, 1009:10
changes [14] - 799:24,
808:5, 847:19,
847:20, 865:9,
865:10, 899:25,
901:3, 939:5, 939:7,
939:20, 1019:19,
1025:23
changing [1] - 874:16
characterize [3] -
941:23, 961:11,
1016:14
characterized [1] -
957:23
characterizing [1] -
941:22
charge [2] - 855:12,
901:4
charity [1] - 768:6
chart [1] - 923:7
charts [1] - 805:13
check [5] - 810:1,
852:18, 859:17,
860:19, 976:3

checking [1] -
1009:13
chemical [1] - 938:17
children [2] - 774:15,
775:3
chin [1] - 918:10
choose [1] - 869:13
chose [3] - 898:22,
917:13, 982:5
Chris [2] - 789:13,
790:24
Christensen [1] -
1021:1
CHRISTOPHER [1] -
754:7
circles [2] - 784:1,
800:9
circuit [1] - 1013:19
Circuit [7] - 756:5,
757:1, 757:22,
758:10, 772:11,
772:13, 1016:19
circular [1] - 780:18
circumstances [5] -
768:5, 769:3, 769:5,
770:3, 1016:18
cite [2] - 868:3, 872:10
cited [7] - 849:1,
911:4, 970:5,
970:10, 1018:19,
1018:20, 1019:3
cites [1] - 963:20
cities [1] - 768:8
civil [1] - 969:12
claim [133] - 786:12,
792:8, 803:14,
805:12, 805:17,
805:22, 805:24,
805:25, 806:1,
806:15, 806:20,
807:9, 812:9,
812:12, 812:13,
812:17, 812:20,
812:21, 821:6,
821:7, 821:8, 821:9,
821:13, 821:25,
826:1, 826:12,
826:25, 830:7,
830:21, 832:21,
833:5, 833:6, 833:8,
843:5, 843:19,
847:14, 847:15,
851:21, 856:13,
856:14, 856:19,
856:22, 858:2,
858:3, 858:12,
859:1, 859:2, 861:7,
863:13, 863:24,
864:6, 864:18,
866:17, 880:24,

881:16, 882:9,
883:9, 883:15,
885:13, 885:17,
886:13, 886:16,
887:23, 888:12,
890:14, 892:8,
893:8, 896:18,
930:23, 931:7,
944:23, 949:5,
949:6, 949:8,
950:25, 953:15,
960:18, 960:19,
962:9, 967:22,
974:5, 974:7, 979:4,
979:15, 980:5,
985:4, 985:5,
985:18, 985:19,
985:22, 986:2,
992:20, 993:2,
993:5, 993:6, 993:8,
993:15, 994:4,
994:10, 994:11,
994:13, 994:18,
994:24, 995:2,
995:6, 995:7, 995:8,
995:9, 995:11,
998:3, 998:4, 998:8,
998:15, 999:20,
999:25, 1000:1,
1003:7, 1012:21,
1014:21, 1017:11,
1017:24
claimed [9] - 792:10,
811:18, 811:19,
826:17, 826:19,
842:19, 843:8,
843:14, 843:24
claims [101] - 786:13,
804:4, 805:18,
806:22, 811:14,
811:16, 812:5,
812:8, 813:10,
813:15, 813:21,
813:23, 814:24,
818:15, 818:20,
818:21, 818:23,
819:6, 819:20,
821:5, 826:15,
826:21, 828:23,
830:15, 830:17,
830:20, 830:23,
830:25, 832:14,
834:8, 839:2,
840:11, 840:13,
840:14, 844:11,
847:15, 852:16,
853:13, 854:14,
857:21, 857:22,
859:15, 859:20,
860:22, 862:11,
862:16, 863:11,

<p>866:14, 867:5, 869:6, 869:12, 869:15, 869:17, 875:24, 876:18, 876:21, 877:11, 883:3, 883:20, 884:2, 885:5, 885:11, 886:10, 886:15, 888:25, 889:6, 890:2, 892:12, 892:15, 893:23, 893:25, 896:3, 896:7, 923:16, 924:18, 945:6, 946:7, 952:19, 953:1, 953:13, 958:8, 960:7, 960:12, 960:18, 962:14, 967:21, 971:24, 979:16, 981:9, 982:12, 982:13, 985:1, 985:3, 985:10, 985:15, 986:2, 986:3, 991:24, 994:1, 1003:6, 1011:24</p> <p>clarification [2] - 916:5, 961:12</p> <p>clarify [12] - 763:12, 823:3, 917:14, 917:16, 922:17, 922:18, 927:10, 927:24, 957:20, 985:11, 999:17, 999:18</p> <p>clarifying [4] - 953:7, 963:11, 963:16, 997:5</p> <p>class [2] - 775:2, 777:20</p> <p>classes [1] - 782:24</p> <p>classic [4] - 764:10, 765:3, 766:14, 1013:11</p> <p>classics [1] - 767:4</p> <p>clause [1] - 890:15</p> <p>clean [1] - 914:10</p> <p>clear [14] - 764:22, 767:17, 841:4, 841:10, 842:12, 853:10, 855:16, 859:10, 860:14, 943:25, 953:11, 954:2, 958:13, 1004:7</p> <p>clearer [1] - 845:7</p> <p>clearly [4] - 795:12, 841:1, 957:21, 1017:4</p>	<p>clerk [3] - 901:8, 901:14, 1025:22</p> <p>CLERK [14] - 754:13, 773:21, 774:3, 807:19, 810:4, 810:15, 810:17, 850:2, 899:11, 951:24, 952:2, 955:19, 1005:9, 1009:4</p> <p>clicking [1] - 947:24</p> <p>Clinical [1] - 954:21</p> <p>clips [2] - 810:24, 811:1</p> <p>clock [1] - 1027:7</p> <p>close [13] - 774:18, 824:13, 824:25, 850:11, 850:19, 901:10, 902:20, 1019:10, 1026:4, 1026:11, 1026:12, 1030:3</p> <p>closed [1] - 1010:22</p> <p>closing [7] - 769:23, 1026:24, 1027:13, 1027:18, 1030:5, 1030:7</p> <p>code [9] - 818:4, 915:12, 915:16, 915:17, 915:18, 915:21, 987:24</p> <p>coded [4] - 845:8, 858:5, 859:4, 971:5</p> <p>codified [1] - 773:6</p> <p>coding [7] - 845:7, 847:16, 847:17, 859:6, 859:12, 880:22, 885:15</p> <p>coefficient [37] - 798:20, 801:14, 801:15, 801:19, 815:5, 815:25, 816:3, 816:4, 816:5, 816:6, 816:9, 816:13, 816:15, 816:18, 816:20, 816:22, 816:24, 817:3, 817:5, 865:23, 920:17, 920:18, 921:2, 921:5, 921:9, 923:1, 933:6, 935:7, 935:9, 935:13, 935:15, 935:20, 936:20, 937:3, 937:9, 939:20, 941:8</p> <p>coefficients [3] - 816:2, 818:1, 932:10</p> <p>collaborators [1] - 871:9</p>	<p>colleagues [2] - 796:20, 874:22</p> <p>collection [1] - 798:7</p> <p>college [1] - 777:21</p> <p>collimate [1] - 1006:22</p> <p>collimated [6] - 833:18, 836:17, 855:11, 855:22, 926:4, 926:6</p> <p>collimator [11] - 797:25, 800:23, 855:9, 856:4, 856:13, 856:16, 877:20, 1006:14, 1007:2, 1007:9, 1007:11</p> <p>color [28] - 815:14, 845:7, 845:8, 847:11, 847:15, 847:17, 847:19, 849:14, 849:15, 858:1, 858:4, 858:5, 859:3, 859:4, 859:6, 859:9, 859:12, 880:12, 880:16, 880:18, 880:22, 885:15, 940:7, 941:18, 942:9, 971:5</p> <p>colored [1] - 971:10</p> <p>colors [4] - 940:9, 940:19, 941:18, 942:8</p> <p>column [37] - 797:5, 817:6, 819:5, 834:5, 837:18, 837:19, 837:22, 839:8, 839:11, 849:10, 853:8, 854:7, 855:11, 855:25, 860:15, 860:16, 863:1, 865:4, 865:8, 876:25, 878:6, 878:16, 879:6, 879:12, 881:6, 882:13, 884:6, 884:14, 886:23, 955:4, 956:4, 1000:2, 1002:14</p> <p>columns [2] - 880:10, 928:6</p> <p>combination [54] - 832:22, 832:24, 843:9, 844:5, 844:11, 844:14, 851:19, 859:14, 863:15, 866:8, 866:16, 866:20, 866:25, 867:3, 867:4, 867:9,</p>	<p>867:10, 873:11, 874:14, 876:22, 881:17, 883:20, 884:7, 885:3, 885:10, 885:16, 892:15, 894:23, 923:12, 925:11, 925:19, 962:1, 962:19, 962:20, 962:24, 965:21, 965:24, 966:2, 966:8, 966:10, 966:17, 966:20, 966:22, 967:1, 967:4, 967:12, 968:15, 968:18, 968:20, 968:23, 974:17, 974:19, 999:10</p> <p>combinations [10] - 832:19, 844:2, 848:16, 875:4, 892:14, 953:5, 960:5, 966:2, 969:18, 975:7</p> <p>combine [16] - 778:24, 804:12, 847:23, 848:3, 848:22, 849:6, 862:9, 873:8, 873:20, 873:25, 874:6, 874:10, 882:23, 883:12, 960:11, 968:19</p> <p>combined [5] - 831:13, 929:5, 968:13, 968:19, 1003:8</p> <p>combines [2] - 930:5, 967:23</p> <p>combining [5] - 864:3, 924:9, 965:25, 968:4</p> <p>comfortable [3] - 987:14, 1017:3, 1026:5</p> <p>coming [7] - 786:25, 926:2, 926:5, 940:7, 940:11, 968:8, 1008:18</p> <p>commands [2] - 853:21, 877:7</p> <p>comment [2] - 955:13, 957:8</p> <p>commerce [2] - 932:22, 932:23</p> <p>commercial [9] - 795:10, 797:7, 843:6, 843:17, 843:20, 843:21, 1020:22, 1021:21, 1024:9</p>	<p>commercialize [1] - 788:2</p> <p>commercialized [2] - 806:12, 840:24</p> <p>commercially [5] - 839:1, 843:16, 896:16, 896:18, 1021:14</p> <p>common [6] - 787:14, 863:25, 880:21, 899:25, 947:19, 947:23</p> <p>communicated [1] - 821:22</p> <p>communicating [3] - 821:19, 858:10, 864:15</p> <p>communication [1] - 829:8</p> <p>community [2] - 849:2, 945:24</p> <p>compact [1] - 871:16</p> <p>company [2] - 760:24, 788:16</p> <p>comparative [1] - 949:2</p> <p>compare [16] - 789:21, 811:19, 812:9, 821:14, 823:16, 823:17, 824:3, 826:19, 864:19, 887:22, 920:10, 946:23, 975:10, 986:23, 987:1, 987:4</p> <p>compared [2] - 791:12, 873:5</p> <p>comparer [1] - 826:18</p> <p>comparing [77] - 791:12, 791:23, 805:19, 805:20, 805:21, 807:11, 813:2, 821:4, 821:6, 821:11, 821:12, 821:17, 821:21, 822:3, 822:12, 822:22, 823:2, 823:23, 825:11, 825:22, 826:1, 826:5, 826:7, 827:3, 833:4, 838:14, 838:16, 840:7, 864:8, 864:12, 864:20, 864:23, 866:9, 884:3, 884:4, 884:16, 884:17, 885:2, 885:5, 886:4, 886:7, 886:25, 887:1, 887:11, 887:12, 887:16, 887:19, 888:1,</p>
---	--	--	---	---

<p>888:12, 888:17, 888:22, 888:23, 888:25, 889:3, 889:6, 889:16, 890:3, 890:6, 890:22, 946:11, 946:21, 947:1, 948:24, 949:4, 949:5, 952:25, 980:4, 980:6, 980:9, 980:12, 980:16, 980:19, 986:12, 991:3</p> <p>comparison [44] - 805:19, 821:20, 821:21, 822:7, 822:9, 823:8, 823:19, 825:13, 825:14, 825:17, 826:10, 838:12, 845:4, 858:11, 864:16, 865:11, 865:23, 866:7, 884:24, 887:3, 887:8, 888:16, 890:8, 946:24, 947:9, 948:12, 950:11, 950:21, 951:5, 951:6, 951:7, 951:13, 951:15, 952:25, 971:1, 985:1, 985:3, 986:11, 986:18, 986:21, 991:1</p> <p>comparisons [1] - 863:6</p> <p>compensate [1] - 943:3</p> <p>compensation [1] - 775:11</p> <p>competitor [1] - 761:14</p> <p>competitors [1] - 771:4</p> <p>compilation [1] - 933:10</p> <p>complete [1] - 1025:10</p> <p>completely [2] - 858:25, 1026:25</p> <p>completeness [1] - 810:25</p> <p>complicated [2] - 1017:19, 1018:23</p> <p>complication [1] - 939:23</p> <p>component [4] - 847:1, 863:23, 971:18, 1021:19</p> <p>components [8] -</p>	<p>848:7, 873:11, 961:23, 965:2, 998:5, 1003:5, 1003:7, 1004:11</p> <p>composition [7] - 815:16, 816:10, 908:2, 937:20, 938:18, 939:5</p> <p>compounds [1] - 933:7</p> <p>compressed [2] - 962:8, 962:18</p> <p>comprise [1] - 820:20</p> <p>comprising [1] - 762:17</p> <p>compromising [1] - 1011:24</p> <p>computational [2] - 845:22, 845:23</p> <p>computationally [1] - 935:11</p> <p>compute [2] - 789:17, 814:19</p> <p>computed [56] - 779:9, 779:15, 780:21, 783:17, 783:18, 788:12, 788:22, 789:2, 789:6, 789:12, 790:8, 795:22, 795:24, 795:25, 796:18, 800:12, 800:18, 800:21, 801:1, 801:25, 802:2, 814:10, 814:17, 831:17, 833:20, 840:25, 841:4, 841:6, 846:8, 861:21, 862:5, 870:21, 871:22, 881:19, 882:21, 895:9, 895:10, 903:14, 904:19, 905:7, 906:10, 918:23, 919:1, 919:25, 920:3, 927:13, 973:7, 973:10, 973:23, 974:4, 974:15, 996:22, 998:1, 998:16, 999:11, 1000:7</p> <p>computer [72] - 784:2, 784:7, 805:18, 805:20, 807:9, 807:11, 811:3, 821:10, 821:12, 821:14, 821:20, 822:9, 822:23, 823:8, 823:20,</p>	<p>824:11, 824:23, 825:12, 825:15, 825:25, 826:7, 832:6, 835:19, 836:22, 849:14, 851:23, 852:1, 852:9, 852:10, 852:15, 854:22, 858:10, 859:21, 860:3, 860:5, 860:7, 860:12, 863:3, 863:5, 864:11, 864:15, 871:2, 875:7, 875:11, 875:12, 875:18, 875:19, 875:21, 875:23, 876:5, 876:7, 876:14, 887:11, 887:18, 887:21, 888:16, 888:21, 890:8, 946:20, 948:7, 948:11, 948:25, 972:22, 975:21, 975:24, 986:11, 986:25, 988:17, 989:19, 989:20, 990:25</p> <p>computers [8] - 800:14, 833:23, 838:8, 848:6, 873:13, 948:15, 948:17, 948:19</p> <p>concedes [1] - 837:7</p> <p>concentrating [1] - 777:19</p> <p>concept [1] - 899:1</p> <p>concerned [2] - 1022:8, 1025:11</p> <p>concerning [1] - 755:4</p> <p>concluded [4] - 898:12, 917:7, 944:3, 1004:8</p> <p>concludes [1] - 763:7</p> <p>concluding [1] - 898:11</p> <p>conclusion [1] - 830:16</p> <p>conclusions [1] - 898:10</p> <p>concrete [2] - 905:9, 969:11</p> <p>conduct [1] - 956:14</p> <p>conducted [3] - 791:8, 872:6, 956:15</p> <p>cone [26] - 795:24, 795:25, 796:18, 796:21, 797:10, 801:25, 840:25, 841:4, 841:6,</p>	<p>878:18, 878:20, 878:21, 878:23, 894:23, 895:9, 895:10, 896:4, 898:18, 943:22, 965:15, 996:22, 998:1, 998:16, 1000:6, 1007:15, 1007:16</p> <p>conference [5] - 870:6, 870:18, 901:4, 931:24, 994:21</p> <p>conferences [1] - 782:14</p> <p>confident [1] - 850:11</p> <p>confidential [1] - 785:24</p> <p>confirm [4] - 850:17, 851:8, 938:10, 938:11</p> <p>confirmed [2] - 849:24, 851:9</p> <p>confirming [1] - 824:16</p> <p>confused [1] - 931:11</p> <p>confusion [2] - 1022:10, 1022:24</p> <p>connected [15] - 851:25, 852:4, 852:21, 852:23, 853:18, 853:20, 854:6, 856:25, 857:3, 858:2, 858:10, 858:13, 864:14, 876:14, 972:20</p> <p>connection [4] - 770:14, 877:2, 972:21, 972:23</p> <p>connections [1] - 972:24</p> <p>consider [17] - 786:2, 842:15, 842:16, 846:18, 846:22, 869:16, 885:20, 889:19, 894:16, 908:15, 908:17, 908:21, 939:19, 945:2, 988:2, 1018:25, 1023:10</p> <p>consideration [2] - 757:1, 889:21</p> <p>considerations [11] - 842:21, 842:23, 842:25, 843:2, 843:4, 1020:4, 1020:9, 1020:11, 1022:2, 1022:7, 1024:4</p>	<p>considered [9] - 867:21, 970:12, 970:16, 984:18, 984:19, 992:15, 1004:11, 1012:4, 1018:11</p> <p>considers [1] - 935:2</p> <p>consist [1] - 962:14</p> <p>consistent [6] - 765:9, 766:5, 808:4, 828:21, 829:4, 830:8</p> <p>console [3] - 784:7, 784:9, 872:25</p> <p>constitute [3] - 929:12, 929:18, 930:1</p> <p>constitutes [1] - 929:22</p> <p>constructed [1] - 1015:22</p> <p>construction [24] - 803:4, 803:13, 803:14, 814:1, 819:3, 819:8, 826:12, 830:21, 882:9, 944:24, 945:15, 949:5, 949:6, 949:8, 949:23, 950:21, 951:1, 951:3, 951:7, 951:11, 971:25, 994:11, 994:18, 1022:25</p> <p>constructions [1] - 952:20</p> <p>construed [9] - 802:25, 812:8, 812:9, 813:14, 815:1, 822:7, 829:24, 857:9, 861:7</p> <p>consult [2] - 772:15, 808:22</p> <p>consultant [1] - 782:3</p> <p>consultation [1] - 772:16</p> <p>consulting [2] - 781:25, 782:2</p> <p>contacted [2] - 772:21, 772:22</p> <p>contain [4] - 799:18, 889:6, 940:12</p> <p>contained [1] - 875:20</p> <p>contains [2] - 877:5, 933:5</p> <p>content [22] - 788:7, 789:24, 790:8, 791:23, 792:1, 792:20, 795:15, 795:18, 842:18, 865:21, 865:24,</p>
--	---	---	---	--

<p>866:1, 881:21, 881:25, 882:4, 919:1, 919:4, 919:5, 920:7, 920:12</p> <p>contention [1] - 840:18</p> <p>context [4] - 902:6, 930:19, 931:24</p> <p>continuation [2] - 888:4, 991:16</p> <p>continue [10] - 759:18, 759:21, 761:5, 810:22, 811:9, 849:20, 914:22, 952:12, 955:23, 991:13</p> <p>continued [1] - 780:16</p> <p>CONTINUED [1] - 754:1</p> <p>contrary [5] - 758:1, 758:2, 759:9, 759:15, 772:1</p> <p>contrast [1] - 878:14</p> <p>contributed [1] - 873:25</p> <p>contribution [2] - 997:12, 999:2</p> <p>contributions [1] - 895:14</p> <p>control [7] - 836:9, 836:11, 875:11, 876:6, 877:4, 877:5, 969:6</p> <p>controlled [5] - 784:7, 797:24, 836:11, 876:8, 877:6</p> <p>controller [35] - 784:1, 784:6, 805:19, 819:13, 821:16, 822:9, 825:15, 825:25, 826:7, 826:18, 835:19, 836:23, 851:23, 851:24, 852:3, 852:10, 852:15, 853:10, 854:6, 857:17, 864:17, 865:1, 875:7, 875:23, 972:16, 972:21, 972:24, 972:25, 973:1, 975:17, 975:21, 975:24</p> <p>controllers [2] - 834:2, 846:8</p> <p>controlling [2] - 854:8, 875:18</p> <p>controls [2] - 784:3, 874:16</p> <p>conventional [2] -</p>	<p>1013:23, 1015:8</p> <p>conversations [1] - 786:7</p> <p>conversion [11] - 856:22, 856:23, 856:25, 857:5, 857:8, 857:9, 857:11, 857:18, 857:21, 879:5, 879:22</p> <p>convert [10] - 795:16, 806:23, 815:7, 815:24, 818:7, 857:13, 881:20, 935:10, 935:11, 935:12</p> <p>converted [5] - 791:11, 791:22, 801:17, 846:9, 879:18</p> <p>converter [17] - 784:4, 845:17, 845:18, 856:22, 857:3, 857:5, 857:11, 857:15, 857:16, 857:20, 879:10, 879:11, 879:16, 977:20, 977:25</p> <p>converters [2] - 833:20, 857:18</p> <p>converting [9] - 816:19, 856:24, 857:2, 879:5, 879:23, 932:8, 932:9, 989:22, 990:6</p> <p>convertor [3] - 857:2, 857:8, 857:10</p> <p>converts [1] - 818:4</p> <p>convincing [2] - 842:13, 944:12</p> <p>coordinate [1] - 911:19</p> <p>coordinates [1] - 784:2</p> <p>copy [10] - 760:1, 776:2, 776:4, 781:6, 792:19, 796:5, 808:24, 901:7, 901:12, 915:4</p> <p>copying [2] - 843:7, 1021:23</p> <p>core [4] - 860:12, 908:7, 908:9, 908:10</p> <p>Cormack [2] - 789:1, 789:3</p> <p>corporate [1] - 768:24</p> <p>corporation [1] - 781:23</p> <p>correct [147] - 754:21, 755:18, 755:19,</p>	<p>760:10, 760:22, 761:22, 762:10, 762:19, 762:21, 763:2, 763:3, 763:5, 763:6, 763:19, 763:21, 765:8, 765:11, 765:13, 765:18, 770:16, 770:19, 770:20, 770:23, 771:1, 771:2, 771:7, 771:10, 771:14, 771:18, 790:11, 801:23, 803:1, 822:1, 822:18, 823:6, 827:4, 830:5, 835:10, 836:3, 838:4, 853:15, 860:18, 860:23, 860:24, 861:14, 862:19, 869:13, 869:25, 878:7, 882:16, 885:18, 886:11, 902:7, 902:8, 903:14, 903:16, 904:5, 906:18, 908:5, 914:1, 914:4, 917:10, 923:19, 924:22, 924:23, 925:9, 925:18, 925:19, 930:3, 933:14, 934:16, 935:5, 945:12, 951:8, 953:2, 953:3, 953:6, 953:13, 954:6, 954:7, 958:10, 958:15, 959:10, 960:12, 961:3, 962:3, 963:1, 963:7, 964:9, 964:15, 966:10, 968:4, 969:19, 970:15, 971:3, 974:20, 975:1, 975:18, 975:21, 975:25, 976:8, 976:12, 976:22, 976:25, 978:4, 978:14, 978:18, 979:6, 981:1, 981:2, 981:15, 982:19, 983:6, 984:6, 984:13, 985:1, 985:10, 986:4, 986:5, 989:1, 989:2, 991:4, 991:17, 992:12, 992:23, 993:4, 994:1, 995:14, 995:18, 997:13, 998:2,</p>	<p>998:6, 998:10, 998:18, 1002:3, 1003:8, 1003:23, 1005:22, 1006:15, 1010:1, 1014:25, 1015:1, 1018:6, 1018:9, 1023:24, 1025:11, 1029:24</p> <p>correction [1] - 881:10</p> <p>correctly [4] - 935:16, 939:25, 971:1, 978:11</p> <p>correspondence [5] - 827:8, 827:11, 827:14, 827:19, 829:19</p> <p>cortical [4] - 816:16, 817:4, 817:9, 933:8</p> <p>cost [2] - 768:15, 874:24</p> <p>costs [1] - 777:25</p> <p>Counsel [2] - 753:24, 754:8</p> <p>counsel [28] - 754:22, 756:4, 756:5, 756:7, 756:13, 756:18, 756:25, 757:19, 757:25, 758:8, 758:21, 759:2, 760:21, 760:22, 760:25, 761:5, 763:10, 770:6, 772:15, 772:16, 772:23, 785:18, 901:23, 955:23, 1005:5, 1008:6, 1008:22, 1019:6</p> <p>couple [9] - 763:12, 774:2, 784:18, 787:16, 863:19, 956:5, 956:24, 989:18, 1005:11</p> <p>coupled [2] - 855:13, 878:14</p> <p>course [8] - 782:19, 784:8, 784:10, 916:15, 931:15, 1025:4, 1025:16, 1029:11</p> <p>courses [10] - 782:15, 903:4, 904:6, 904:11, 904:13, 906:9, 906:11, 916:22, 916:24, 989:14</p> <p>court [36] - 760:4, 802:24, 803:14, 803:16, 811:3, 812:8, 813:14, 822:6, 829:24,</p>	<p>853:23, 853:24, 861:7, 901:1, 901:11, 931:7, 931:9, 944:23, 945:1, 945:5, 945:6, 946:7, 949:23, 950:9, 950:20, 951:4, 951:10, 951:12, 969:4, 969:14, 994:19, 995:18, 1008:9, 1008:14, 1014:8, 1014:14, 1019:18</p> <p>COURT [224] - 753:1, 754:13, 754:15, 754:22, 755:25, 756:2, 756:9, 756:12, 756:20, 757:2, 757:10, 757:15, 757:20, 758:1, 758:23, 759:5, 759:9, 759:13, 759:20, 759:23, 760:7, 760:17, 761:5, 763:10, 763:14, 770:6, 771:23, 771:25, 772:4, 772:9, 772:20, 773:2, 773:7, 773:12, 773:15, 773:21, 773:22, 773:25, 774:3, 774:9, 775:16, 776:20, 776:22, 781:13, 781:15, 781:18, 785:15, 785:17, 790:14, 790:16, 790:20, 793:3, 793:5, 793:9, 794:14, 794:16, 794:20, 796:11, 796:13, 807:13, 807:17, 807:19, 807:21, 808:10, 808:14, 809:2, 809:8, 809:13, 809:17, 809:22, 809:25, 810:3, 810:4, 810:8, 810:11, 810:14, 810:15, 810:17, 810:19, 828:1, 828:3, 828:7, 834:23, 834:25, 849:21, 850:2, 850:4, 850:7, 850:15, 850:22, 868:22, 868:24, 870:11, 870:13, 899:8, 899:11,</p>
---	---	---	---	--

899:13, 899:19,
899:22, 900:4,
900:6, 900:14,
900:19, 901:7,
901:13, 901:19,
950:2, 950:8,
951:22, 951:24,
952:2, 952:3, 952:6,
952:11, 954:10,
955:11, 955:16,
955:19, 955:20,
955:23, 957:2,
969:1, 969:13,
985:13, 991:6,
994:16, 994:20,
996:9, 996:14,
999:17, 1004:21,
1004:25, 1005:9,
1005:11, 1005:16,
1005:25, 1006:6,
1006:9, 1006:13,
1006:20, 1006:24,
1007:2, 1007:8,
1007:17, 1007:23,
1008:2, 1008:6,
1008:12, 1008:18,
1008:22, 1009:4,
1009:5, 1009:15,
1009:18, 1010:4,
1010:21, 1011:5,
1011:12, 1011:16,
1011:21, 1012:5,
1012:11, 1012:14,
1013:6, 1013:15,
1013:20, 1014:2,
1014:5, 1014:9,
1014:12, 1014:15,
1014:24, 1015:5,
1015:11, 1015:16,
1015:19, 1016:1,
1016:9, 1017:2,
1017:23, 1018:6,
1018:9, 1019:5,
1019:15, 1020:5,
1020:9, 1020:13,
1021:7, 1022:6,
1022:14, 1022:17,
1022:25, 1023:5,
1023:14, 1023:17,
1023:19, 1023:20,
1024:2, 1024:6,
1024:13, 1025:1,
1025:9, 1025:14,
1025:20, 1026:3,
1026:8, 1026:15,
1026:18, 1026:25,
1027:6, 1027:10,
1027:15, 1028:1,
1028:5, 1028:8,
1028:14, 1028:25,
1029:3, 1029:6,

1029:19, 1029:25,
1030:4, 1030:13,
1030:17
Court [8] - 753:14,
808:2, 808:9,
808:11, 808:23,
808:25, 857:9,
1030:19
court's [1] - 945:15
Court's [14] - 803:4,
803:12, 814:1,
819:3, 819:8,
826:12, 830:21,
882:9, 901:3, 949:9,
949:13, 951:2,
951:11, 971:25
courtroom [17] -
754:14, 774:1,
792:5, 802:5,
807:20, 810:12,
810:18, 827:10,
827:13, 839:24,
850:3, 850:21,
899:12, 901:18,
951:25, 952:10,
1005:10
cover [3] - 758:4,
830:8, 998:23
covered [5] - 812:5,
895:1, 896:2,
960:20, 998:17
covers [2] - 998:5,
998:7
crack [1] - 938:23
cracked [1] - 938:22
Cravey [42] - 754:7,
1009:16, 1010:19,
1011:13, 1012:1,
1013:7, 1013:17,
1013:22, 1014:4,
1014:7, 1014:13,
1015:1, 1015:6,
1015:12, 1015:18,
1016:13, 1017:22,
1018:4, 1018:7,
1018:12, 1020:3,
1020:6, 1020:12,
1021:10, 1022:10,
1022:15, 1022:23,
1023:3, 1023:25,
1024:3, 1024:7,
1024:25, 1025:7,
1025:24, 1026:7,
1027:9, 1027:14,
1027:23, 1028:23,
1029:2, 1029:17,
1030:11
Cravey [6] - 759:6,
772:2, 1016:11,
1021:8, 1023:20,

1027:22
create [5] - 778:13,
811:18, 826:17,
828:23, 840:7
created [8] - 804:10,
804:12, 804:14,
819:12, 883:14,
1022:10, 1022:24
creating [3] - 821:10,
864:11, 891:23
credibility [1] -
1024:15
credit [2] - 999:20,
999:25
credited [1] - 789:5
criminal [1] - 1029:7
cross [11] - 759:19,
759:22, 761:1,
763:8, 764:13,
861:16, 872:4,
901:23, 912:16,
919:14, 1008:8
CROSS [1] - 754:23
cross-examination [4]
- 763:8, 764:13,
901:23, 1008:8
CROSS-
EXAMINATION [1] -
754:23
cross-section [3] -
872:4, 912:16,
919:14
cross-sections [1] -
861:16
CT [35] - 779:16,
779:17, 780:17,
781:8, 789:16,
791:9, 791:10,
791:19, 795:19,
796:20, 796:21,
804:18, 806:16,
829:3, 833:23,
848:12, 848:15,
848:17, 848:19,
862:1, 864:2,
872:21, 872:22,
874:22, 874:23,
881:19, 894:24,
896:4, 898:19,
907:18, 918:2,
921:16, 943:22,
973:15, 1005:14
CT/T [1] - 848:8
cube [6] - 798:17,
798:18, 798:19,
798:22, 927:18,
927:19
cubed [1] - 882:4
cubic [3] - 872:11,
872:17, 881:25

cumulative [4] -
905:23, 905:24,
1018:15, 1018:16
curiosity [2] -
1007:17, 1008:3
current [3] - 865:13,
882:24, 1016:7
curriculum [4] -
775:25, 776:2,
776:4, 776:5
curved [1] - 800:7
customer [1] - 769:11
customers [2] -
761:16, 763:4
cutting [1] - 969:2
cylinder [3] - 797:11,
927:6, 928:5

D

D.D.S's [1] - 904:14
damages [5] - 786:15,
892:20, 893:20,
893:22, 897:11
data [21] - 767:14,
767:18, 769:15,
784:3, 801:7, 820:9,
820:11, 833:23,
853:5, 860:10,
861:24, 864:4,
864:5, 867:1, 869:7,
909:5, 948:9, 972:6,
973:18, 989:23
date [3] - 828:11,
896:10, 896:24
dates [4] - 791:17,
829:4, 841:7, 869:3
daughter [1] - 774:16
days [1] - 779:15
DDX-4 [1] - 796:25
DDX-4.4 [1] - 779:8
deadline [1] - 808:18
dealing [2] - 976:18,
985:4
decade [2] - 780:20,
841:7
decades [1] - 829:4
decalcification [1] -
840:5
December [12] -
791:18, 831:19,
831:24, 832:8,
844:17, 847:16,
849:7, 862:4, 869:5,
882:19, 883:12,
892:4
decide [4] - 759:25,
965:20, 982:8,
1019:23
decided [4] - 778:8,
949:23, 968:15,
970:17
deciding [1] - 843:5
decision [2] - 851:2,
1005:3
decisions [1] - 924:1
declined [2] - 772:13,
950:25
deconvolution [1] -
860:7
deeper [2] - 797:17,
940:22
defendant [10] -
773:22, 773:23,
796:10, 950:18,
1005:13, 1019:25,
1020:2, 1021:4,
1027:18, 1029:9
Defendant [2] - 753:7,
754:8
Defendant's [1] -
776:18
defendant's [1] -
1018:12
defendants [4] -
809:4, 868:21,
949:22, 950:17
Defense [4] - 781:12,
796:10, 834:22,
867:16
defense [9] - 758:22,
760:22, 959:4,
1009:15, 1009:16,
1013:3, 1013:5,
1013:15, 1028:4
define [2] - 884:18,
933:1
defined [1] - 947:19
definitely [2] - 1024:3,
1024:25
definition [7] - 832:3,
832:5, 832:10,
949:22, 988:16,
988:24
degree [5] - 777:15,
831:7, 831:12,
832:6, 989:5
degrees [2] - 831:10,
903:4
DELAWARE [1] -
753:2
Delaware [2] - 753:12,
758:21
Delayed [1] - 954:20
delete [1] - 992:1
deleted [1] - 1011:17
deleting [4] - 930:23,
994:24, 995:2
deliberation [1] -
851:5

<p>deliberations [1] - 811:8</p> <p>deliver [1] - 891:21</p> <p>demineralization [3] - 840:6, 939:3, 939:4</p> <p>demineralizes [1] - 938:15</p> <p>demineralizing [1] - 938:16</p> <p>demonstrate [4] - 814:20, 822:12, 836:16, 841:13</p> <p>demonstrated [2] - 860:9, 880:23</p> <p>demonstrates [1] - 848:21</p> <p>demonstrating [1] - 849:2</p> <p>demonstrative [2] - 830:11, 835:12</p> <p>demonstratives [1] - 851:16</p> <p>denied [1] - 1020:16</p> <p>denominator [1] - 817:7</p> <p>densitometer [1] - 788:5</p> <p>densitometry [160] - 779:7, 780:2, 783:15, 783:17, 785:9, 785:13, 787:13, 787:14, 789:7, 789:12, 791:8, 792:23, 794:9, 802:18, 802:25, 804:11, 804:12, 806:10, 806:21, 806:25, 807:5, 811:17, 813:3, 813:6, 813:8, 813:12, 813:13, 813:16, 813:20, 813:23, 814:2, 814:4, 814:21, 814:22, 814:24, 814:25, 818:15, 819:7, 819:13, 820:25, 821:1, 821:11, 821:19, 822:6, 822:8, 823:5, 823:7, 825:16, 826:8, 826:10, 826:16, 827:2, 828:15, 828:17, 828:22, 828:24, 829:4, 829:23, 830:1, 830:4, 831:8, 831:14, 831:18, 833:9, 833:24, 837:24, 838:6,</p>	<p>838:24, 839:3, 839:5, 840:4, 841:10, 841:15, 846:10, 847:24, 852:2, 854:23, 858:5, 858:6, 858:11, 859:4, 859:5, 860:22, 861:2, 861:6, 861:20, 862:11, 862:19, 863:8, 863:11, 864:10, 864:13, 864:15, 866:7, 870:21, 871:15, 871:17, 871:20, 871:22, 871:23, 873:22, 874:7, 881:12, 881:16, 882:8, 882:17, 882:21, 883:3, 883:13, 888:18, 913:16, 914:12, 918:23, 943:6, 943:9, 943:12, 945:17, 951:3, 951:12, 954:6, 956:3, 956:8, 956:14, 957:20, 957:24, 964:6, 964:13, 964:17, 964:23, 965:1, 965:19, 966:14, 966:15, 966:16, 966:18, 967:4, 967:24, 968:12, 972:1, 973:18, 974:7, 974:9, 974:14, 974:15, 980:24, 981:1, 981:20, 984:19, 986:13, 986:24, 987:4, 987:5, 989:14, 991:4, 994:9, 999:11, 1003:4, 1015:14</p> <p>density [98] - 789:18, 791:11, 792:2, 792:4, 794:5, 794:22, 794:24, 795:1, 802:21, 802:24, 803:3, 803:9, 803:11, 803:12, 803:13, 803:16, 803:18, 803:19, 804:8, 804:13, 806:24, 807:7, 813:15, 813:18, 814:6, 814:10, 814:19, 815:2, 815:8, 815:22, 816:5,</p>	<p>816:14, 816:23, 817:14, 817:20, 818:5, 818:8, 819:11, 837:25, 861:22, 861:25, 865:21, 867:2, 872:11, 872:17, 882:5, 882:10, 882:15, 884:19, 895:21, 910:11, 910:12, 910:19, 913:17, 920:14, 920:18, 920:19, 920:21, 920:22, 920:23, 920:24, 921:3, 921:6, 921:8, 921:17, 923:2, 934:19, 934:20, 934:21, 935:1, 935:8, 935:11, 935:15, 935:24, 936:2, 936:5, 936:20, 939:7, 943:10, 943:18, 943:19, 943:23, 944:15, 945:8, 945:10, 945:13, 945:25, 946:9, 964:7, 965:17, 973:17, 998:2, 1003:4</p> <p>dental [80] - 764:5, 766:10, 766:22, 768:11, 768:14, 792:21, 792:23, 794:7, 794:9, 796:21, 828:14, 828:16, 833:22, 835:25, 837:7, 841:8, 841:10, 841:15, 844:19, 845:2, 847:23, 848:10, 848:25, 849:3, 854:18, 854:21, 854:24, 864:10, 864:14, 868:7, 868:11, 873:13, 877:25, 888:18, 895:20, 903:5, 903:7, 903:24, 904:21, 904:22, 904:23, 904:24, 905:2, 905:7, 905:15, 905:18, 906:7, 906:11, 906:20, 907:3, 907:7, 907:14, 907:23, 909:1, 909:4, 910:4, 910:12, 910:15, 911:11, 911:13,</p>	<p>911:15, 916:12, 916:23, 916:24, 916:25, 917:2, 917:22, 939:21, 940:13, 942:18, 943:16, 943:20, 944:1, 944:2, 944:4, 986:13, 986:23, 992:21, 1003:3, 1015:15</p> <p>dentist [9] - 765:21, 766:14, 766:18, 823:16, 909:5, 909:10, 909:14, 909:22, 933:18</p> <p>dentistry [14] - 792:12, 793:15, 841:14, 841:16, 845:1, 848:12, 873:17, 903:7, 965:11, 965:13, 965:15, 965:16, 965:17, 965:19</p> <p>dentists [6] - 764:5, 768:9, 904:13, 909:2, 910:13, 1025:18</p> <p>dentomaxillofacial [3] - 797:7, 835:23, 840:25</p> <p>Department [2] - 778:10, 778:11</p> <p>department [6] - 778:12, 778:13, 811:3, 871:10, 904:2, 932:22</p> <p>dependence [1] - 1014:22</p> <p>dependent [1] - 985:5</p> <p>depicting [2] - 804:8, 819:11</p> <p>deposition [23] - 761:25, 763:24, 764:14, 764:17, 765:9, 765:14, 765:17, 770:10, 770:13, 785:23, 786:5, 902:6, 902:13, 902:14, 905:17, 908:23, 910:24, 915:22, 928:10, 928:19, 928:21, 930:24, 987:18</p> <p>depth [1] - 799:21</p> <p>deputy [2] - 774:1, 810:12</p> <p>derive [2] - 922:6, 922:16</p> <p>describe [18] - 780:14,</p>	<p>783:21, 786:3, 823:11, 851:21, 867:12, 886:14, 887:1, 887:6, 890:12, 890:18, 896:3, 896:4, 929:9, 973:23, 974:2, 986:19, 994:7</p> <p>described [19] - 799:11, 801:10, 822:17, 839:20, 840:23, 841:12, 842:1, 847:8, 855:10, 862:7, 883:13, 884:18, 886:19, 910:18, 943:18, 944:7, 973:21, 975:8, 990:25</p> <p>describes [10] - 801:16, 847:1, 848:19, 856:2, 921:10, 958:25, 993:11, 993:12, 993:15</p> <p>describing [5] - 790:22, 803:7, 821:24, 857:14, 861:21</p> <p>description [27] - 801:12, 833:3, 833:6, 859:6, 862:22, 864:2, 885:23, 885:25, 886:1, 886:9, 886:13, 886:25, 888:1, 888:8, 888:13, 888:22, 889:1, 889:2, 889:9, 914:25, 915:1, 958:16, 984:24, 985:9, 985:23, 990:19, 1017:5</p> <p>descriptions [1] - 886:6</p> <p>descriptive [1] - 991:22</p> <p>deserves [2] - 999:20, 1000:6</p> <p>design [2] - 858:23, 872:14</p> <p>designed [3] - 986:22, 1005:24, 1021:25</p> <p>designing [2] - 903:24, 905:15</p> <p>desired [1] - 860:10</p> <p>detail [4] - 767:3, 823:16, 835:15, 990:25</p> <p>detailed [1] - 776:14</p>
--	---	--	---	---

<p>details [1] - 800:17</p> <p>detect [1] - 831:17</p> <p>detecting [2] - 907:14, 907:16</p> <p>detection [4] - 792:11, 815:9, 882:20, 1005:21</p> <p>detector [62] - 783:25, 797:11, 800:24, 819:23, 833:22, 835:18, 836:1, 836:21, 839:22, 845:12, 845:14, 845:15, 845:18, 846:7, 853:4, 853:6, 853:9, 854:16, 854:25, 855:12, 855:13, 855:15, 855:18, 855:23, 856:5, 856:6, 856:24, 856:25, 857:3, 857:4, 857:10, 857:19, 864:25, 874:14, 874:15, 876:13, 877:18, 878:11, 878:12, 878:15, 878:22, 884:1, 891:3, 926:19, 926:20, 943:2, 971:9, 972:17, 972:25, 992:6, 992:11, 992:17, 992:23, 1002:18, 1002:19, 1006:11, 1006:23, 1007:4, 1007:6, 1007:12</p> <p>detectors [4] - 848:6, 855:10, 873:12, 877:24</p> <p>determination [4] - 772:17, 792:2, 792:3, 872:7</p> <p>determine [8] - 798:21, 844:10, 872:11, 872:16, 893:5, 943:17, 943:19, 957:8</p> <p>determined [5] - 922:9, 922:25, 923:1, 941:11, 957:6</p> <p>determines [2] - 921:10, 942:4</p> <p>determining [3] - 769:13, 882:3, 957:9</p> <p>detrimental [1] - 907:18</p> <p>develop [3] - 779:16, 789:11, 987:21</p> <p>developed [5] - 780:9,</p>	<p>780:18, 788:16, 799:13, 846:10</p> <p>developing [1] - 780:4</p> <p>development [3] - 788:24, 789:2, 987:9</p> <p>developments [1] - 848:25</p> <p>device [64] - 786:25, 797:23, 821:19, 835:19, 836:12, 836:13, 836:23, 836:24, 851:25, 852:4, 852:20, 852:21, 852:23, 852:24, 853:1, 853:4, 853:13, 854:19, 855:1, 855:9, 855:13, 856:15, 857:17, 857:25, 858:2, 858:4, 858:7, 858:9, 858:12, 858:14, 859:2, 859:15, 864:14, 873:21, 874:7, 874:11, 875:12, 876:2, 876:4, 876:11, 876:17, 877:25, 878:24, 880:1, 880:2, 880:5, 880:8, 880:15, 880:25, 909:4, 943:16, 965:23, 967:16, 971:19, 975:18, 976:8, 977:8, 990:15, 992:22, 997:2, 998:23, 1003:22, 1021:17, 1021:25</p> <p>devices [17] - 784:8, 833:19, 834:2, 834:3, 845:24, 845:25, 852:11, 855:2, 858:17, 876:3, 880:7, 882:24, 917:19, 976:12, 978:4, 978:7, 978:10</p> <p>Devlin [3] - 792:19, 793:23, 795:7</p> <p>devoted [3] - 785:4, 797:7, 840:24</p> <p>DEXA [3] - 814:7, 944:13, 946:7</p> <p>diagnose [1] - 840:4</p> <p>diagnostic [6] - 782:16, 832:7, 849:3, 849:16, 868:8, 940:14</p> <p>diagram [5] - 800:4,</p>	<p>800:9, 836:7, 857:15, 974:2</p> <p>dialogue [1] - 947:19</p> <p>DIETRICH [20] - 754:7, 755:23, 756:3, 756:22, 757:17, 757:22, 758:6, 758:17, 759:11, 760:3, 760:12, 763:11, 763:16, 770:4, 773:5, 773:13, 808:23, 809:7, 900:24, 901:11</p> <p>differ [2] - 799:10, 832:4</p> <p>difference [10] - 849:3, 922:24, 934:11, 973:6, 973:9, 973:12, 973:25, 975:2, 975:5, 1013:9</p> <p>differences [10] - 800:16, 804:9, 819:11, 841:22, 842:2, 842:19, 847:20, 847:21, 975:12, 981:11</p> <p>different [43] - 766:4, 767:20, 769:5, 791:17, 799:4, 804:4, 816:17, 819:6, 822:10, 866:3, 866:5, 869:12, 869:15, 872:1, 875:21, 889:15, 891:16, 900:18, 921:12, 921:20, 921:25, 926:16, 926:18, 929:5, 933:7, 936:20, 939:6, 941:6, 941:7, 941:14, 941:15, 949:22, 961:23, 972:3, 973:16, 984:4, 984:15, 984:18, 1006:18, 1013:19, 1018:16, 1022:18</p> <p>differs [1] - 832:5</p> <p>difficult [1] - 862:3</p> <p>Digest [1] - 772:8</p> <p>digital [26] - 768:9, 784:4, 785:8, 785:13, 821:11, 833:20, 838:10, 838:11, 847:17, 852:1, 857:10, 864:12, 877:22,</p>	<p>877:23, 879:9, 879:13, 879:15, 879:19, 881:9, 884:8, 884:11, 887:3, 888:21, 980:14, 989:23, 990:6</p> <p>digitally [5] - 888:17, 986:12, 986:23, 987:1, 987:4</p> <p>digitization [1] - 879:19</p> <p>Dimaxis [16] - 832:23, 844:6, 847:4, 847:6, 847:10, 847:13, 849:8, 849:17, 859:11, 866:17, 880:19, 880:23, 885:16, 960:2, 966:3, 969:19</p> <p>dimensional [12] - 801:25, 821:11, 845:1, 860:8, 860:11, 862:25, 863:1, 864:12, 911:19, 920:5, 987:4, 991:3</p> <p>dimensionally [1] - 909:8</p> <p>direct [12] - 762:1, 770:9, 902:22, 913:10, 917:20, 952:17, 989:11, 991:19, 995:25, 997:19, 1012:5, 1013:1</p> <p>DIRECT [1] - 774:11</p> <p>directed [3] - 779:4, 1010:11, 1012:3</p> <p>direction [4] - 797:24, 820:16, 889:22, 1007:6</p> <p>directions [9] - 797:22, 799:23, 799:24, 800:13, 800:23, 845:16, 928:4, 928:5, 928:6</p> <p>directly [3] - 760:14, 813:24, 957:1</p> <p>disagree [7] - 766:11, 769:25, 838:22, 930:14, 951:9, 951:18, 1000:5</p> <p>disagreed [3] - 805:17, 967:9, 1015:20</p> <p>disagreement [2] - 838:19, 1009:20</p> <p>disagreements [2] - 807:1, 900:3</p>	<p>disappear [1] - 938:16</p> <p>disappointed [1] - 900:22</p> <p>discern [1] - 825:10</p> <p>disclose [10] - 772:18, 854:10, 859:24, 864:22, 876:11, 881:1, 881:3, 882:8, 980:16, 981:21</p> <p>disclosed [20] - 839:15, 841:21, 842:1, 847:25, 852:18, 853:1, 857:22, 858:17, 861:19, 866:18, 871:17, 871:23, 875:8, 880:2, 880:7, 967:8, 974:22, 975:21, 981:1, 981:17</p> <p>discloses [13] - 856:18, 866:9, 876:22, 975:3, 978:18, 979:1, 979:18, 980:5, 980:12, 980:13, 981:6, 981:7</p> <p>disclosing [1] - 1022:2</p> <p>disclosure [1] - 876:2</p> <p>disclosures [12] - 852:14, 858:21, 862:12, 876:16, 877:15, 879:2, 879:22, 882:17, 883:2, 885:9, 892:5, 992:11</p> <p>discount [2] - 768:13, 768:14</p> <p>discourse [1] - 969:12</p> <p>discovered [1] - 786:18</p> <p>discovery [5] - 786:5, 787:5, 1020:8, 1021:13, 1022:3</p> <p>discuss [5] - 786:16, 809:1, 867:14, 876:1, 897:9</p> <p>discussed [16] - 763:8, 767:7, 797:18, 820:24, 829:5, 830:12, 840:11, 860:25, 862:15, 879:3, 879:25, 884:3, 885:4, 895:9, 917:20, 944:10</p> <p>discussing [4] - 770:18, 770:19, 846:5, 911:3</p>
---	---	--	---	---

<p>Discussion [1] - 1025:19</p> <p>discussion [9] - 756:1, 759:25, 771:24, 836:25, 839:13, 846:15, 901:9, 910:24, 992:5</p> <p>discussions [2] - 831:2, 915:23</p> <p>display [21] - 784:9, 822:21, 824:18, 825:19, 835:21, 836:12, 847:10, 849:12, 857:16, 857:17, 858:1, 858:19, 858:23, 859:8, 859:9, 863:5, 875:12, 875:13, 880:3, 880:9, 880:16</p> <p>displaying [3] - 825:7, 989:24, 990:7</p> <p>displays [1] - 978:19</p> <p>dispute [6] - 759:2, 1011:23, 1012:2, 1014:9, 1014:12</p> <p>disputes [3] - 808:7, 900:17, 1014:13</p> <p>distribution [2] - 768:17, 897:9</p> <p>distributor [1] - 769:19</p> <p>DISTRICT [2] - 753:1, 753:2</p> <p>District [1] - 753:14</p> <p>dive [1] - 797:17</p> <p>divide [2] - 817:9, 869:13</p> <p>divided [1] - 816:4</p> <p>division [3] - 869:9, 869:14</p> <p>divisions [1] - 869:11</p> <p>doctor [8] - 773:25, 851:11, 952:7, 994:22, 998:12, 1005:14, 1008:4, 1017:14</p> <p>doctoral [1] - 782:17</p> <p>doctorate [1] - 784:20</p> <p>Doctorate [1] - 777:18</p> <p>doctors [1] - 1005:17</p> <p>document [14] - 767:9, 771:16, 775:21, 777:1, 790:4, 792:18, 794:3, 808:25, 829:13, 834:15, 870:5, 949:19, 955:9, 956:9</p> <p>documents [2] - 785:24, 786:3</p>	<p>done [38] - 760:5, 787:9, 788:21, 789:3, 814:4, 815:10, 815:11, 822:9, 822:22, 822:23, 823:8, 823:19, 824:7, 824:9, 825:14, 887:18, 888:20, 888:23, 918:13, 918:15, 920:24, 933:11, 943:17, 943:21, 944:13, 952:24, 958:1, 978:23, 988:19, 996:8, 1001:24, 1005:19, 1013:1, 1021:15, 1021:22, 1025:22, 1030:3</p> <p>dose [2] - 780:21, 783:8</p> <p>dot [3] - 824:20, 824:22</p> <p>dotted [2] - 891:4, 926:9</p> <p>doubt [2] - 760:7, 1026:5</p> <p>down [24] - 773:15, 773:17, 896:12, 912:8, 918:7, 918:10, 919:7, 929:10, 940:17, 940:24, 946:25, 956:5, 969:7, 973:1, 980:23, 981:4, 983:8, 983:11, 989:22, 990:13, 990:14, 1000:8, 1029:10</p> <p>Dr [260] - 773:24, 774:13, 775:18, 776:12, 776:25, 777:9, 777:10, 780:23, 781:20, 782:9, 783:20, 784:10, 785:7, 785:11, 785:21, 786:10, 786:16, 787:13, 790:1, 791:4, 791:25, 792:5, 792:8, 792:13, 792:16, 793:11, 794:1, 794:22, 795:5, 795:22, 796:16, 797:1, 799:10, 801:10, 801:21, 801:24, 802:5, 802:10, 802:12, 802:15, 803:21,</p>	<p>805:11, 807:1, 807:2, 810:22, 811:13, 811:24, 812:15, 813:9, 814:3, 814:20, 814:23, 817:15, 818:6, 818:10, 818:14, 819:15, 819:16, 820:21, 822:10, 823:24, 825:4, 825:24, 826:13, 827:5, 827:10, 827:16, 827:19, 828:9, 829:11, 830:12, 831:22, 832:4, 832:10, 832:12, 833:2, 834:1, 834:12, 835:3, 835:13, 836:14, 836:25, 839:24, 841:17, 842:22, 843:12, 845:19, 847:22, 848:25, 849:5, 851:10, 851:17, 852:14, 853:16, 854:1, 854:13, 856:12, 856:21, 857:7, 857:24, 858:16, 859:1, 859:14, 859:19, 860:14, 860:22, 861:19, 862:3, 862:10, 862:14, 863:18, 866:8, 867:8, 868:5, 868:13, 869:2, 870:16, 872:19, 873:7, 874:5, 875:1, 875:22, 876:10, 876:20, 877:10, 879:1, 879:21, 879:25, 880:24, 881:3, 881:13, 881:16, 883:1, 883:6, 883:19, 884:2, 885:3, 885:19, 887:24, 888:24, 890:10, 891:6, 892:3, 892:10, 892:17, 893:15, 894:4, 894:14, 894:19, 894:22, 895:3, 895:8, 895:10, 895:12, 895:24, 896:1, 896:25, 897:18, 897:19, 897:23, 898:18, 898:24, 901:21, 902:1, 902:22,</p>	<p>907:23, 911:4, 913:3, 913:11, 913:15, 914:7, 915:15, 918:19, 923:21, 924:18, 925:7, 925:17, 944:7, 944:18, 945:22, 947:14, 952:16, 953:1, 953:13, 954:12, 955:25, 958:4, 959:9, 959:23, 962:15, 963:17, 963:22, 964:9, 964:11, 965:18, 966:16, 966:17, 967:9, 970:2, 971:3, 982:19, 982:22, 983:7, 983:13, 984:2, 984:8, 984:15, 991:16, 994:6, 996:1, 996:19, 997:3, 997:18, 998:2, 998:3, 998:18, 998:21, 998:23, 999:1, 999:5, 999:9, 999:21, 999:25, 1000:5, 1000:10, 1001:15, 1002:2, 1002:6, 1002:11, 1002:25, 1003:2, 1003:20, 1004:3, 1004:4, 1004:8, 1004:10, 1004:20, 1013:10, 1014:16, 1015:6, 1015:9, 1015:13, 1019:9, 1020:16, 1020:19, 1021:1, 1023:21, 1023:24, 1024:1, 1024:4, 1024:6, 1024:7, 1024:14</p> <p>DRAFT [1] - 753:6</p> <p>draft [3] - 900:25, 901:3, 901:8</p> <p>dramatically [1] - 816:24</p> <p>draw [2] - 868:13, 956:24</p> <p>drawing [3] - 797:8, 878:21, 911:21</p> <p>drawings [1] - 858:20</p> <p>draws [1] - 887:14</p> <p>Drew [3] - 982:25, 983:3, 984:4</p> <p>drew [1] - 983:11</p> <p>dropping [1] - 1022:11</p> <p>DTX [1] - 835:1</p>	<p>DTX-8 [1] - 834:25</p> <p>dual [21] - 779:23, 779:25, 783:10, 783:19, 788:2, 788:3, 814:7, 814:8, 814:16, 863:25, 864:2, 871:20, 882:10, 883:21, 883:25, 943:13, 944:20, 944:21, 945:3, 945:7, 945:11</p> <p>due [5] - 893:4, 907:17, 922:1, 985:23, 1003:13</p> <p>duly [1] - 774:7</p> <p>Dunn [4] - 982:25, 983:3, 983:4, 984:4</p> <p>during [28] - 761:8, 764:13, 766:20, 766:24, 767:7, 769:5, 769:6, 769:23, 779:15, 781:24, 784:10, 811:8, 850:7, 850:23, 900:8, 903:3, 910:24, 913:10, 917:20, 928:10, 952:17, 954:4, 987:18, 997:19, 1012:18, 1020:7, 1021:13, 1022:3</p> <p>DX [4] - 776:23, 781:16, 796:14, 868:25</p> <p>DX-150 [1] - 776:15</p> <p>DX-4 [1] - 911:9</p> <p>DX-7 [3] - 868:17, 868:24, 869:2</p> <p>DX-8 [1] - 834:17</p> <p>DX-93 [2] - 796:7, 796:8</p> <p>dynamic [1] - 910:3</p>
E				
<p>e-mail [3] - 828:11, 900:4, 900:25</p> <p>early [6] - 779:15, 788:19, 798:6, 799:13, 807:23, 837:4</p> <p>earned [2] - 779:6</p> <p>easier [3] - 777:8, 847:21, 959:12</p> <p>easily [4] - 787:7, 901:4, 925:12, 941:3</p> <p>eastern [1] - 774:23</p> <p>easy [4] - 801:16, 874:24, 887:17,</p>				

<p>987:2 eat [1] - 1027:7 economic [2] - 775:2, 893:19 education [1] - 1012:8 education [2] - 776:6, 916:17 educational [2] - 777:13, 903:2 Edward [1] - 983:18 effects [2] - 907:18, 942:7 efficient [1] - 820:6 efforts [1] - 789:11 egg [4] - 928:1, 928:3, 928:4, 928:9 eggs [1] - 838:10 eight [3] - 863:1, 870:11, 875:12 either [18] - 759:4, 760:16, 793:19, 804:22, 821:23, 864:22, 883:12, 897:6, 912:2, 915:2, 924:19, 925:8, 943:15, 967:5, 993:17, 1006:3, 1011:25, 1026:21 elected [1] - 784:12 Electric [3] - 778:3, 903:12, 903:13 electrical [1] - 832:6 electron [27] - 833:9, 889:14, 890:11, 890:13, 890:19, 891:3, 891:7, 891:10, 891:12, 891:15, 891:17, 891:23, 892:1, 892:7, 993:5, 993:7, 993:8, 993:13, 993:16, 993:19, 994:9, 995:3, 995:5, 995:9, 995:13, 995:19 electronic [2] - 848:5, 873:12 electronically [1] - 854:8 electronics [2] - 800:24, 877:5 electrons [6] - 891:17, 891:19, 891:21, 993:14, 994:6, 994:7 elects [1] - 784:14 element [60] - 812:10, 812:25, 821:9, 821:22, 821:24, 822:4, 843:18, 844:9, 847:3,</p>	<p>849:19, 851:18, 852:20, 853:16, 854:14, 859:20, 860:19, 875:2, 876:1, 879:25, 885:9, 893:6, 893:11, 898:3, 898:13, 950:11, 951:2, 951:10, 952:22, 952:23, 952:25, 953:12, 953:17, 953:18, 953:24, 976:7, 977:7, 995:6, 996:21, 999:4, 999:5, 999:6, 999:8, 1000:1, 1003:9, 1003:14, 1012:19, 1012:20, 1014:21 element-by-element [2] - 844:9, 849:19 elements [24] - 791:16, 806:1, 812:13, 815:17, 816:11, 819:17, 826:25, 832:21, 843:9, 851:21, 854:11, 858:23, 859:15, 862:11, 866:14, 866:18, 884:3, 898:8, 933:6, 933:9, 939:6, 953:15, 953:21, 1024:8 eligibility [7] - 1013:11, 1013:25, 1015:25, 1016:5, 1017:12, 1018:2, 1029:24 eligible [4] - 1016:17, 1016:21, 1016:25, 1017:24 embodied [2] - 951:2, 951:11 embodiment [1] - 855:17 embody [1] - 898:14 EMI [2] - 788:16, 788:25 emit [1] - 940:4 emits [1] - 941:19 emphasize [3] - 865:10, 878:20, 1019:22 emphasizing [1] - 879:13 employed [1] - 837:7 employees [1] - 786:7 enable [2] - 889:12, 889:13</p>	<p>enabled [6] - 886:17, 992:21, 993:2, 993:7, 994:3, 994:4 enablement [19] - 833:3, 833:7, 833:8, 886:18, 889:4, 889:7, 889:8, 889:16, 889:20, 890:5, 890:11, 890:22, 891:1, 958:17, 984:25, 985:9, 985:24, 990:18, 995:17 enamel [3] - 908:8, 933:20, 935:1 encourage [2] - 848:15, 932:23 encouraged [1] - 848:22 End [1] - 773:10 end [13] - 758:24, 761:4, 776:10, 801:12, 929:21, 930:25, 940:16, 940:18, 944:14, 948:9, 952:7, 969:4, 1027:20 ended [4] - 808:4, 898:11, 1000:14, 1011:24 endo [2] - 765:5, 765:7 energetic [1] - 891:19 energies [5] - 816:17, 940:13, 940:16, 941:7, 942:6 energy [71] - 779:24, 779:25, 783:10, 783:19, 786:25, 787:24, 788:2, 788:3, 814:7, 814:8, 814:16, 815:14, 816:22, 816:25, 817:11, 817:17, 817:20, 818:3, 833:7, 854:19, 863:25, 864:2, 864:4, 871:20, 882:11, 883:22, 883:25, 890:15, 890:17, 891:1, 892:7, 926:3, 926:10, 935:18, 939:21, 940:3, 940:15, 941:3, 941:4, 941:11, 941:13, 941:14, 941:15, 941:23, 942:2, 942:4, 943:13, 944:20,</p>	<p>944:21, 945:3, 945:7, 945:11, 992:8, 992:15, 992:18, 992:22, 992:23, 992:24, 992:25, 993:3, 993:11, 993:14, 993:15, 993:17, 993:21, 994:13, 995:11, 995:19 engage [1] - 969:12 engaging [1] - 998:9 engine [3] - 893:9, 893:10, 903:22 engineering [8] - 777:17, 778:25, 784:13, 784:15, 785:3, 831:7, 831:12, 832:6 enhancement [1] - 860:11 entail [1] - 874:14 entered [1] - 994:18 entering [5] - 754:14, 810:18, 850:21, 901:18, 952:10 entire [9] - 820:15, 886:16, 886:17, 893:13, 927:5, 927:19, 958:25, 960:17 entirely [5] - 874:12, 892:25, 922:25, 923:1, 938:16 entirety [2] - 781:10, 896:2 entitled [5] - 792:20, 794:4, 893:12, 999:24, 1004:20 entry [1] - 1004:17 environment [1] - 768:11 equal [1] - 921:5 equate [1] - 1024:18 equating [1] - 807:5 equations [2] - 801:11, 820:7 equipment [38] - 783:21, 786:22, 833:18, 838:24, 839:1, 839:3, 839:4, 839:5, 839:14, 839:18, 839:19, 839:22, 845:23, 847:24, 848:5, 854:14, 854:15, 854:25, 855:3, 855:6, 855:21, 856:1, 856:18, 862:6, 877:14,</p>	<p>877:16, 879:2, 881:10, 896:17, 896:19, 971:10, 971:13, 977:8, 977:9, 977:12, 977:16 equivalent [6] - 795:15, 820:7, 861:9, 861:18, 971:11, 995:6 era [1] - 916:22 erroneous [1] - 805:24 error [2] - 817:7, 817:11 errors [2] - 814:9, 817:12 errs [3] - 807:4, 807:7, 807:8 especially [4] - 777:23, 779:17, 786:7, 1023:12 ESQ [10] - 753:18, 753:21, 753:21, 753:22, 753:22, 754:3, 754:6, 754:6, 754:7, 754:7 essential [1] - 885:1 essentially [1] - 815:25 established [1] - 1017:4 estates [1] - 917:12 estimate [1] - 940:16 estimates [1] - 864:3 ESW [1] - 1018:19 et [2] - 772:11, 850:9 European [1] - 796:5 eventually [1] - 965:8 evidence [72] - 772:21, 772:22, 772:25, 773:2, 776:18, 776:23, 781:12, 781:16, 790:13, 790:17, 793:2, 793:6, 794:13, 794:17, 796:14, 811:7, 814:15, 817:16, 817:19, 817:25, 818:2, 818:3, 825:25, 826:7, 827:25, 828:4, 829:17, 834:22, 835:1, 850:9, 851:4, 868:21, 868:25, 870:10, 870:14, 884:4, 936:1, 943:15, 944:16, 946:19, 954:5, 954:13, 956:2,</p>
--	---	--	---	---

<p>956:22, 957:3, 957:19, 957:23, 1005:4, 1010:22, 1010:24, 1012:17, 1013:5, 1013:8, 1017:3, 1017:15, 1019:23, 1021:18, 1021:24, 1022:3, 1022:15, 1023:6, 1023:9, 1023:10, 1023:22, 1024:23, 1025:3, 1026:12, 1029:9</p> <p>evidenced [2] - 849:16, 958:9</p> <p>exact [2] - 944:11, 1015:9</p> <p>exactly [7] - 793:16, 846:4, 948:22, 959:22, 968:17, 1000:2, 1002:22</p> <p>EXAMINATION [4] - 754:23, 763:15, 770:7, 774:11</p> <p>examination [8] - 763:8, 764:13, 811:10, 901:23, 902:22, 952:12, 983:25, 1008:8</p> <p>examined [5] - 774:8, 983:7, 984:1, 984:10, 984:12</p> <p>examiner [17] - 914:3, 914:6, 914:14, 914:18, 966:11, 966:13, 966:15, 967:25, 968:21, 970:11, 982:24, 983:3, 983:17, 983:20, 984:10, 984:12, 984:16</p> <p>examiner's [1] - 983:13</p> <p>examiners [2] - 984:1, 984:18</p> <p>example [30] - 780:5, 792:23, 794:9, 806:2, 817:1, 836:14, 843:15, 852:9, 858:1, 863:14, 863:19, 864:9, 876:22, 881:8, 881:17, 887:25, 893:7, 907:15, 922:1, 922:12, 933:1, 936:6, 936:14, 936:21, 939:24, 962:5, 1002:13, 1019:2, 1020:19,</p>	<p>1020:21</p> <p>examples [20] - 807:10, 832:19, 837:9, 838:1, 839:14, 839:17, 841:13, 844:2, 889:24, 899:3, 913:18, 943:12, 945:17, 946:4, 946:5, 946:6, 964:8, 964:13, 965:2</p> <p>except [4] - 945:21, 993:18, 1004:18, 1009:21</p> <p>excerpt [13] - 823:24, 837:18, 837:21, 839:11, 861:12, 874:18, 874:20, 879:6, 884:14, 886:22, 913:10, 913:14, 989:18</p> <p>excerpts [5] - 791:4, 839:7, 875:15, 878:8, 882:12</p> <p>exchange [1] - 808:2</p> <p>exclude [3] - 898:4, 908:19, 908:20</p> <p>excursion [1] - 927:13</p> <p>excuse [2] - 762:5, 841:23</p> <p>excused [1] - 1008:17</p> <p>exemplary [1] - 939:18</p> <p>exercise [9] - 815:21, 935:10, 935:25, 975:10, 981:3, 998:25, 999:3, 1019:8, 1019:12</p> <p>exhaustive [1] - 1002:7</p> <p>exhaustively [1] - 908:13</p> <p>Exhibit [26] - 775:25, 776:18, 776:23, 781:12, 781:16, 790:10, 790:13, 790:17, 793:2, 793:6, 794:13, 794:17, 796:10, 796:14, 827:22, 827:25, 828:4, 834:22, 835:1, 844:22, 865:15, 867:16, 868:21, 868:25, 870:10, 870:14</p> <p>exhibit [3] - 809:19, 829:13, 970:1</p> <p>exhibits [5] - 785:24, 809:18, 810:23,</p>	<p>811:2, 811:6</p> <p>existing [10] - 763:4, 839:3, 860:9, 865:11, 871:19, 874:11, 1013:12, 1013:23, 1016:15, 1016:23</p> <p>expand [1] - 778:22</p> <p>expanded [1] - 776:13</p> <p>expected [1] - 862:1</p> <p>expecting [2] - 1008:7, 1009:13</p> <p>experience [8] - 778:21, 779:6, 831:8, 831:13, 832:7, 872:13, 989:15</p> <p>experiences [1] - 782:10</p> <p>experimentation [2] - 889:10, 890:9</p> <p>experimentations [1] - 889:22</p> <p>experiments [3] - 916:13, 916:25, 918:11</p> <p>expert [15] - 756:16, 785:7, 785:12, 785:23, 786:15, 892:20, 893:20, 897:11, 989:12, 1010:25, 1013:1, 1015:3, 1017:10, 1017:16, 1017:18</p> <p>expert's [1] - 1011:1</p> <p>expertise [1] - 786:15</p> <p>explain [35] - 776:3, 779:10, 791:5, 797:18, 800:20, 813:11, 818:21, 819:3, 822:2, 822:19, 824:1, 832:12, 835:3, 835:15, 836:5, 845:5, 847:22, 849:5, 855:5, 861:5, 862:21, 868:5, 869:9, 870:17, 885:23, 890:25, 891:15, 892:22, 894:11, 909:12, 920:2, 921:3, 925:24, 935:6, 996:18</p> <p>explained [4] - 787:2, 803:15, 920:2, 991:19</p> <p>explanation [2] - 769:8, 846:4</p> <p>explicit [2] - 859:5,</p>	<p>859:7</p> <p>explicitly [1] - 1015:2</p> <p>exposure [2] - 872:23, 874:17</p> <p>exposures [2] - 868:9, 894:21</p> <p>expressed [5] - 808:12, 984:24, 989:8, 996:25, 1002:2</p> <p>expressing [3] - 923:15, 990:2, 990:17</p> <p>extensive [1] - 898:5</p> <p>extent [2] - 885:14, 902:19</p> <p>externally [1] - 891:10</p> <p>extract [1] - 816:23</p> <p>eye [4] - 847:19, 971:7, 1019:1</p> <p>eyes [2] - 799:21, 918:8</p>	<p>898:25, 1005:18</p> <p>family [5] - 761:20, 774:21, 774:24, 775:2, 777:21</p> <p>fan [1] - 1007:5</p> <p>far [11] - 757:18, 773:3, 787:10, 905:13, 911:14, 918:15, 922:15, 945:23, 949:2, 1022:7, 1025:11</p> <p>fashion [1] - 942:3</p> <p>fast [1] - 838:8</p> <p>faster [2] - 783:8, 949:12</p> <p>fault [1] - 957:15</p> <p>fax [1] - 990:22</p> <p>feature [15] - 894:6, 894:9, 894:11, 894:12, 895:8, 895:13, 895:16, 895:17, 895:25, 896:20, 896:22, 897:18, 897:23, 997:17</p> <p>features [16] - 868:12, 894:14, 894:16, 894:17, 895:4, 895:6, 897:2, 897:5, 897:9, 897:13, 897:21, 961:24, 1002:7, 1004:18</p> <p>February [2] - 835:5, 867:18</p> <p>Federal [6] - 757:1, 757:22, 758:10, 772:10, 772:12, 1016:19</p> <p>federal [1] - 1013:18</p> <p>feet [7] - 922:5, 922:6, 922:8, 936:14, 936:17, 940:25, 957:10</p> <p>FEIN [1] - 753:20</p> <p>FEINLAND [11] - 753:22, 899:24, 900:5, 900:10, 900:15, 1012:9, 1012:13, 1014:6, 1014:11, 1029:23, 1030:3</p> <p>Feldkamp [6] - 820:6, 820:9, 820:11, 898:16, 930:4, 931:2</p> <p>fellow [2] - 784:23, 784:25</p> <p>fellows [2] - 784:22, 784:25</p> <p>fellowships [2] - 776:6, 778:1</p>
F				
			<p>face [4] - 848:14, 894:23, 969:22, 982:22</p> <p>fact [18] - 772:13, 795:13, 800:8, 800:10, 806:23, 818:6, 841:8, 846:6, 848:13, 848:18, 873:18, 878:20, 887:18, 913:3, 965:13, 965:18, 966:14, 998:22</p> <p>factor [4] - 817:8, 817:11, 1020:24, 1023:12</p> <p>factors [3] - 842:14, 889:19, 1021:13</p> <p>facts [3] - 1016:18, 1020:18, 1021:4</p> <p>factually [1] - 964:21</p> <p>faculty [1] - 778:14</p> <p>failed [1] - 1020:7</p> <p>failure [1] - 1021:12</p> <p>fair [14] - 759:10, 769:11, 769:20, 774:25, 776:12, 809:8, 834:11, 845:19, 850:12, 863:14, 937:20, 955:15, 976:4, 995:15</p> <p>fairly [1] - 1015:9</p> <p>fall [2] - 773:17</p> <p>familiar [5] - 831:16, 874:4, 882:20,</p>	

<p>felt [7] - 775:3, 843:6, 971:6, 1002:5, 1002:10, 1020:24, 1024:20</p> <p>female [1] - 1025:17</p> <p>few [10] - 755:2, 760:15, 768:5, 771:22, 785:24, 786:6, 840:18, 871:9, 902:24, 990:14</p> <p>fewer [1] - 798:25</p> <p>fiducial [1] - 864:13</p> <p>field [30] - 765:21, 765:22, 778:23, 785:7, 785:12, 787:15, 799:12, 805:10, 814:4, 829:5, 837:24, 838:13, 873:13, 874:3, 884:25, 887:19, 906:23, 913:16, 945:19, 964:6, 964:12, 988:3, 989:6, 989:14, 1013:10, 1013:13, 1015:15, 1016:16, 1024:22</p> <p>fields [4] - 766:4, 869:12, 873:14, 989:15</p> <p>fifteen [1] - 807:18</p> <p>Figure [29] - 797:15, 836:8, 845:6, 845:9, 845:10, 845:14, 854:5, 855:7, 875:10, 875:17, 876:5, 876:25, 878:6, 878:10, 880:4, 880:5, 880:9, 887:25, 891:2, 911:16, 911:23, 911:24, 971:3, 972:9, 1006:10, 1006:20, 1006:21</p> <p>figure [11] - 783:20, 783:24, 822:19, 822:20, 848:18, 854:5, 877:17, 882:1, 889:11, 935:19, 997:17</p> <p>figures [13] - 790:5, 825:3, 835:14, 835:16, 836:2, 836:15, 845:9, 852:8, 853:7, 853:8, 858:20, 912:22, 971:2</p> <p>filed [11] - 782:5, 782:6, 835:4, 835:5,</p>	<p>844:9, 844:15, 844:17, 867:17, 867:18, 869:5, 888:6</p> <p>filling [3] - 869:3, 896:10, 896:24</p> <p>fill [3] - 976:14, 977:14, 978:2</p> <p>filled [1] - 938:17</p> <p>filling [3] - 907:15, 977:15, 978:9</p> <p>fillings [1] - 907:18</p> <p>final [4] - 799:5, 879:25, 912:24, 995:21</p> <p>finally [1] - 906:14</p> <p>finder [1] - 772:13</p> <p>fine [13] - 809:7, 828:10, 852:6, 908:24, 917:15, 935:6, 963:16, 973:24, 1004:1, 1012:13, 1016:9, 1026:14, 1029:16</p> <p>finish [1] - 923:8</p> <p>finished [5] - 807:13, 850:9, 850:25, 981:3, 996:10</p> <p>Finland [2] - 916:9, 917:12</p> <p>fire [1] - 878:14</p> <p>firm [1] - 775:6</p> <p>first [63] - 775:19, 775:22, 776:15, 779:24, 787:4, 787:11, 788:15, 788:16, 788:19, 791:8, 793:13, 793:20, 793:22, 794:7, 795:6, 795:8, 795:10, 796:6, 797:5, 797:6, 799:2, 799:13, 812:8, 813:6, 813:9, 815:24, 816:19, 821:15, 824:7, 824:10, 832:22, 835:7, 844:4, 846:1, 848:10, 848:13, 851:19, 867:14, 871:6, 889:5, 889:17, 895:8, 896:8, 922:8, 930:16, 935:12, 944:20, 947:20, 956:5, 969:17, 972:15, 988:18, 996:21, 996:25, 999:4, 1000:9, 1012:1, 1012:5, 1016:10, 1019:5,</p>	<p>1021:14, 1029:22</p> <p>fitted [1] - 947:4</p> <p>fitting [7] - 826:6, 947:4, 947:10, 947:15, 947:16, 947:18</p> <p>five [16] - 768:8, 778:14, 780:24, 791:14, 831:13, 837:8, 855:11, 855:23, 861:24, 877:18, 881:6, 884:6, 929:4, 929:25, 1004:23, 1004:24</p> <p>fix [1] - 979:22</p> <p>flashlight [1] - 922:14</p> <p>flat [13] - 800:8, 894:20, 897:16, 1002:13, 1002:17, 1002:25, 1003:7, 1003:16, 1003:17, 1004:1, 1004:2, 1004:8, 1006:11</p> <p>flavor [1] - 783:23</p> <p>flea [1] - 896:5</p> <p>flexible [1] - 918:6</p> <p>fluoroscopy [3] - 871:16, 871:19, 881:10</p> <p>FLYNN [7] - 754:3, 758:20, 1026:14, 1026:16, 1026:22, 1028:7, 1028:12</p> <p>focal [4] - 800:7, 800:17, 819:14</p> <p>focus [5] - 767:6, 817:6, 860:4, 904:20, 904:23</p> <p>focused [5] - 903:4, 903:24, 906:6, 906:19, 916:24</p> <p>focusing [2] - 891:23, 991:10</p> <p>follow [2] - 773:12, 952:6</p> <p>follow-up [2] - 773:12, 952:6</p> <p>follows [3] - 771:3, 774:8, 949:25</p> <p>Fontevraud [17] - 832:25, 867:13, 870:7, 870:24, 871:21, 872:16, 872:20, 873:1, 874:8, 874:19, 881:23, 882:18, 883:2, 883:17, 885:11, 960:2, 966:7</p> <p>foot [1] - 911:20</p>	<p>footnote [4] - 1012:25, 1014:11, 1019:3, 1022:11</p> <p>footnotes [1] - 899:25</p> <p>footprint [1] - 874:13</p> <p>FOR [1] - 753:2</p> <p>force [1] - 767:4</p> <p>forearm [2] - 787:21, 884:21</p> <p>foreign [2] - 907:14, 907:16</p> <p>Forest [1] - 844:19</p> <p>forever [1] - 1009:11</p> <p>forget [2] - 941:23, 983:12</p> <p>forgot [1] - 927:6</p> <p>form [9] - 916:1, 973:5, 992:8, 1016:24, 1029:18, 1029:19, 1029:20, 1029:21, 1030:1</p> <p>formations [1] - 930:7</p> <p>forms [2] - 973:8, 1030:9</p> <p>formulated [1] - 1028:21</p> <p>forth [9] - 904:20, 906:10, 909:12, 937:7, 947:25, 964:7, 975:15, 989:21, 1017:17</p> <p>Fortran [1] - 987:14</p> <p>forty [1] - 849:25</p> <p>forty-minute [1] - 849:25</p> <p>forward [2] - 851:11, 1002:13</p> <p>founded [1] - 788:1</p> <p>four [12] - 768:9, 781:15, 798:7, 836:10, 877:1, 877:6, 880:10, 893:9, 928:23, 989:21, 1012:20, 1017:23</p> <p>fourth [1] - 896:20</p> <p>fraction [5] - 798:17, 798:18, 816:11, 939:6, 997:16</p> <p>fractions [1] - 815:17</p> <p>Fractures [1] - 954:20</p> <p>frame [4] - 819:23, 819:24, 988:3, 988:4</p> <p>frames [2] - 805:14, 927:12</p> <p>France [2] - 870:7, 870:24</p> <p>Francisco [2] - 789:10, 871:11</p> <p>frankly [2] - 891:14,</p>	<p>892:2</p> <p>Frederick [1] - 784:20</p> <p>free [1] - 824:25</p> <p>Friday [5] - 850:12, 850:19, 851:2, 851:3, 851:5</p> <p>front [18] - 774:1, 775:24, 783:24, 797:2, 797:23, 798:8, 798:13, 799:6, 799:18, 799:25, 848:14, 867:24, 967:25, 968:20, 1010:10, 1019:11, 1029:8</p> <p>frugal [1] - 777:25</p> <p>fruitless [1] - 953:24</p> <p>full [11] - 776:2, 809:14, 809:18, 889:2, 890:6, 904:3, 973:20, 973:21, 994:2, 994:3</p> <p>function [4] - 816:25, 825:21, 826:3, 1002:15</p> <p>functionality [1] - 997:8</p> <p>functions [2] - 833:17, 961:24</p> <p>fundamental [1] - 799:6</p>
G				
			<p>gain [2] - 766:21, 766:25</p> <p>gallbladder [1] - 907:6</p> <p>gantry [4] - 783:25, 784:1, 872:24, 883:25</p> <p>GE [16] - 779:13, 779:17, 779:18, 780:3, 846:6, 848:8, 866:3, 872:2, 872:10, 872:13, 872:15, 872:22, 903:20, 905:9, 905:14, 1007:18</p> <p>gears [1] - 795:21</p> <p>Genant [7] - 789:8, 790:25, 795:16, 814:11, 870:7, 871:7, 874:21</p> <p>gender [1] - 838:18</p> <p>general [4] - 913:1, 914:25, 915:1, 915:2</p> <p>General [3] - 778:3, 903:12, 903:13</p> <p>generally [17] - 764:6, 766:10, 781:7,</p>	

784:24, 797:19,
864:19, 880:12,
924:16, 942:15,
963:23, 973:13,
1010:9, 1011:18,
1011:19, 1012:15,
1018:1, 1028:5
generate [2] - 831:16,
912:19
generation [1] - 854:8
generic [1] - 800:2
gentlemen [18] -
754:16, 769:24,
807:17, 807:22,
810:20, 810:21,
849:24, 850:23,
899:9, 899:15,
901:20, 951:23,
952:12, 1005:8,
1008:14, 1025:15,
1030:15
geometric [2] - 798:8,
799:17
geometry [3] - 797:9,
799:17, 927:6
giant [2] - 801:11,
902:16
given [27] - 760:22,
787:3, 789:3, 801:7,
831:22, 884:7,
898:21, 934:17,
938:15, 953:23,
967:15, 969:18,
989:5, 993:11,
993:13, 1004:4,
1009:20, 1015:20,
1015:21, 1016:2,
1016:20, 1017:18,
1018:4, 1018:18,
1018:19, 1018:21,
1019:14
glad [1] - 786:18
Glick [1] - 983:18
goal [2] - 893:5,
932:22
goals [1] - 871:18
Godfrey [2] - 788:25,
801:21
goggled [1] - 938:1
GOLDEN [4] - 753:18,
772:7, 772:10,
900:16
government [3] -
776:8, 932:20,
932:21
government's [1] -
932:19
GP [1] - 765:4
grab [1] - 773:18
graduate [16] - 778:1,

778:2, 778:19,
778:22, 779:5,
779:9, 788:1, 831:7,
831:10, 831:12,
869:21, 904:18,
905:14, 916:15,
989:5
graduated [1] - 904:9
grandchildren [1] -
774:17
granted [2] - 784:19,
964:20
graph [1] - 944:14
graphic [2] - 798:16,
933:25
gray [4] - 847:20,
933:22, 933:24,
935:1
grayscale [11] -
803:17, 825:8,
847:21, 859:13,
909:19, 909:20,
909:22, 909:24,
910:8, 943:23
great [3] - 807:15,
893:15, 1024:24
greatly [1] - 874:12
Greek [3] - 799:15,
816:13, 816:14
green [5] - 824:22,
928:6, 947:23,
948:4, 971:15
grew [1] - 774:23
Grimes [2] - 850:20,
1008:12
gross [1] - 767:25
grossly [1] - 971:7
group [3] - 778:4,
778:5, 850:10
groupings [1] - 800:4
grow [1] - 774:20
guarantee [1] - 850:18
Guenther [78] -
832:24, 834:18,
835:4, 835:5, 835:7,
835:16, 836:9,
867:11, 867:14,
867:16, 867:20,
868:4, 868:5,
868:10, 874:7,
874:14, 875:8,
875:10, 876:2,
876:24, 877:15,
877:17, 877:25,
878:5, 878:15,
879:7, 879:22,
880:1, 880:3, 881:3,
881:5, 883:6, 883:8,
883:9, 883:25,
884:4, 885:10,

896:13, 953:4,
960:2, 966:4, 966:6,
974:20, 974:22,
974:23, 974:24,
975:2, 975:6,
975:11, 975:20,
976:11, 976:25,
977:11, 977:24,
978:6, 978:17,
978:19, 978:21,
979:5, 979:9,
979:11, 979:12,
979:17, 979:25,
980:12, 980:16,
981:1, 981:7,
981:12, 981:22,
982:2, 982:3, 982:9,
982:14, 997:25,
1019:10
guess [10] - 779:25,
793:15, 856:6,
875:20, 926:3,
938:10, 949:7,
951:18, 1013:3,
1029:17
guidance [2] - 889:23,
892:19
guide [2] - 861:14,
971:7
guilty [1] - 1029:10
guys [4] - 773:8,
773:16, 773:17,
1010:14

H

half [2] - 780:3, 900:14
halfway [2] - 801:1,
977:18
hand [5] - 787:10,
798:3, 918:10,
954:8, 1000:2
handed [1] - 954:12
hands [2] - 817:13,
969:7
hang [3] - 911:9,
978:25, 1000:18
hanging [1] - 896:12
happy [5] - 930:10,
930:11, 945:15,
1010:20, 1027:24
hard [9] - 777:24,
915:4, 934:12,
935:2, 969:13,
991:7, 991:10,
998:12, 1023:1
harder [1] - 887:19
hardware [11] -
761:10, 762:9,
762:17, 833:15,

836:16, 845:20,
848:7, 873:11,
879:25, 898:12,
961:24
Harry [2] - 789:8,
790:25
Harvard [2] - 777:18,
916:20
head [10] - 760:23,
823:21, 856:9,
905:10, 911:20,
918:4, 918:5, 941:5,
942:23, 969:5
headed [1] - 797:25
header [1] - 954:17
heading [1] - 961:17
heads [2] - 809:2,
918:4
Health [1] - 955:1
hear [6] - 774:25,
785:10, 840:2,
1005:5, 1008:25,
1024:23
heard [28] - 778:25,
786:17, 787:13,
795:3, 800:5,
800:10, 801:20,
802:14, 803:11,
803:22, 815:6,
818:6, 820:5, 831:1,
831:2, 831:23,
842:24, 863:7,
886:12, 894:19,
927:3, 994:12,
1005:4, 1010:22,
1011:1, 1011:7,
1017:9, 1029:9
hearing [1] - 931:14
Heart [1] - 785:4
heart [1] - 780:10
heavily [1] - 1018:25
heel [1] - 884:22
height [2] - 794:5,
922:9
held [1] - 870:23
help [4] - 887:21,
912:23, 925:24,
1000:21
helped [6] - 777:25,
778:13, 779:3,
779:16, 872:14,
905:9
helpful [4] - 760:2,
915:20, 949:7,
1013:21
helps [2] - 949:11,
970:7
hen [1] - 952:6
hence [1] - 772:15
Herndon [10] - 767:7,

767:12, 777:9,
796:25, 798:24,
829:18, 830:11,
835:12, 851:15,
871:4
hiding [1] - 964:23
high [19] - 780:13,
782:11, 796:16,
796:22, 805:4,
813:11, 822:5,
832:13, 835:3,
836:2, 844:13,
844:22, 846:3,
894:12, 900:21,
929:21, 930:25,
941:4, 974:19
higher [1] - 779:21
highlight [2] - 836:19,
840:15
highlighted [17] -
789:13, 804:9,
812:18, 812:23,
813:23, 813:25,
818:23, 821:18,
840:17, 860:1,
861:1, 878:17,
878:19, 881:24,
886:5, 888:15,
986:10
highlighting [4] -
813:22, 821:10,
827:1, 992:21
hired [2] - 775:6,
782:2
histories [2] - 838:15,
887:5
history [4] - 785:22,
829:5, 903:11, 915:7
hit [2] - 768:17, 969:5
hitting [1] - 855:23
Hoffman [1] - 917:12
hokey [1] - 991:12
hold [3] - 763:25,
839:23, 1009:11
holding [1] - 1018:20
hole [2] - 938:21,
938:23
home [1] - 977:18
honestly [1] - 1016:6
Honor [115] - 755:23,
756:23, 757:5,
757:22, 758:18,
758:20, 759:16,
760:3, 760:14,
761:6, 763:7,
763:11, 770:5,
771:20, 772:1,
773:9, 773:14,
773:19, 773:23,
774:10, 775:14,

776:17, 781:11, 781:17, 785:6, 785:16, 785:19, 790:12, 790:15, 790:19, 793:1, 793:8, 794:12, 794:15, 794:19, 796:9, 807:16, 808:1, 809:10, 809:24, 810:5, 810:13, 811:11, 827:24, 828:6, 834:21, 849:18, 850:13, 850:14, 851:13, 868:20, 870:9, 899:7, 899:24, 900:16, 900:24, 901:6, 901:24, 949:25, 950:5, 951:20, 952:13, 954:8, 955:8, 955:15, 955:22, 957:1, 957:4, 969:10, 994:17, 1001:24, 1004:22, 1008:7, 1008:16, 1009:12, 1009:17, 1011:4, 1011:13, 1012:1, 1012:9, 1012:13, 1012:24, 1012:25, 1013:8, 1013:17, 1013:18, 1013:22, 1014:4, 1014:6, 1014:14, 1014:18, 1015:1, 1016:6, 1016:13, 1017:22, 1018:12, 1019:7, 1020:4, 1020:14, 1020:15, 1021:10, 1022:12, 1022:23, 1025:7, 1025:12, 1025:24, 1026:7, 1026:14, 1026:22, 1026:23, 1027:23, 1028:2, 1028:7, 1028:24, 1030:16 honor [1] - 784:14 Honor's [2] - 1010:20, 1018:4 honorable [1] - 1018:20 HONORABLE [1] - 753:13 honorary [1] - 784:19 honors [1] - 776:7 Hoon [1] - 983:20 hope [1] - 978:6 hopefully [4] - 769:7, 824:13, 824:24,	901:14 horizontal [1] - 855:24 Horner [1] - 792:19 Hounsfeld [47] - 788:25, 789:4, 791:11, 791:19, 795:17, 801:18, 801:21, 801:22, 802:19, 802:20, 803:7, 803:8, 803:10, 803:19, 806:18, 806:21, 807:5, 813:17, 813:20, 815:3, 815:4, 815:7, 815:22, 815:24, 815:25, 816:19, 816:20, 817:2, 818:4, 818:7, 822:21, 823:4, 833:24, 848:13, 865:19, 881:20, 932:9, 935:11, 935:12, 956:16, 956:17, 956:18, 956:19, 956:21, 957:7, 957:9 hour [3] - 900:14, 952:5, 1019:7 hours [1] - 1015:6 house [2] - 772:23, 774:18 HU [4] - 818:14, 823:3, 826:8, 826:9 huge [1] - 891:21 human [1] - 788:15 hundred [7] - 769:2, 895:12, 896:22, 909:11, 940:1, 1000:6, 1004:4 hundreds [7] - 927:4, 927:5, 927:7, 927:14, 927:17, 927:22, 928:9 hydroxy [1] - 861:11 hydroxyapatite [1] - 908:10 hypothetical [6] - 922:19, 932:3, 936:11, 962:13, 1003:1	926:15, 1014:21, 1015:12, 1016:23, 1016:25, 1017:9, 1017:14, 1018:23, 1021:2, 1027:6 ideal [1] - 799:16 ideas [2] - 870:20, 1017:10 identical [1] - 841:20 identically [1] - 842:1 identification [2] - 955:17, 955:21 identifying [1] - 885:1 illuminate [1] - 1007:13 illumines [1] - 1007:12 image [57] - 764:7, 780:10, 787:10, 788:15, 788:16, 788:18, 789:12, 789:14, 795:13, 798:1, 798:2, 798:3, 798:9, 799:9, 799:23, 801:13, 804:24, 819:25, 822:16, 822:24, 824:19, 849:11, 859:13, 860:3, 863:4, 872:3, 875:19, 875:21, 876:15, 878:13, 878:22, 879:17, 881:7, 884:8, 884:11, 887:10, 894:23, 904:25, 905:10, 909:17, 909:22, 910:3, 912:24, 913:13, 918:4, 918:13, 927:5, 927:7, 927:25, 928:3, 947:24, 948:4, 960:13, 974:9, 974:15, 1005:24 imaged [3] - 815:16, 911:17, 927:2 images [55] - 768:10, 787:8, 791:14, 795:9, 795:11, 797:12, 797:14, 799:16, 799:24, 800:5, 800:6, 800:15, 806:14, 806:17, 806:18, 807:7, 807:8, 815:3, 818:6, 819:24, 822:11, 822:24, 838:10, 840:8, 846:9, 847:8,	847:10, 847:17, 865:18, 872:3, 880:16, 881:11, 907:17, 909:13, 909:25, 912:17, 912:18, 913:4, 921:1, 926:7, 926:17, 927:1, 927:8, 927:17, 927:23, 928:12, 946:14, 956:15, 974:4, 989:23, 990:6, 990:14, 1007:4 imagine [2] - 798:7, 912:8 IMAGING [1] - 753:3 Imaging [3] - 829:20, 944:17, 945:21 imaging [106] - 766:11, 766:19, 778:15, 778:16, 778:19, 779:21, 779:24, 780:4, 780:9, 780:17, 780:19, 781:8, 782:16, 783:6, 785:8, 785:13, 796:21, 797:8, 799:12, 799:15, 800:3, 800:12, 831:9, 831:14, 832:7, 840:25, 841:8, 844:25, 845:1, 846:24, 848:11, 849:1, 849:3, 849:4, 849:16, 859:11, 859:21, 859:22, 859:25, 860:6, 860:13, 860:19, 873:13, 873:14, 873:21, 879:18, 880:22, 881:3, 881:9, 881:13, 882:24, 894:25, 897:14, 903:5, 903:16, 903:24, 904:21, 904:22, 904:23, 904:24, 905:2, 905:8, 905:16, 905:18, 906:7, 906:11, 906:20, 907:4, 908:25, 909:4, 909:7, 910:8, 910:13, 910:15, 911:12, 911:15, 916:22, 916:23, 916:24, 916:25, 917:2, 917:22,	921:13, 921:16, 942:18, 943:16, 944:4, 944:5, 978:13, 978:17, 978:18, 978:19, 980:14, 987:21, 989:22, 990:3, 990:5, 990:11, 1005:21, 1020:20 immediately [1] - 965:7 impact [2] - 886:24, 1003:13 impacting [1] - 874:12 impeachment [2] - 954:9, 955:9 implant [9] - 764:9, 766:1, 766:10, 766:14, 766:22, 767:1, 822:17, 822:20, 822:22 implants [4] - 764:5, 765:5, 765:7 implement [3] - 874:25, 892:7, 896:16 implemented [5] - 872:9, 896:10, 896:23, 898:13 implementing [2] - 829:3, 987:7 implements [1] - 898:16 important [7] - 782:22, 786:21, 804:7, 804:10, 848:1, 894:21, 920:15 imported [1] - 812:5 importing [2] - 1013:24, 1016:24 imposition [1] - 798:10 impression [1] - 760:19 impressive [1] - 902:23 impressively [1] - 905:20 improper [1] - 955:8 improve [2] - 780:8, 907:17 improved [2] - 779:20, 1007:21 improvement [6] - 792:9, 892:25, 893:1, 893:3, 893:14, 906:20 improvements [3] - 779:17, 872:21,
	I			
	i.e [1] - 1012:7 Idashkina [1] - 954:24 idea [17] - 799:22, 875:6, 896:11, 906:25, 909:13, 909:21, 919:24,			

<p>873:2 IN [1] - 753:1 in-house [1] - 772:23 inadequate [1] - 986:7 inadvertently [1] - 1022:24 INC [1] - 753:6 include [15] - 763:22, 813:15, 813:24, 814:2, 834:1, 837:22, 839:12, 895:4, 925:17, 967:16, 988:11, 993:20, 993:21, 1002:8, 1029:21 included [21] - 812:13, 821:6, 831:11, 897:2, 897:3, 897:4, 897:5, 897:6, 897:10, 897:13, 913:15, 916:16, 916:23, 916:25, 988:25, 1002:10, 1002:14, 1003:20, 1004:9, 1019:4, 1029:25 includes [15] - 784:4, 803:10, 832:17, 858:4, 859:3, 875:11, 888:16, 966:11, 986:11, 986:21, 989:20, 993:5, 993:8, 995:3, 1003:5 including [20] - 780:2, 781:25, 785:8, 785:12, 829:5, 838:11, 852:1, 854:15, 854:19, 854:25, 860:12, 892:13, 913:18, 914:7, 914:11, 958:9, 964:8, 965:3, 992:22, 1003:6 incorrect [2] - 768:1, 953:24 increase [1] - 768:15 increased [1] - 872:22 incredibly [1] - 831:10 incremental [1] - 893:6 independent [5] - 775:9, 789:4, 799:5, 843:11, 861:24 indicate [1] - 976:3 indicated [1] - 771:17 indicates [3] - 836:10, 837:5, 861:15 indicating [1] - 813:22 indications [1] -</p>	<p>882:14 individual [3] - 805:6, 820:12, 864:4 individually [1] - 962:18 indulge [1] - 1027:23 industry [2] - 778:8, 910:5 ineligibility [1] - 1025:6 ineligible [1] - 1013:2 infer [2] - 789:23, 922:22 inference [3] - 756:6, 756:24, 757:24 inflated [2] - 918:5, 918:6 inform [2] - 810:10, 841:17 information [38] - 777:6, 801:5, 804:5, 804:14, 804:23, 806:4, 806:17, 808:6, 818:24, 819:9, 820:1, 820:18, 821:20, 821:21, 822:8, 823:22, 826:8, 830:1, 852:2, 858:11, 861:25, 863:24, 864:16, 876:7, 883:23, 892:19, 913:15, 930:21, 932:23, 932:25, 933:9, 967:7, 969:22, 990:9, 990:10, 1003:4, 1004:16, 1015:22 infringe [12] - 786:12, 811:14, 811:15, 811:21, 812:16, 813:4, 813:10, 818:12, 818:19, 821:22, 826:15, 830:17 infringed [10] - 785:8, 812:12, 826:22, 826:23, 894:2, 894:3, 998:8, 998:13, 998:16, 1024:17 infringement [33] - 755:21, 756:19, 786:10, 802:4, 802:6, 802:8, 802:10, 802:12, 802:18, 803:23, 804:17, 805:13, 811:25, 812:3,</p>	<p>812:7, 814:20, 830:20, 862:14, 893:23, 893:24, 897:20, 898:21, 931:20, 958:5, 998:5, 999:1, 1010:9, 1011:18, 1011:19, 1012:6, 1025:1, 1028:10 infringer [2] - 772:14, 772:17 infringing [4] - 772:24, 898:25, 899:3, 899:6 ingredients [1] - 963:3 initial [3] - 809:6, 1009:7, 1009:10 innovation [1] - 789:5 innovations [1] - 787:19 innovative [1] - 954:16 input [30] - 784:8, 824:15, 833:19, 835:19, 836:12, 836:23, 845:24, 852:2, 852:11, 852:20, 852:21, 852:22, 852:23, 852:24, 853:1, 853:4, 853:6, 853:13, 854:18, 854:23, 876:1, 876:2, 876:4, 876:11, 876:17, 948:7, 976:8, 976:11, 992:22 inquiries [1] - 850:24 inquiry [3] - 757:18, 760:8, 760:20 insert [1] - 950:10 inserted [1] - 918:4 inset [1] - 847:11 inside [9] - 781:9, 783:6, 787:8, 800:4, 845:18, 857:10, 918:12, 934:3, 934:4 inspection [2] - 989:24, 990:7 installation [1] - 868:8 installed [1] - 761:11 instance [1] - 793:23 instead [6] - 817:7, 817:10, 855:17, 922:4, 924:8, 941:22 institute [3] - 785:3, 932:18, 933:3 instruct [2] - 1010:14, 1027:12 instructed [4] -</p>	<p>757:24, 758:8, 1018:22, 1022:5 instruction [41] - 758:4, 758:7, 899:15, 899:23, 948:13, 948:16, 994:21, 1010:4, 1010:8, 1010:9, 1010:16, 1011:9, 1011:17, 1012:15, 1014:2, 1014:19, 1014:20, 1014:22, 1015:17, 1015:20, 1016:2, 1017:25, 1018:1, 1018:8, 1018:10, 1018:13, 1018:18, 1018:24, 1019:4, 1020:1, 1020:3, 1021:9, 1021:11, 1022:7, 1022:19, 1022:21, 1022:22, 1023:4, 1025:3, 1025:5 instructional [1] - 810:24 instructions [20] - 758:16, 807:24, 808:3, 808:5, 808:14, 809:4, 809:6, 900:18, 901:9, 947:22, 1008:15, 1009:6, 1009:8, 1009:21, 1010:13, 1011:15, 1025:10, 1026:10, 1026:23, 1027:11 insufficient [1] - 1017:1 intended [2] - 783:5, 926:8 intense [1] - 878:14 intensifier [1] - 879:18 intensifies [1] - 878:22 intensity [7] - 798:21, 798:24, 799:3, 799:5, 800:25, 847:20, 921:11 intent [2] - 896:16, 953:14 inter [1] - 800:11 interactive [1] - 870:19 interest [7] - 780:17, 808:12, 860:4, 882:2, 887:15, 897:16, 970:20 interested [7] - 769:1, 778:23, 780:9, 920:4, 920:7, 920:9,</p>	<p>928:8 interesting [6] - 799:1, 800:6, 866:2, 874:9, 903:23, 910:2 interestingly [1] - 932:21 interests [1] - 778:24 interface [1] - 857:16 intermediate [1] - 799:3 international [1] - 785:2 interpose [1] - 1009:8 interpret [1] - 993:25 interpretation [14] - 803:22, 803:25, 805:18, 805:24, 805:25, 806:7, 806:8, 815:2, 819:21, 829:21, 952:18, 953:23, 995:14, 995:16 interpretations [1] - 953:9 interpreted [2] - 830:22, 830:25 interpreting [2] - 802:17, 956:18 interrogatories [2] - 757:10, 1020:8 interrupt [1] - 806:6 intervention [1] - 780:11 intraoral [1] - 892:1 introduce [4] - 774:13, 953:12, 954:13, 1017:20 introduced [8] - 758:9, 779:3, 829:17, 918:20, 919:24, 923:8, 925:3, 1021:1 introducing [1] - 1017:8 invalid [8] - 786:14, 830:14, 833:2, 886:10, 889:7, 985:23, 995:7, 998:13 invalidity [24] - 755:22, 832:12, 841:18, 851:18, 868:18, 885:19, 885:20, 892:11, 958:5, 958:7, 958:13, 959:12, 1012:3, 1012:15, 1013:2, 1013:16, 1016:21, 1017:5, 1017:25, 1018:10,</p>
---	---	--	---	--

<p>1027:22, 1027:25, 1028:10, 1028:13 invasion [1] - 780:11 invent [9] - 893:7, 894:19, 894:22, 895:10, 898:12, 898:18, 962:16, 962:17, 1002:25 invented [3] - 959:23, 962:15, 1003:3 invention [40] - 782:3, 839:15, 841:20, 842:1, 842:4, 842:17, 842:19, 843:8, 843:11, 843:14, 843:21, 843:24, 865:13, 880:13, 886:3, 887:2, 889:11, 889:12, 889:24, 895:2, 896:24, 912:23, 912:24, 962:24, 965:10, 998:2, 998:3, 999:9, 999:21, 999:25, 1000:6, 1004:5, 1015:12, 1020:25, 1021:14, 1021:22, 1021:23, 1024:12, 1024:16, 1024:23 inventive [14] - 843:18, 893:6, 893:11, 898:3, 898:8, 898:13, 999:5, 999:6, 999:8, 1003:9, 1003:13, 1003:14, 1015:8 inventor [7] - 780:24, 835:7, 869:11, 886:2, 886:20, 906:17, 965:10 inventor's [1] - 844:18 inverse [1] - 942:3 investment [2] - 765:24, 766:4 invitation [1] - 1010:20 invited [2] - 776:9, 1025:25 involved [9] - 778:12, 778:15, 780:15, 783:22, 828:19, 828:24, 871:9, 959:3, 983:25 Irakli [1] - 984:11 irrelevant [1] - 981:12 isolate [2] - 810:6, 898:7 issuance [1] - 869:4 issue [41] - 759:13,</p>	<p>760:1, 760:11, 766:8, 782:7, 809:11, 849:18, 885:15, 885:25, 923:6, 930:20, 943:6, 946:11, 950:10, 950:17, 950:24, 955:12, 984:20, 988:19, 995:20, 995:22, 1012:9, 1012:14, 1014:13, 1015:4, 1015:5, 1015:13, 1016:12, 1016:13, 1018:10, 1018:12, 1018:14, 1018:15, 1020:7, 1022:21, 1022:22, 1022:23, 1023:5, 1025:5, 1026:23, 1029:17 issued [9] - 776:10, 780:24, 803:14, 835:4, 835:6, 844:16, 844:20, 867:17, 867:18 issues [9] - 760:23, 798:5, 902:19, 909:12, 928:11, 997:11, 1009:22, 1019:21, 1020:17 IT [1] - 811:2 Item [1] - 1018:5 items [1] - 971:5 itself [4] - 789:18, 861:6, 869:5, 921:2</p>	<p>journal [7] - 782:13, 793:15, 793:17, 794:6, 871:2, 905:21 JTX [1] - 828:4 JTX-0002 [1] - 983:12 JTX-13 [1] - 828:3 judge [3] - 950:24, 951:16, 951:17 Judge [2] - 753:14, 931:16 judgment [1] - 1026:1 July [1] - 782:8 jump [2] - 975:15, 1011:14 jumped [1] - 782:25 June [2] - 791:18, 829:22 jurors [2] - 850:8, 853:3 Jury [1] - 753:10 jury [85] - 754:14, 756:25, 757:23, 758:4, 758:7, 758:8, 763:12, 772:13, 774:13, 776:3, 776:19, 777:1, 779:11, 781:20, 782:11, 790:18, 793:7, 794:18, 797:18, 800:21, 807:20, 807:24, 808:3, 809:15, 809:19, 810:6, 810:10, 810:18, 810:21, 811:6, 823:12, 826:13, 828:6, 832:13, 840:10, 845:5, 846:4, 847:22, 849:5, 850:3, 850:20, 850:21, 850:23, 861:14, 862:21, 871:12, 875:5, 885:23, 892:10, 899:12, 899:14, 899:15, 899:23, 900:18, 901:9, 901:17, 901:18, 906:14, 916:19, 951:25, 952:10, 954:14, 958:23, 986:1, 1005:10, 1005:12, 1008:15, 1009:6, 1009:7, 1009:21, 1015:2, 1015:24, 1017:8, 1017:18, 1018:22, 1018:25, 1019:20, 1019:23, 1020:19, 1021:3,</p>	<p>1022:4, 1023:10, 1024:14, 1027:12, 1029:9 just-he [1] - 938:23 JX [2] - 790:17, 870:14 JX-0008 [1] - 870:8 JX-1 [4] - 868:2, 969:25, 970:1, 982:21 JX-16 [2] - 829:14, 829:18 JX-3 [1] - 984:7 JX-5 [1] - 790:16 JX-8 [1] - 870:13</p>	<p>927:11, 954:6, 962:4, 962:23, 974:3 kinds [4] - 780:20, 833:15, 887:1, 921:1 King [1] - 753:11 Klemetti [6] - 794:8, 795:8, 806:15, 806:22, 953:10, 953:13 Knorr [3] - 757:23, 759:3, 772:12 KNORR [1] - 757:23 Knorr-Bemse [2] - 757:23, 759:3 knowing [1] - 815:12 knowledge [8] - 762:12, 762:19, 763:3, 763:6, 782:22, 829:5, 831:25, 873:24 known [72] - 789:19, 789:20, 789:22, 795:15, 795:25, 796:18, 814:21, 832:18, 833:11, 833:14, 833:16, 833:21, 833:24, 834:5, 836:16, 838:21, 839:5, 840:6, 840:7, 840:8, 840:16, 840:19, 841:1, 841:4, 841:6, 841:11, 847:16, 847:18, 848:25, 849:16, 858:24, 860:11, 861:17, 884:24, 893:5, 893:11, 896:9, 896:13, 898:16, 920:10, 920:14, 920:25, 942:20, 945:19, 961:9, 961:11, 961:16, 961:18, 963:19, 963:22, 963:23, 964:13, 964:16, 964:18, 964:23, 964:25, 965:2, 965:14, 965:15, 966:18, 967:4, 990:8, 1013:10, 1013:12, 1013:23, 1015:7, 1015:14, 1016:15, 1016:22 knows [3] - 931:23, 964:12 KVP [1] - 939:25</p>
			K	
			<p>keep [4] - 806:19, 938:19, 968:7, 1005:5 keV [5] - 816:17, 817:6, 937:9, 940:16, 941:11 key [1] - 1003:12 keyboard [5] - 784:8, 835:19, 853:5, 876:4, 876:12 Kia [36] - 801:10, 802:5, 814:20, 814:23, 818:6, 818:10, 818:14, 822:10, 825:4, 894:4, 894:14, 895:8, 895:24, 896:1, 897:19, 897:23, 915:15, 944:7, 944:18, 945:22, 947:14, 967:9, 997:3, 998:21, 1000:5, 1000:10, 1002:2, 1002:6, 1003:20, 1004:3, 1004:8, 1004:10, 1015:9, 1020:16, 1023:24, 1024:4 Kia's [13] - 786:10, 802:10, 802:12, 802:15, 805:11, 807:2, 819:16, 832:4, 832:10, 895:12, 996:19, 1001:15, 1002:11 Kiknakze [1] - 984:11 kind [17] - 758:4, 768:2, 779:2, 786:2, 833:13, 835:8, 836:7, 851:7, 871:16, 871:23, 875:4, 893:7,</p>	
	J			
	<p>J.DENT [1] - 793:14 JACKSON [1] - 754:5 jaw [13] - 795:4, 795:12, 795:14, 795:18, 823:14, 891:4, 891:20, 894:24, 895:19, 905:1, 907:17, 918:9 JEFFREY [1] - 753:22 job [7] - 778:3, 778:9, 779:3, 779:5, 801:8, 923:5, 1016:15 John [5] - 779:1, 787:18, 903:10, 952:15, 1000:20 joint [10] - 790:10, 790:13, 823:14, 827:22, 827:25, 829:13, 844:21, 865:15, 870:10 joints [1] - 823:17 JOSEPH [1] - 753:13</p>			

L				
<p>Lab [1] - 778:5 label [1] - 796:7 labeled [3] - 788:22, 827:22, 834:17 laboratory [1] - 779:4 lack [15] - 833:6, 886:24, 888:25, 889:7, 889:20, 890:4, 890:10, 891:1, 958:16, 958:17, 985:9, 985:23, 985:24, 990:18, 1012:18 lacked [1] - 886:9 lacks [3] - 889:2, 1012:21, 1017:24 ladies [17] - 754:15, 769:24, 807:17, 807:21, 810:19, 810:21, 849:24, 850:22, 850:23, 899:9, 899:14, 901:19, 951:23, 952:11, 1005:7, 1008:13, 1025:15 land [1] - 798:2 landed [1] - 899:15 landmarks [1] - 824:16 lands [2] - 797:11, 1006:23 language [17] - 803:2, 812:17, 821:8, 840:15, 859:2, 890:16, 960:18, 960:20, 992:20, 994:24, 995:2, 1012:7, 1016:3, 1017:23, 1018:13, 1019:19, 1020:10 languages [1] - 987:13 large [12] - 766:11, 768:23, 770:22, 783:6, 797:11, 838:9, 878:15, 894:14, 905:20, 997:16 larger [5] - 765:1, 766:15, 766:16, 770:19, 771:5 largest [4] - 766:16, 771:13, 771:18 laser [2] - 919:9, 970:7 lasers [1] - 940:10 last [20] - 755:3, 758:10, 763:18, 766:8, 769:22,</p>	<p>779:5, 780:19, 783:3, 793:21, 837:12, 863:18, 864:7, 892:17, 917:2, 917:4, 937:18, 955:17, 1028:3, 1028:9, 1028:11 late [3] - 851:2, 851:6, 1008:1 lateral [1] - 872:3 law [18] - 756:5, 757:2, 758:1, 758:2, 758:7, 758:10, 759:2, 759:9, 759:15, 760:20, 760:22, 761:2, 773:4, 1015:3, 1016:7, 1021:20, 1026:1, 1029:8 lawsuit [1] - 1027:1 lawyer [6] - 759:1, 772:22, 869:10, 959:1, 959:14, 1009:1 lawyer's [1] - 758:24 lawyers [6] - 810:22, 849:22, 850:24, 851:9, 924:1, 1027:21 lax [1] - 833:8 lay [1] - 788:5 layer [1] - 799:15 layers [3] - 800:3, 800:7, 800:19 laying [1] - 912:8 lead [1] - 866:21 leading [2] - 772:10, 843:20 leads [1] - 843:9 learn [1] - 782:21 least [23] - 760:25, 777:5, 801:1, 812:15, 819:14, 828:20, 828:25, 831:13, 831:19, 832:7, 832:8, 854:20, 900:17, 906:4, 908:22, 942:10, 946:4, 949:15, 974:23, 997:16, 1019:10, 1020:24, 1023:13 leather [6] - 962:7, 962:8, 962:14, 962:15, 962:16, 962:17 leave [4] - 773:20, 773:21, 901:13, 1008:16</p>	<p>leaving [6] - 807:20, 850:3, 899:12, 951:25, 1005:10, 1008:21 lectures [1] - 776:9 led [5] - 779:18, 779:24, 788:24, 789:11, 838:10 left [32] - 789:8, 795:6, 797:2, 797:4, 801:18, 812:19, 819:5, 822:16, 823:18, 825:5, 825:6, 833:14, 834:5, 835:17, 835:22, 840:12, 840:17, 845:9, 848:10, 849:9, 876:13, 881:5, 908:21, 913:13, 965:14, 971:2, 971:18, 971:21, 972:11, 1006:19, 1025:25, 1029:14 legal [3] - 785:23, 841:19, 959:15 legally [1] - 811:24 LEISA [1] - 754:6 length [18] - 922:4, 922:7, 922:10, 922:11, 922:12, 922:16, 922:21, 922:22, 922:25, 936:8, 936:10, 936:12, 936:16, 936:17, 936:18, 936:19, 936:21 lengthy [1] - 777:2 less [5] - 784:14, 866:6, 900:14, 932:20, 1028:20 letter [11] - 755:8, 755:12, 755:15, 755:17, 755:20, 756:5, 758:7, 758:9, 760:21, 816:14, 829:22 letters [4] - 757:19, 816:13, 827:6, 1021:1 letting [1] - 1028:18 level [20] - 771:10, 780:13, 782:11, 796:16, 796:22, 805:4, 813:11, 822:5, 832:13, 835:3, 836:3, 842:16, 844:13, 844:22, 846:3, 894:12, 900:21,</p>	<p>939:21, 974:19, 990:25 levels [3] - 791:15, 847:20, 935:19 lexicon [1] - 1017:8 license [1] - 762:25 licensed [1] - 762:16 licenses [1] - 761:19 lifetime [1] - 784:16 light [16] - 832:15, 892:13, 922:5, 922:15, 940:7, 940:9, 940:12, 940:19, 940:20, 940:23, 940:24, 940:25, 941:17, 941:21, 958:8 lights [1] - 941:16 likely [5] - 849:14, 859:9, 880:17, 1012:8, 1029:2 limine [4] - 1020:6, 1020:15, 1021:12, 1021:18 limit [3] - 797:24, 951:5, 1029:13 limitation [20] - 805:22, 806:9, 806:10, 806:11, 806:20, 807:10, 813:2, 813:16, 814:21, 815:4, 825:22, 825:23, 826:5, 833:7, 856:14, 863:13, 863:18, 886:5, 889:13, 889:16 limitations [13] - 806:16, 822:13, 833:4, 856:13, 856:22, 864:8, 864:20, 866:10, 886:7, 888:2, 889:6, 890:3, 890:22 limited [9] - 918:7, 927:13, 930:13, 945:2, 945:6, 945:7, 946:7, 946:8, 1028:12 line [21] - 761:17, 762:6, 779:17, 798:11, 824:8, 837:18, 860:15, 861:15, 877:23, 879:9, 891:4, 896:5, 929:3, 929:13, 929:17, 963:14, 997:7, 999:3, 1009:22, 1018:14, 1019:24</p>	<p>linear [28] - 798:20, 801:14, 801:15, 801:18, 802:20, 815:5, 815:24, 816:1, 816:4, 816:18, 816:19, 817:3, 855:12, 856:5, 909:10, 920:17, 920:18, 921:2, 921:5, 921:9, 922:25, 932:9, 935:7, 935:13, 935:20, 936:19, 1006:4, 1007:14 lined [1] - 947:9 lines [35] - 764:19, 765:19, 770:25, 837:19, 837:22, 839:8, 839:9, 849:10, 855:11, 855:18, 855:23, 855:25, 856:2, 863:2, 865:4, 877:1, 878:6, 878:17, 879:7, 879:12, 880:10, 881:6, 882:13, 884:6, 884:15, 886:23, 901:1, 926:2, 926:3, 926:5, 926:9, 989:18, 989:21, 990:14 list [29] - 776:5, 776:11, 778:6, 778:11, 779:8, 784:12, 784:22, 837:8, 895:3, 898:5, 914:24, 915:5, 958:9, 959:25, 961:6, 961:23, 962:7, 962:8, 962:23, 962:25, 963:2, 970:4, 970:9, 970:13, 982:11, 982:12, 996:21, 1002:7 listed [10] - 837:12, 838:3, 839:17, 848:13, 871:6, 896:20, 906:9, 914:13, 960:3, 1002:23 listen [3] - 805:10, 944:11, 969:14 listened [2] - 803:6, 922:18 listening [1] - 968:17 lists [1] - 970:23 literal [1] - 1012:6 litigation [3] - 778:18,</p>

<p>832:25, 1017:19 live [3] - 774:14, 774:17, 998:15 LLC [1] - 753:3 LLP [3] - 753:20, 754:3, 754:5 loaded [1] - 881:9 local [1] - 768:9 locate [2] - 884:20, 884:23 location [2] - 861:15, 948:9 logistical [1] - 849:18 logistics [1] - 808:24 lonely [1] - 755:5 long-felt [1] - 843:6 look [51] - 755:12, 761:25, 764:17, 768:25, 769:15, 769:16, 769:18, 776:1, 777:12, 781:21, 800:17, 800:22, 814:22, 817:25, 823:16, 841:3, 856:21, 863:9, 867:24, 893:16, 894:11, 895:22, 896:5, 899:17, 909:10, 911:8, 914:7, 914:14, 918:16, 928:17, 937:19, 949:15, 955:3, 956:4, 956:6, 960:23, 986:6, 986:7, 987:20, 994:2, 999:4, 1000:20, 1001:16, 1007:10, 1016:7, 1016:10, 1019:15, 1021:7, 1021:22, 1029:21 looked [16] - 771:16, 836:3, 866:3, 893:18, 897:2, 898:14, 915:6, 915:10, 917:12, 933:19, 937:18, 956:12, 959:21, 970:21, 1021:13 looking [20] - 765:1, 765:2, 765:3, 765:4, 765:6, 767:17, 780:12, 783:12, 855:14, 869:17, 907:5, 919:7, 949:16, 949:17, 949:19, 966:1, 984:16, 1006:1, 1019:17</p>	<p>looks [6] - 822:16, 835:22, 911:21, 926:11, 1005:18, 1006:10 lose [2] - 932:6, 936:25 loud [3] - 764:22, 764:24, 765:19 lower [5] - 795:11, 876:12, 940:16, 940:17, 941:3 luck [1] - 773:8 lucky [2] - 769:4, 952:8 lumber [2] - 791:15, 791:16 Lunar [7] - 781:23, 781:25, 782:1, 788:1, 788:5, 788:8, 792:11 lunch [6] - 808:25, 849:22, 849:23, 849:24, 849:25, 850:24 luncheon [2] - 850:6, 850:8</p>	<p>1021:19 machines [28] - 766:11, 766:16, 768:8, 768:9, 768:12, 769:2, 770:19, 770:22, 780:20, 786:3, 816:7, 826:25, 866:5, 866:6, 874:2, 903:14, 903:24, 909:1, 910:5, 910:13, 910:15, 916:3, 917:8, 939:21, 1007:25 Madison [1] - 777:16 magnetic [2] - 780:3, 785:2 magnets [1] - 891:25 mail [3] - 828:11, 900:4, 900:25 main [1] - 826:13 major [2] - 768:8, 915:4 makeup [3] - 761:11, 768:15, 928:12 man [1] - 759:1 managed [1] - 778:5 mandible [2] - 794:5, 795:1 mandibles [1] - 918:13 Mandibular [1] - 954:20 mandibular [1] - 792:20 manual [15] - 826:6, 832:23, 844:6, 847:13, 849:17, 859:11, 866:18, 880:19, 880:23, 885:16, 946:18, 947:3, 947:10, 947:11 manually [4] - 824:14, 947:4, 947:8, 947:15 manuals [3] - 771:12, 915:24, 946:15 manufactured [1] - 1021:25 map [2] - 812:18, 960:19 mapping [1] - 838:11 march [2] - 1011:14, 1011:16 March [3] - 835:6, 867:18, 869:6 margin [12] - 767:13, 767:22, 767:25, 768:3, 769:14, 769:20, 769:25,</p>	<p>771:6, 771:8, 771:9, 771:11, 771:17 margins [3] - 769:9, 770:14, 770:18 mark [2] - 955:16, 955:18 marked [6] - 755:8, 776:15, 809:18, 809:20, 829:13, 947:23 markers [1] - 864:13 market [2] - 768:23, 771:4 marketed [1] - 1024:21 Markman [1] - 931:14 Marraskuuta [1] - 828:12 mass [25] - 784:8, 816:3, 816:5, 816:6, 816:9, 816:12, 816:15, 816:21, 816:23, 817:5, 817:25, 882:5, 921:8, 933:5, 935:9, 935:14, 936:2, 937:2, 937:3, 937:9, 937:22, 938:12, 939:19, 941:8 Massie [41] - 792:5, 792:8, 792:13, 827:10, 839:24, 868:3, 891:6, 894:19, 894:22, 895:10, 898:12, 898:18, 907:23, 911:4, 914:7, 945:2, 958:14, 959:23, 962:15, 963:17, 963:22, 964:11, 965:18, 966:16, 966:17, 970:20, 970:22, 972:2, 973:22, 974:25, 994:6, 997:18, 1002:25, 1003:2, 1004:20, 1013:10, 1015:13, 1020:19, 1024:6, 1024:7 Massie's [33] - 913:3, 913:11, 913:15, 923:21, 924:18, 925:7, 925:17, 953:1, 953:13, 959:9, 964:9, 970:2, 971:3, 982:19, 982:22, 983:7, 983:13, 984:2, 984:8, 984:15, 991:16, 998:2,</p>	<p>998:3, 998:18, 998:23, 999:1, 999:5, 999:9, 999:21, 999:25, 1000:5, 1004:4, 1024:14 Masters [1] - 777:17 masters [1] - 916:20 match [2] - 812:11, 972:12 matched [3] - 971:5, 971:6, 971:7 matches [1] - 971:16 material [14] - 798:18, 801:17, 815:16, 816:11, 816:25, 888:5, 908:2, 908:9, 921:12, 925:21, 932:25, 935:1, 991:23 materially [1] - 1018:15 materials [9] - 785:21, 785:25, 786:1, 862:2, 914:24, 915:5, 933:7, 938:17, 939:19 mathematics [2] - 777:16, 778:24 matter [21] - 805:24, 841:22, 842:2, 842:3, 842:6, 851:5, 890:17, 1012:19, 1012:22, 1013:2, 1013:12, 1013:25, 1016:5, 1016:17, 1016:21, 1016:25, 1017:24, 1018:2, 1025:6, 1026:1, 1029:23 matters [2] - 805:25, 851:1 Matthews [1] - 772:7 Mazess [42] - 779:4, 787:25, 832:24, 867:11, 868:17, 869:16, 869:19, 869:20, 871:15, 871:18, 873:22, 874:10, 875:15, 875:17, 875:19, 876:11, 876:14, 878:9, 878:10, 879:10, 879:22, 880:7, 880:8, 880:15, 881:3, 881:8, 882:7, 882:8, 882:14, 882:18, 883:2, 883:22, 884:14, 884:17,</p>
M				
<p>machine [64] - 765:4, 765:6, 766:19, 771:5, 771:13, 779:21, 779:22, 780:8, 787:22, 788:6, 788:24, 792:11, 795:18, 796:20, 796:21, 796:23, 796:24, 797:6, 797:9, 797:13, 804:16, 806:9, 806:11, 806:13, 835:8, 840:23, 868:11, 871:16, 892:25, 893:2, 912:18, 912:19, 916:6, 916:7, 916:12, 916:13, 917:1, 917:2, 917:22, 918:3, 918:4, 918:7, 918:10, 919:23, 930:21, 936:1, 939:24, 940:4, 940:14, 943:4, 943:20, 944:1, 944:3, 966:8, 990:22, 999:7, 1002:21, 1002:23, 1007:11, 1007:18, 1007:21, 1021:15,</p>				

885:11, 960:2,
966:6, 978:17,
978:19, 980:16
Mazess's [1] - 883:25
MD's [1] - 904:11
mean [33] - 758:3,
759:24, 794:23,
802:8, 804:5, 806:6,
809:3, 812:16,
813:14, 815:1,
815:17, 816:14,
819:8, 820:14,
830:25, 877:7,
830:19, 905:8,
909:8, 917:25,
924:3, 928:16,
941:13, 948:17,
958:24, 959:17,
970:9, 970:10,
986:20, 1000:3,
1017:4, 1018:21,
1030:6
meaning [10] - 803:7,
812:9, 829:25,
830:2, 830:15,
830:20, 832:15,
843:18, 930:23,
943:17
meanings [1] - 856:25
means [41] - 768:17,
776:3, 787:17,
791:21, 799:15,
800:2, 837:19,
838:16, 839:22,
850:17, 856:22,
856:23, 857:5,
857:8, 857:9,
857:11, 857:12,
857:18, 857:21,
860:6, 864:9, 868:6,
877:6, 877:22,
879:5, 879:9,
879:16, 887:7,
913:21, 914:2,
914:6, 924:7, 926:4,
947:11, 959:8,
959:19, 959:20,
991:21, 991:22,
1017:11, 1018:5
meant [4] - 905:25,
916:4, 927:9, 939:18
measure [13] - 787:21,
788:7, 789:17,
800:24, 816:6,
882:5, 895:21,
936:10, 936:12,
936:18, 936:19,
944:15
measured [7] -
791:10, 795:19,

881:20, 922:21,
935:18, 956:21
measurement [10] -
790:6, 790:7,
792:20, 815:12,
909:16, 918:25,
920:20, 941:9,
957:14
measurements [12] -
780:1, 801:5,
803:17, 806:23,
874:23, 910:11,
910:12, 929:5,
929:11, 932:25,
933:10, 965:17
measures [4] -
920:16, 936:17,
943:23, 998:2
measuring [8] -
787:17, 837:25,
913:17, 919:23,
921:20, 934:18,
945:25, 964:7
mechanics [1] -
941:25
medical [20] - 777:19,
779:2, 779:13,
785:3, 837:24,
849:1, 849:3,
849:16, 903:12,
903:13, 903:16,
904:7, 904:9,
905:10, 913:16,
940:14, 964:6,
964:12, 1015:8,
1015:14
Medical [1] - 778:3
medicine [7] - 778:25,
784:17, 784:20,
785:1, 785:2, 789:2,
954:16
meet [24] - 803:4,
803:12, 803:20,
804:17, 805:22,
806:9, 806:10,
806:15, 806:20,
812:25, 815:3,
822:3, 826:5, 843:7,
852:14, 853:12,
876:17, 879:22,
883:2, 975:23,
1013:13, 1013:25,
1016:16, 1023:10
meeting [3] - 768:22,
814:23, 990:18
meetings [1] - 961:7
meets [7] - 807:9,
819:16, 819:19,
825:22, 825:23,
883:14, 994:13

MEISTER [1] - 753:20
member [1] - 778:14
members [1] - 784:25
memories [1] - 838:9
memory [12] - 834:2,
851:25, 852:1,
852:4, 852:10,
853:11, 884:9,
884:12, 924:21,
966:5, 975:18,
989:20
mention [1] - 848:24
mentioned [20] -
776:25, 777:20,
778:21, 779:13,
783:19, 787:17,
814:12, 851:19,
856:12, 859:8,
867:8, 870:16,
872:10, 883:21,
885:14, 890:10,
907:14, 920:16,
989:6, 1014:23
Mercy [1] - 768:7
mere [1] - 802:19
merge [7] - 805:8,
811:17, 820:1,
826:17, 931:2,
931:21, 972:2
merged [4] - 787:24,
805:9, 931:3, 932:1
merger [3] - 971:18,
971:19, 972:1
merges [2] - 820:18,
930:21
merging [17] - 804:5,
804:14, 804:21,
804:23, 806:4,
806:17, 813:7,
818:24, 819:9,
820:23, 863:24,
864:5, 883:23,
930:7, 931:8,
931:10, 972:6
meritorious [1] -
784:24
met [26] - 812:23,
820:23, 822:12,
826:25, 827:3,
834:9, 855:6,
857:21, 860:20,
862:11, 863:16,
875:2, 875:24,
875:25, 876:19,
877:12, 877:13,
879:2, 881:14,
881:15, 881:17,
883:20, 888:13,
902:4, 953:22
meter [1] - 933:2

method [19] - 800:10,
814:11, 838:25,
839:2, 845:2,
847:24, 861:22,
861:23, 862:5,
864:1, 872:8,
881:19, 883:8,
883:17, 883:21,
896:16, 932:8,
944:20, 987:8
methods [9] - 779:16,
780:18, 780:21,
800:14, 800:19,
814:21, 945:7,
955:5, 956:4
MICHAEL [1] - 754:3
microprocessor [23] -
804:11, 819:13,
836:10, 851:24,
851:25, 852:4,
852:5, 852:12,
852:22, 852:24,
853:18, 853:19,
853:20, 853:21,
857:1, 857:4, 858:3,
858:13, 877:3,
877:5, 877:8,
975:18, 975:24
Microsoft [1] -
1019:18
mid [3] - 765:3,
796:19, 808:25
middle [4] - 789:13,
797:8, 912:2, 934:1
might [20] - 768:8,
780:8, 783:4, 787:8,
799:19, 835:23,
843:1, 848:3, 863:9,
889:15, 900:14,
902:19, 907:6,
918:8, 921:24,
939:19, 1017:13,
1022:10, 1024:9,
1026:5
milligrams [10] -
791:23, 792:1,
792:4, 794:25,
795:18, 861:10,
872:11, 872:17,
881:25, 882:4
milliliter [6] - 791:23,
792:2, 792:4,
794:25, 795:19,
861:10
millimeter [4] -
1007:1, 1007:19,
1007:22, 1007:24
millimeters [1] -
1008:1
million [1] - 1020:23

mind [3] - 806:19,
915:9, 1026:5
mineral [47] - 779:4,
787:21, 788:7,
789:24, 790:7,
791:11, 791:22,
792:1, 792:4,
792:20, 794:4,
794:22, 794:24,
795:1, 795:15,
795:18, 837:25,
861:9, 861:10,
861:17, 864:1,
864:3, 865:20,
865:21, 865:24,
866:1, 867:2, 872:7,
872:11, 881:21,
881:24, 882:4,
887:15, 908:11,
919:1, 919:4, 919:5,
920:7, 920:12,
920:22, 937:21,
937:23, 938:12,
938:13, 938:14,
965:16
mineralization [1] -
938:18
minerals [1] - 938:15
mini [1] - 852:10
minimize [1] - 916:19
ministry [1] - 954:25
Ministry [1] - 955:1
minor [1] - 808:7
minute [5] - 845:8,
849:25, 923:7,
991:8, 1019:16
minutes [10] - 771:22,
807:18, 900:11,
1008:23, 1028:24,
1029:1, 1029:4,
1029:13, 1029:14,
1029:15
misinterpretation [2] -
957:14
misinterpreting [2] -
804:18, 953:16
misread [1] - 950:16
misreading [1] -
952:19
missed [2] - 1000:15,
1027:9
missing [4] - 853:24,
915:2, 942:17,
1003:12
Missions [1] - 768:7
mistake [1] - 1026:21
misunderstand [1] -
1026:8
misunderstanding [1] -
957:15

<p>misunderstands [2] - 807:3, 807:4</p> <p>misunderstood [2] - 1022:20, 1026:7</p> <p>model [81] - 791:13, 803:23, 804:1, 804:3, 813:3, 813:25, 818:20, 818:22, 819:6, 819:16, 819:19, 820:22, 821:15, 821:20, 823:1, 823:10, 824:10, 824:11, 827:2, 829:24, 829:25, 830:1, 830:4, 858:5, 858:11, 859:4, 862:15, 862:16, 862:17, 862:25, 863:15, 864:5, 864:8, 864:11, 864:13, 864:15, 866:9, 872:2, 883:5, 883:6, 883:14, 885:5, 887:9, 887:10, 887:13, 887:14, 887:16, 887:17, 895:9, 895:16, 895:17, 895:18, 895:20, 931:3, 932:2, 943:18, 951:3, 951:11, 951:12, 972:1, 973:20, 973:21, 974:7, 974:10, 974:12, 974:13, 974:14, 974:16, 979:5, 979:10, 987:5, 996:23, 997:1, 997:4</p> <p>modeling [12] - 819:4, 819:6, 829:24, 833:9, 846:25, 862:22, 863:11, 863:24, 873:17, 883:7, 883:19, 1003:3</p> <p>models [56] - 761:11, 766:22, 805:19, 805:20, 805:21, 811:18, 811:19, 813:6, 814:1, 821:11, 822:8, 823:1, 823:2, 823:9, 823:22, 824:12, 824:24, 825:12, 826:1, 826:8, 826:18, 826:19, 828:15, 828:17, 828:23, 838:6,</p>	<p>838:11, 838:12, 838:14, 838:17, 840:7, 866:7, 880:22, 884:5, 887:3, 887:4, 887:19, 887:22, 888:18, 890:6, 946:12, 947:8, 951:4, 979:1, 979:6, 979:12, 979:13, 979:14, 979:15, 979:18, 986:13, 986:24, 987:22, 991:4, 997:9</p> <p>modern [1] - 800:14</p> <p>modes [1] - 894:25</p> <p>modified [1] - 874:23</p> <p>modify [2] - 874:11, 981:24</p> <p>module [11] - 822:20, 823:11, 823:12, 823:13, 823:15, 823:25, 824:2, 825:7, 825:22, 826:4, 898:14</p> <p>modules [1] - 822:17</p> <p>MOM [1] - 768:6</p> <p>moment [3] - 763:25, 808:7, 928:18</p> <p>Monday [2] - 850:18, 851:7</p> <p>money [3] - 779:6, 893:17, 1024:19</p> <p>monitor [10] - 811:4, 858:1, 858:4, 880:11, 880:12, 880:15, 880:18, 989:24, 990:8</p> <p>monitoring [1] - 859:3</p> <p>monoenergetic [1] - 940:3</p> <p>morbid [1] - 921:15</p> <p>morning [13] - 754:25, 755:1, 807:18, 807:23, 831:23, 860:25, 1005:7, 1029:22, 1030:2, 1030:4, 1030:7, 1030:8, 1030:14</p> <p>morphology [2] - 913:17, 964:7</p> <p>MORRIS [1] - 754:3</p> <p>most [4] - 767:4, 930:12, 987:14, 1029:2</p> <p>motion [15] - 756:10, 894:24, 1010:11, 1010:20, 1011:6, 1020:6, 1020:15, 1021:12, 1021:18,</p>	<p>1025:25, 1026:11, 1026:14, 1026:16, 1026:17, 1026:18</p> <p>motions [1] - 950:7</p> <p>motivated [2] - 775:4, 882:23</p> <p>motivation [8] - 847:23, 848:3, 849:6, 873:7, 873:25, 874:5, 874:9, 874:10</p> <p>motor [17] - 784:1, 784:5, 784:6, 845:13, 845:15, 853:16, 853:17, 853:20, 853:22, 854:4, 854:5, 854:9, 854:11, 876:21, 877:2, 877:11, 976:21</p> <p>motors [15] - 834:2, 836:10, 836:18, 845:15, 846:7, 848:6, 854:3, 876:8, 876:9, 876:23, 876:24, 877:6, 976:18, 976:25, 977:4</p> <p>mouse [1] - 947:25</p> <p>mouth [2] - 904:25, 905:10</p> <p>move [33] - 774:24, 778:8, 793:1, 794:12, 796:10, 798:4, 819:15, 821:3, 822:15, 827:24, 831:1, 834:22, 836:5, 845:4, 845:13, 845:16, 870:9, 876:10, 888:10, 890:11, 892:17, 904:1, 926:22, 946:10, 947:8, 947:11, 951:21, 969:11, 977:23, 991:11, 995:21, 1005:25, 1026:1</p> <p>moveable [1] - 853:18</p> <p>moved [6] - 774:22, 784:5, 876:8, 926:16, 977:19, 1018:13</p> <p>moves [2] - 839:23, 926:24</p> <p>moving [26] - 800:13, 815:19, 817:22, 819:2, 821:3, 822:2, 823:10, 826:20, 838:5, 846:1, 854:1,</p>	<p>854:13, 856:17, 857:7, 857:24, 858:16, 862:10, 864:7, 879:5, 880:6, 884:13, 890:24, 899:25, 926:18, 1013:12, 1016:16</p> <p>Mozzo [12] - 796:6, 796:16, 796:20, 797:5, 797:14, 806:12, 840:23, 899:5, 925:1, 925:2, 925:3, 925:18</p> <p>MR [177] - 754:24, 755:23, 756:3, 756:10, 756:14, 756:16, 756:17, 756:19, 756:22, 757:4, 757:14, 757:17, 757:22, 758:2, 758:6, 758:12, 758:17, 758:20, 759:4, 759:6, 759:10, 759:11, 759:16, 759:21, 760:3, 760:12, 760:13, 761:6, 761:7, 763:7, 763:11, 763:16, 770:4, 770:8, 771:20, 772:1, 772:5, 772:7, 772:10, 772:12, 772:25, 773:5, 773:9, 773:11, 773:13, 776:21, 781:14, 785:10, 785:14, 785:16, 790:15, 793:4, 794:15, 796:12, 808:1, 808:11, 808:15, 808:22, 808:23, 809:7, 809:10, 809:14, 809:20, 809:24, 810:1, 810:5, 810:10, 810:13, 828:2, 834:24, 850:13, 868:23, 870:12, 899:18, 899:24, 900:5, 900:10, 900:15, 900:16, 900:24, 901:11, 901:24, 901:25, 950:5, 951:20, 952:5, 952:9, 952:13, 952:14, 954:8, 954:11, 955:15, 955:22, 955:24, 957:4, 957:5,</p>	<p>969:15, 969:16, 991:14, 996:15, 1004:22, 1008:16, 1008:20, 1009:12, 1009:16, 1010:2, 1010:19, 1011:4, 1011:11, 1011:13, 1011:20, 1012:1, 1012:9, 1012:13, 1012:24, 1013:7, 1013:17, 1013:22, 1014:4, 1014:6, 1014:7, 1014:11, 1014:13, 1014:18, 1015:1, 1015:6, 1015:12, 1015:18, 1015:23, 1016:6, 1016:13, 1017:22, 1018:4, 1018:7, 1018:12, 1019:7, 1019:14, 1020:3, 1020:6, 1020:12, 1020:14, 1021:10, 1022:10, 1022:15, 1022:23, 1023:3, 1023:12, 1023:15, 1023:18, 1023:25, 1024:3, 1024:7, 1024:25, 1025:7, 1025:12, 1025:13, 1025:24, 1026:7, 1026:14, 1026:16, 1026:22, 1027:4, 1027:9, 1027:14, 1027:23, 1028:2, 1028:7, 1028:12, 1028:23, 1029:2, 1029:5, 1029:16, 1029:17, 1029:23, 1030:3, 1030:11, 1030:16</p> <p>Mr.▲ [1] - 758:13</p> <p>MRI [2] - 780:4, 780:16</p> <p>MS [45] - 773:23, 774:10, 774:12, 775:14, 775:17, 776:17, 776:24, 781:11, 781:19, 785:6, 785:11, 785:19, 785:20, 790:12, 790:18, 790:21, 793:1, 793:7, 793:10, 794:12, 794:18, 794:21, 796:9, 796:15, 807:15, 811:11, 811:12, 827:24, 828:5, 828:8, 834:21, 835:2, 849:18, 850:14, 851:13,</p>
---	--	---	--	---

<p>851:14, 868:20, 869:1, 870:9, 870:15, 899:7, 955:8, 985:12, 994:17, 1008:7</p> <p>Mu [1] - 816:13</p> <p>Muller [3] - 786:8, 896:9, 915:23</p> <p>multifunction [2] - 1021:19</p> <p>multiple [30] - 800:15, 804:5, 804:14, 804:15, 804:23, 804:24, 806:4, 806:17, 811:17, 813:7, 818:24, 819:9, 820:1, 820:18, 826:17, 845:16, 862:24, 864:5, 883:23, 883:24, 920:5, 926:8, 930:7, 930:21, 931:6, 931:8, 931:10, 931:20, 933:9</p> <p>must [10] - 828:12, 879:17, 893:1, 893:22, 898:4, 898:13, 947:19, 962:6, 993:21, 1022:20</p>	<p>neck [1] - 856:9</p> <p>need [44] - 755:12, 757:15, 766:2, 782:21, 808:10, 808:19, 808:20, 815:13, 815:15, 818:8, 842:16, 843:6, 843:7, 875:2, 884:9, 892:20, 909:11, 915:17, 915:18, 920:20, 920:22, 927:7, 927:24, 928:7, 928:9, 941:7, 944:14, 947:13, 951:13, 955:16, 968:18, 980:25, 988:21, 988:25, 1005:3, 1011:7, 1019:21, 1020:20, 1024:20, 1025:21, 1026:15, 1026:16, 1026:18, 1026:19</p> <p>needed [9] - 863:23, 881:11, 887:21, 908:25, 928:12, 931:9, 943:19, 944:4, 948:14</p> <p>needlessly [1] - 1018:23</p> <p>needs [7] - 848:2, 950:11, 951:1, 951:15, 1018:22, 1022:4, 1022:12</p> <p>neglected [1] - 1001:12</p> <p>negotiation [2] - 769:3, 769:11</p> <p>nerve [2] - 934:2, 934:4</p> <p>nerves [2] - 908:20</p> <p>never [14] - 758:23, 760:24, 771:12, 907:21, 910:15, 915:15, 918:15, 921:5, 942:8, 942:9, 951:16, 956:2, 989:8, 1017:14</p> <p>nevertheless [1] - 964:20</p> <p>new [17] - 768:22, 779:16, 779:19, 780:20, 792:13, 792:15, 797:6, 837:8, 843:19, 874:12, 892:25, 893:7, 893:12, 924:8, 991:24, 1017:8</p> <p>newer [3] - 872:2,</p>	<p>1006:1, 1006:2</p> <p>NewTom [12] - 806:13, 840:24, 899:5, 953:1, 965:23, 966:8, 967:1, 967:16, 967:17, 968:6, 968:7, 968:8</p> <p>next [35] - 765:25, 767:12, 769:2, 773:22, 773:23, 791:5, 801:4, 806:14, 856:21, 876:1, 881:16, 883:5, 900:8, 903:10, 904:16, 906:13, 914:23, 915:3, 955:16, 976:7, 977:7, 977:18, 980:8, 1001:3, 1001:7, 1001:10, 1001:11, 1011:16, 1011:23, 1012:14, 1018:9, 1020:1, 1023:5, 1025:5</p> <p>nexus [4] - 843:13, 843:20, 843:23, 1003:13</p> <p>nice [1] - 774:19</p> <p>NICHOLS [1] - 754:3</p> <p>night [3] - 755:4, 755:5, 763:18</p> <p>nine [1] - 913:8</p> <p>ninety [1] - 780:24</p> <p>ninety-five [1] - 780:24</p> <p>NIST [3] - 932:13, 932:17, 933:12</p> <p>Nobel [3] - 787:3, 787:4, 789:1</p> <p>nobody [3] - 786:23, 1015:25, 1028:21</p> <p>noise [2] - 897:14, 1002:14</p> <p>nomenclature [1] - 875:4</p> <p>non [9] - 755:21, 802:4, 802:6, 830:20, 862:14, 898:25, 899:3, 899:6, 1028:10</p> <p>non-3D [1] - 894:25</p> <p>non-infringement [6] - 755:21, 802:4, 802:6, 830:20, 862:14, 1028:10</p> <p>non-infringing [3] - 898:25, 899:3, 899:6</p> <p>nondestructive [1] - 903:17</p>	<p>noninvasive [1] - 780:11</p> <p>nonobvious [1] - 965:6</p> <p>nonobviousness [7] - 1022:16, 1023:6, 1023:11, 1023:21, 1023:22, 1024:5, 1025:3</p> <p>noon [1] - 873:17</p> <p>Norbert [3] - 773:24, 774:5, 774:14</p> <p>NORBERT [1] - 774:7</p> <p>normal [3] - 823:15, 840:8, 1007:11</p> <p>normalized [1] - 865:24</p> <p>normally [1] - 805:15</p> <p>North [1] - 784:18</p> <p>nose [1] - 824:20</p> <p>note [2] - 965:25, 1025:16</p> <p>notebook [1] - 827:16</p> <p>nothing [10] - 773:13, 816:3, 866:24, 867:2, 911:14, 915:8, 943:4, 953:21, 1014:20, 1014:22</p> <p>notice [3] - 861:4, 895:3, 991:9</p> <p>noticed [3] - 786:20, 853:23, 900:19</p> <p>notified [1] - 829:3</p> <p>novel [3] - 962:19, 962:20, 1013:9</p> <p>November [3] - 791:17, 828:12, 847:13</p> <p>Number [2] - 1015:18, 1018:5</p> <p>number [53] - 779:16, 780:1, 782:15, 782:23, 783:9, 787:2, 787:19, 811:6, 817:6, 817:7, 817:10, 822:10, 862:1, 869:22, 869:24, 877:18, 880:9, 887:16, 887:17, 894:14, 902:16, 905:20, 910:1, 928:11, 933:6, 940:1, 940:2, 947:22, 955:4, 955:17, 955:18, 969:23, 987:1, 1000:10, 1000:14, 1001:15, 1001:17, 1003:5, 1003:22,</p>	<p>1005:13, 1006:1, 1012:19, 1012:20, 1017:23, 1020:21, 1025:21</p> <p>numbers [13] - 783:3, 791:10, 791:19, 795:20, 809:25, 930:25, 963:14, 989:21, 1001:20, 1001:21, 1010:5, 1010:6</p> <p>numeral [4] - 855:8, 858:19, 875:11, 875:12</p> <p>Nuremberg [1] - 784:21</p>
O				
<p style="text-align: center;">N</p> <p>N-O-R-B-E-R-T [1] - 774:5</p> <p>name [17] - 774:4, 779:1, 793:17, 793:20, 793:21, 794:7, 796:6, 806:12, 835:7, 844:18, 902:3, 938:15, 950:10, 983:13, 983:17, 984:5</p> <p>named [3] - 789:1, 801:21, 954:23</p> <p>naming [1] - 784:25</p> <p>Natalya [1] - 954:24</p> <p>national [3] - 784:13, 932:18, 933:3</p> <p>nature [3] - 889:24, 1017:11, 1017:19</p> <p>necessarily [2] - 999:2, 1000:3</p> <p>necessary [8] - 881:10, 883:17, 912:23, 913:5, 913:6, 917:7, 920:13, 949:23</p>	<p>negotiated [1] - 1001:12</p> <p>negotiation [2] - 769:3, 769:11</p> <p>nerve [2] - 934:2, 934:4</p> <p>nerves [2] - 908:20</p> <p>never [14] - 758:23, 760:24, 771:12, 907:21, 910:15, 915:15, 918:15, 921:5, 942:8, 942:9, 951:16, 956:2, 989:8, 1017:14</p> <p>nevertheless [1] - 964:20</p> <p>new [17] - 768:22, 779:16, 779:19, 780:20, 792:13, 792:15, 797:6, 837:8, 843:19, 874:12, 892:25, 893:7, 893:12, 924:8, 991:24, 1017:8</p> <p>newer [3] - 872:2,</p>	<p>1006:1, 1006:2</p> <p>NewTom [12] - 806:13, 840:24, 899:5, 953:1, 965:23, 966:8, 967:1, 967:16, 967:17, 968:6, 968:7, 968:8</p> <p>next [35] - 765:25, 767:12, 769:2, 773:22, 773:23, 791:5, 801:4, 806:14, 856:21, 876:1, 881:16, 883:5, 900:8, 903:10, 904:16, 906:13, 914:23, 915:3, 955:16, 976:7, 977:7, 977:18, 980:8, 1001:3, 1001:7, 1001:10, 1001:11, 1011:16, 1011:23, 1012:14, 1018:9, 1020:1, 1023:5, 1025:5</p> <p>nexus [4] - 843:13, 843:20, 843:23, 1003:13</p> <p>nice [1] - 774:19</p> <p>NICHOLS [1] - 754:3</p> <p>night [3] - 755:4, 755:5, 763:18</p> <p>nine [1] - 913:8</p> <p>ninety [1] - 780:24</p> <p>ninety-five [1] - 780:24</p> <p>NIST [3] - 932:13, 932:17, 933:12</p> <p>Nobel [3] - 787:3, 787:4, 789:1</p> <p>nobody [3] - 786:23, 1015:25, 1028:21</p> <p>noise [2] - 897:14, 1002:14</p> <p>nomenclature [1] - 875:4</p> <p>non [9] - 755:21, 802:4, 802:6, 830:20, 862:14, 898:25, 899:3, 899:6, 1028:10</p> <p>non-3D [1] - 894:25</p> <p>non-infringement [6] - 755:21, 802:4, 802:6, 830:20, 862:14, 1028:10</p> <p>non-infringing [3] - 898:25, 899:3, 899:6</p> <p>nondestructive [1] - 903:17</p>	<p>o'clock [2] - 900:9, 1005:7</p> <p>oath [4] - 754:20, 930:15, 931:23, 931:24</p> <p>object [30] - 760:4, 783:6, 785:14, 785:15, 798:7, 799:16, 799:23, 800:12, 800:22, 800:25, 804:7, 804:9, 815:13, 815:18, 816:22, 819:10, 819:12, 820:16, 845:16, 891:18, 920:6, 920:9, 920:14, 928:7, 941:5, 941:6, 944:4, 973:14, 1010:18</p> <p>objecting [3] - 1016:2, 1021:8, 1021:10</p> <p>objection [34] - 755:23, 756:2, 758:18, 759:14, 761:3, 776:20, 776:21, 781:13, 781:14, 790:14, 793:3, 793:4, 794:14, 796:11, 796:12, 809:22, 828:1, 828:2, 834:23, 834:24, 868:22, 868:23, 870:11, 870:12, 955:8, 985:12, 994:16, 994:17, 994:22, 1009:16, 1015:21, 1015:23, 1016:3, 1017:21</p> <p>objectionable [1] -</p>	

<p>1022:9 objections [1] - 1009:7 objective [5] - 1022:15, 1023:6, 1023:10, 1023:21, 1025:2 objects [10] - 798:8, 798:10, 799:8, 799:17, 800:16, 907:14, 907:16, 918:12, 920:7, 1020:2 observe [1] - 824:3 observer [6] - 823:20, 824:9, 824:21, 824:23, 824:25, 825:11 observing [1] - 822:24 obtained [7] - 756:4, 760:21, 777:15, 841:25, 861:24, 865:9, 865:11 obvious [20] - 832:15, 832:21, 842:4, 843:5, 844:11, 867:5, 885:4, 885:11, 885:16, 892:12, 892:16, 925:8, 925:17, 958:8, 958:14, 958:20, 962:20, 965:21, 968:16 obviously [8] - 757:6, 766:18, 787:11, 791:9, 838:8, 1016:14, 1018:13, 1024:20 obviousness [30] - 841:19, 842:7, 842:11, 842:12, 842:15, 844:2, 844:10, 848:1, 858:22, 863:15, 924:4, 924:22, 925:12, 959:13, 960:3, 960:7, 960:21, 965:24, 966:19, 967:1, 967:11, 969:18, 975:6, 1013:15, 1013:16, 1016:19, 1017:4, 1020:2, 1022:20, 1023:4 occurs [3] - 758:25, 939:3, 939:4 October [3] - 755:9, 774:16, 788:17 odd [1] - 1025:17 OF [1] - 753:2</p>	<p>offer [8] - 762:24, 776:18, 781:12, 790:12, 868:20, 915:11, 1015:3, 1015:6 offered [4] - 756:4, 761:19, 763:4, 812:4 Office [33] - 846:18, 867:20, 869:12, 869:16, 914:3, 914:10, 963:18, 964:2, 964:12, 964:14, 964:20, 964:24, 965:1, 965:5, 965:9, 965:12, 965:14, 965:20, 967:3, 968:12, 968:14, 968:15, 970:16, 981:14, 981:21, 982:1, 982:2, 982:18, 983:5, 1012:4, 1018:11, 1018:24, 1019:12 office [4] - 765:23, 916:10, 964:16, 969:5 offices [1] - 769:1 often [2] - 793:21, 918:11 old [1] - 773:16 older [1] - 987:14 omit [3] - 1003:20, 1003:22, 1004:8 omitted [3] - 894:14, 1002:2, 1002:5 once [6] - 783:11, 809:3, 816:1, 897:4, 907:10, 1011:17 one [207] - 757:9, 758:9, 760:15, 762:4, 762:5, 767:6, 768:5, 769:21, 781:2, 781:6, 782:17, 784:16, 784:17, 787:23, 788:19, 789:14, 789:15, 791:12, 793:23, 795:3, 798:6, 798:8, 799:6, 799:18, 803:3, 803:11, 806:9, 808:24, 809:9, 812:13, 812:20, 812:21, 813:13, 815:23, 819:14, 820:13, 820:20, 820:23, 821:3, 821:6, 821:25, 822:25, 823:1,</p>	<p>823:20, 823:21, 824:3, 824:4, 824:20, 825:8, 825:9, 830:21, 831:3, 831:20, 832:1, 832:3, 832:9, 833:5, 833:8, 837:13, 837:14, 837:19, 843:4, 844:4, 847:10, 847:14, 848:10, 848:13, 848:24, 849:6, 856:14, 857:13, 858:2, 858:12, 859:7, 859:11, 863:24, 867:1, 868:1, 868:4, 869:13, 870:22, 871:18, 873:24, 880:14, 882:18, 883:9, 883:16, 887:12, 887:15, 887:16, 887:17, 888:12, 889:15, 890:14, 891:20, 892:8, 896:5, 898:2, 902:3, 902:14, 902:16, 907:19, 911:3, 913:10, 914:23, 915:3, 916:7, 916:8, 917:5, 917:7, 917:19, 919:6, 919:16, 922:2, 922:3, 925:11, 926:4, 926:5, 929:12, 930:5, 931:5, 931:19, 935:23, 936:18, 938:5, 939:19, 944:3, 947:22, 948:24, 949:21, 952:16, 958:25, 959:18, 959:19, 959:20, 959:25, 960:17, 961:2, 963:15, 965:24, 966:4, 966:6, 966:10, 968:3, 969:3, 969:6, 974:3, 975:7, 980:8, 980:9, 980:23, 982:5, 984:10, 985:4, 985:18, 985:19, 985:23, 986:2, 986:16, 987:1, 990:2, 990:10, 991:8, 992:20, 993:18, 993:23, 994:10, 996:18, 997:11, 1000:22, 1000:23,</p>	<p>1000:24, 1002:12, 1003:7, 1006:9, 1006:19, 1007:19, 1011:24, 1012:3, 1012:5, 1012:14, 1013:10, 1013:13, 1013:20, 1013:24, 1014:9, 1016:16, 1017:5, 1017:6, 1019:15, 1019:22, 1020:1, 1020:24, 1021:14, 1023:14, 1025:8, 1025:9, 1025:16, 1026:15, 1026:22, 1029:18 ones [10] - 788:19, 812:24, 813:5, 897:3, 987:14, 1002:8, 1002:9, 1009:23, 1019:3, 1023:14 open [10] - 763:24, 772:15, 896:5, 896:9, 896:11, 896:13, 1007:15, 1008:9, 1011:24, 1029:17 opened [1] - 947:20 opening [6] - 775:22, 872:25, 962:6, 962:13, 1007:12, 1028:20 operate [2] - 942:7, 948:15 operated [1] - 917:5 operates [1] - 939:24 operating [2] - 820:19, 836:12 operator [3] - 805:21, 872:25, 948:14 operator's [2] - 948:13, 948:16 operators [1] - 768:25 opinion [98] - 756:4, 756:5, 756:7, 756:15, 756:16, 756:17, 756:24, 757:6, 757:8, 757:25, 758:15, 758:19, 758:21, 758:24, 759:1, 802:4, 802:15, 802:17, 803:5, 811:13, 811:15, 813:12, 822:3, 823:4, 825:21, 826:21, 826:23, 828:21, 831:3, 831:6, 832:14, 841:18, 842:22,</p>	<p>843:22, 853:12, 854:10, 856:17, 857:20, 866:8, 866:13, 867:4, 875:22, 876:16, 876:19, 877:10, 879:1, 879:21, 880:25, 881:14, 883:1, 883:19, 885:3, 885:10, 886:5, 886:24, 887:20, 888:11, 888:24, 889:5, 889:12, 890:4, 895:23, 897:18, 916:2, 917:9, 923:15, 923:20, 925:7, 925:16, 949:9, 953:21, 958:5, 960:10, 969:18, 971:11, 972:8, 975:23, 980:25, 984:24, 985:20, 985:22, 986:4, 986:16, 988:6, 988:8, 988:13, 990:2, 990:9, 990:17, 991:2, 993:6, 996:19, 996:25, 1000:9, 1001:13, 1002:2, 1015:4 opinions [20] - 758:8, 772:18, 775:7, 775:8, 775:9, 786:11, 786:13, 818:11, 827:1, 830:9, 832:13, 833:2, 833:10, 892:11, 958:7, 958:13, 985:8, 1020:17 opportunities [1] - 775:2 opportunity [4] - 759:17, 760:6, 764:19, 781:20 opposed [1] - 944:5 opposite [1] - 877:19 optics [1] - 785:4 optimistic [1] - 1030:11 optimize [1] - 765:23 option [4] - 758:17, 758:18, 917:17, 947:15 optional [2] - 895:4, 895:5 options [1] - 982:4 oral [3] - 765:2,</p>
--	--	--	--	--

<p>1026:14, 1026:17 orally [1] - 1026:19 orange [4] - 798:17, 798:22, 799:3, 928:7 oranges [1] - 885:2 order [18] - 799:2, 808:19, 812:3, 814:8, 818:7, 857:13, 859:12, 891:17, 891:19, 909:1, 917:8, 927:1, 943:19, 944:24, 950:6, 1027:9, 1027:17, 1028:23 orderly [39] - 830:22, 831:3, 831:4, 831:6, 831:20, 832:1, 832:3, 832:9, 832:16, 832:20, 842:5, 842:17, 846:21, 848:2, 849:6, 862:4, 863:9, 873:7, 874:5, 880:14, 883:11, 883:16, 892:4, 986:16, 988:2, 988:5, 988:7, 988:9, 988:14, 988:19, 988:24, 990:3, 990:10, 990:21, 993:10, 993:14, 993:23, 994:5, 994:8 oriented [1] - 984:22 original [4] - 990:24, 991:25, 992:1, 1005:18 orthodontists [1] - 768:21 orthopedic [13] - 765:2, 780:19, 828:15, 828:17, 854:18, 854:21, 854:24, 864:10, 878:1, 888:18, 986:13, 986:24, 992:22 OS [2] - 884:21 OSSEO [1] - 753:3 Osseo [87] - 766:9, 769:23, 786:14, 801:24, 802:2, 802:17, 803:8, 804:17, 805:23, 807:3, 811:14, 812:6, 813:10, 814:25, 826:15, 827:6, 827:8, 829:3, 829:20, 829:21, 830:7, 830:14, 831:5, 832:18,</p>	<p>837:1, 837:3, 837:4, 837:23, 838:5, 838:20, 838:23, 839:13, 844:9, 845:6, 845:14, 845:24, 846:13, 846:14, 846:16, 846:19, 852:16, 853:13, 856:19, 859:15, 862:11, 866:10, 866:14, 867:5, 867:21, 875:23, 876:18, 876:21, 877:11, 880:24, 883:3, 885:6, 887:1, 887:24, 888:14, 888:25, 892:13, 896:3, 896:15, 896:22, 897:20, 898:3, 898:4, 902:4, 923:16, 933:25, 960:1, 960:4, 960:8, 960:9, 960:13, 960:15, 960:22, 961:4, 961:7, 961:9, 961:17, 963:6, 1012:23, 1014:13, 1018:16, 1021:15, 1022:1 Osseo's [17] - 755:9, 764:13, 764:18, 765:16, 767:13, 802:19, 803:22, 803:25, 815:2, 869:17, 896:7, 952:18, 953:9, 961:5, 963:6, 963:8, 1021:12 osteoporosis [1] - 840:5 Ostrow [9] - 902:3, 915:8, 921:21, 924:10, 952:12, 1011:3, 1019:14, 1020:13, 1023:8 OSTROW [58] - 753:21, 776:21, 781:14, 785:10, 785:14, 785:16, 790:15, 793:4, 794:15, 796:12, 808:1, 808:11, 808:15, 808:22, 809:24, 810:5, 828:2, 834:24, 850:13, 868:23, 870:12, 901:24, 901:25, 950:5, 951:20, 952:5, 952:9, 952:13,</p>	<p>952:14, 954:8, 954:11, 955:15, 955:22, 955:24, 957:4, 957:5, 969:15, 969:16, 991:14, 996:15, 1004:22, 1009:12, 1010:2, 1011:4, 1011:11, 1012:24, 1014:18, 1015:23, 1016:6, 1019:7, 1020:14, 1023:12, 1023:15, 1023:18, 1025:12, 1027:4, 1029:5, 1029:16 otherwise [2] - 885:1, 1004:23 ought [1] - 1015:20 ourselves [1] - 808:8 outcome [1] - 775:12 outer [1] - 908:8 outlet [1] - 857:25 output [32] - 821:19, 834:3, 836:13, 836:23, 845:24, 852:3, 852:11, 858:2, 858:3, 858:5, 858:6, 858:9, 858:10, 858:12, 858:14, 858:17, 859:2, 859:4, 859:6, 859:15, 864:14, 864:15, 880:1, 880:2, 880:5, 880:7, 880:8, 880:15, 880:25, 978:4, 978:6, 978:10 outside [4] - 781:24, 899:14, 1005:12, 1009:1 oval [1] - 882:2 overall [2] - 761:17, 893:16 overinflate [1] - 894:15 overlap [3] - 800:9, 905:23, 948:8 overlay [5] - 825:6, 825:14, 825:20, 825:21, 826:3 overrule [1] - 994:21 overruled [1] - 785:17 overview [3] - 783:3, 847:4, 871:14 own [12] - 761:10, 762:8, 762:17, 775:8, 838:15, 839:20, 887:4, 898:7, 959:5, 975:8, 988:16, 1005:5</p>	<p>OY [1] - 755:18 Oy [2] - 758:16, 786:6</p> <hr/> <p style="text-align: center;">P</p> <hr/> <p>P-E-L-C [1] - 774:6 P.A [1] - 753:18 p.m [7] - 850:21, 899:12, 901:18, 951:25, 952:10, 1005:10, 1030:19 package [2] - 847:7, 897:8 page [52] - 762:1, 762:6, 763:24, 763:25, 764:17, 764:19, 765:14, 765:17, 767:12, 767:15, 770:10, 770:19, 770:22, 770:24, 775:24, 776:15, 793:13, 795:6, 795:8, 797:2, 797:5, 829:18, 829:19, 846:2, 855:15, 861:13, 873:2, 874:19, 881:24, 901:15, 928:19, 928:24, 949:13, 949:14, 956:5, 967:6, 1010:5, 1011:11, 1011:18, 1011:22, 1011:23, 1012:15, 1014:6, 1014:7, 1017:25, 1018:5, 1018:8, 1020:12, 1022:13, 1022:20, 1022:21, 1022:22 Page [1] - 1015:18 pages [2] - 776:9, 1010:2 paid [2] - 768:19, 778:1 panel [14] - 836:12, 894:20, 897:16, 1002:13, 1002:17, 1002:25, 1003:7, 1003:16, 1003:17, 1004:2, 1004:8, 1005:25, 1006:11 panoramic [18] - 792:21, 800:5, 800:6, 835:8, 845:1, 860:6, 865:12, 868:8, 868:11, 883:9, 883:10, 894:25, 916:13, 917:1, 974:4, 974:9, 974:11, 979:5</p>	<p>paper [24] - 790:5, 791:7, 791:19, 792:19, 795:8, 795:9, 796:5, 796:22, 797:4, 797:6, 806:23, 832:22, 832:25, 840:23, 841:2, 847:1, 848:12, 867:12, 870:6, 871:8, 872:1, 872:8, 872:20, 901:12 papers [6] - 776:9, 782:14, 841:13, 905:23, 918:16, 943:21 paragraph [2] - 987:21, 989:20 paragraphs [2] - 956:6, 956:24 parameter [3] - 887:13, 921:9, 922:16 parameters [1] - 887:13 parents [2] - 775:3, 777:24 part [46] - 757:7, 772:16, 799:13, 810:6, 822:17, 827:6, 827:19, 829:14, 830:13, 837:8, 843:18, 843:19, 876:13, 884:16, 888:4, 893:21, 895:1, 904:6, 910:16, 912:5, 920:2, 920:13, 920:15, 926:5, 927:2, 933:23, 933:24, 937:11, 938:3, 947:1, 948:11, 959:4, 966:8, 967:1, 991:16, 993:20, 1002:21, 1002:24, 1003:17, 1003:21, 1004:11, 1020:2, 1021:8, 1022:9, 1022:11 partially [2] - 808:3, 808:6 particular [20] - 771:19, 776:25, 781:22, 782:5, 800:18, 801:17, 803:14, 811:20, 820:16, 835:8, 835:9, 839:7, 846:25, 860:3,</p>
--	---	--	---	--

868:11, 884:20,
884:23, 898:3,
910:22, 918:2
particularly [1] - 884:7
parties [17] - 761:20,
763:1, 808:2, 829:9,
833:14, 833:15,
833:17, 833:25,
834:5, 834:8,
840:16, 899:25,
961:8, 961:15,
1017:17, 1027:8
parts [3] - 897:6,
941:6, 972:3
party [1] - 1026:19
party's [1] - 895:13
pass [2] - 798:1,
891:19
passed [1] - 789:9
passes [2] - 797:25,
891:10
past [4] - 768:16,
840:7, 1004:23,
1004:24
Patent [34] - 772:7,
846:18, 867:20,
869:11, 869:16,
914:3, 914:10,
963:18, 964:2,
964:11, 964:14,
964:20, 964:24,
965:1, 965:5, 965:9,
965:12, 965:14,
965:20, 967:3,
968:12, 968:14,
968:15, 970:16,
981:14, 981:21,
982:1, 982:2,
982:18, 983:4,
1012:4, 1018:11,
1018:24, 1019:11
patent [264] - 772:9,
779:25, 781:6,
781:7, 781:22,
782:1, 782:5, 783:1,
783:2, 783:5,
783:19, 783:21,
783:22, 783:24,
785:8, 788:8,
801:24, 802:2,
811:14, 812:12,
812:20, 812:21,
812:22, 813:11,
813:24, 814:2,
821:7, 821:9,
821:13, 821:25,
828:14, 828:16,
829:24, 829:25,
830:3, 830:4, 830:7,
832:22, 833:5,

833:6, 833:8,
834:16, 834:18,
835:5, 835:8, 835:9,
835:14, 835:17,
836:15, 836:17,
837:12, 837:13,
837:15, 837:18,
838:2, 838:3, 839:8,
839:13, 839:16,
840:13, 840:14,
841:20, 841:21,
841:25, 844:5,
844:15, 844:17,
844:23, 844:24,
845:9, 845:10,
845:11, 846:13,
846:14, 846:19,
847:15, 848:14,
849:10, 851:24,
852:1, 852:3, 852:8,
852:16, 852:21,
852:22, 852:23,
853:14, 853:17,
853:19, 854:11,
854:13, 854:15,
854:18, 855:1,
855:16, 856:23,
857:1, 858:2, 858:9,
858:12, 859:2,
859:15, 859:19,
862:11, 864:9,
864:11, 864:17,
864:18, 866:17,
867:11, 867:12,
867:14, 867:16,
867:20, 867:23,
868:2, 868:5, 868:7,
868:17, 869:3,
869:5, 869:11,
869:13, 869:16,
869:17, 869:22,
869:24, 870:16,
871:17, 871:18,
875:15, 875:23,
876:18, 876:21,
877:11, 878:5,
878:9, 879:23,
881:14, 884:14,
884:18, 885:6,
885:14, 885:17,
886:23, 887:25,
888:2, 888:4, 888:6,
888:7, 888:8,
888:12, 889:9,
889:13, 889:23,
890:14, 890:17,
891:2, 891:8, 892:6,
892:24, 893:8,
893:23, 893:25,
894:1, 896:3,
896:11, 896:13,

896:22, 907:13,
907:19, 911:6,
911:11, 911:24,
912:18, 912:25,
913:6, 913:14,
913:19, 913:21,
913:22, 913:24,
914:3, 914:6, 914:8,
914:11, 914:13,
915:6, 924:7,
931:11, 958:25,
961:11, 962:9,
962:14, 962:16,
963:12, 964:8,
964:16, 965:3,
969:21, 969:22,
970:2, 970:16,
970:17, 970:22,
971:2, 971:3, 972:2,
972:3, 972:4,
973:22, 974:24,
982:22, 983:7,
983:13, 983:24,
984:2, 984:8,
984:12, 985:4,
986:8, 986:10,
988:22, 991:15,
991:17, 991:23,
991:24, 992:1,
992:3, 992:5,
992:10, 992:12,
992:20, 996:3,
996:4, 996:7, 999:5,
999:13, 1012:3,
1012:21, 1013:2,
1013:11, 1015:25,
1016:17, 1016:21,
1016:25, 1017:12,
1017:14, 1017:24,
1018:10, 1024:17
patentability [1] -
1014:1
patented [7] - 841:23,
842:2, 843:5,
912:19, 1003:8,
1021:21, 1024:11
patentee [1] - 893:1
patenting [1] - 844:24
patents [103] - 775:7,
776:10, 780:23,
780:25, 781:6,
783:16, 783:18,
785:12, 785:22,
786:6, 786:14,
805:8, 807:3, 812:6,
814:25, 826:15,
829:21, 830:14,
831:5, 832:17,
832:24, 837:1,
837:3, 837:5,

837:23, 838:5,
838:20, 838:23,
839:17, 839:20,
844:9, 845:7,
845:14, 845:24,
846:16, 848:11,
848:13, 866:10,
867:6, 867:21,
868:3, 868:4, 886:6,
887:1, 888:14,
896:7, 896:15,
897:20, 897:21,
898:3, 898:4,
898:12, 899:6,
906:15, 906:17,
906:19, 906:23,
907:8, 907:11,
907:23, 911:3,
913:1, 913:3,
913:11, 913:15,
915:7, 923:16,
923:21, 925:8,
925:17, 934:18,
934:23, 934:25,
945:2, 953:1,
958:14, 958:20,
959:9, 960:18,
961:2, 961:5, 963:7,
963:8, 963:9, 964:9,
964:21, 964:22,
970:20, 970:22,
973:23, 974:25,
982:19, 984:15,
984:20, 988:10,
991:16, 997:20,
997:23, 998:18,
998:23, 1022:1
patents-in-suit [1] -
775:7
path [3] - 799:8,
801:6, 891:21
patient [36] - 784:5,
788:17, 795:11,
797:10, 798:2,
813:5, 814:18,
824:3, 828:15,
828:17, 836:20,
838:12, 838:15,
838:16, 852:2,
856:8, 856:10,
864:14, 868:9,
872:4, 872:24,
877:19, 887:3,
888:18, 891:11,
891:22, 895:18,
896:6, 896:9,
896:11, 896:13,
911:16, 911:17,
986:13, 986:23
patient's [12] - 833:21,
835:25, 838:15,

854:21, 854:24,
877:25, 895:19,
895:20, 912:3,
918:3, 918:5,
1006:21
patient-specific [1] -
986:23
patient-specifics [1] -
986:13
patients [1] - 905:11
patients's [1] - 887:4
pay [1] - 777:21
paying [2] - 944:10,
1000:15
PC [1] - 898:15
PDX-4 [1] - 851:16
peace [1] - 1009:11
peer [2] - 782:13,
905:21
Pelc [146] - 773:24,
774:5, 774:13,
774:14, 775:18,
776:12, 776:25,
777:10, 780:23,
781:20, 782:9,
783:20, 784:10,
785:7, 785:11,
785:21, 786:16,
787:13, 790:1,
791:4, 791:25,
792:5, 792:16,
793:11, 794:1,
794:22, 795:5,
795:22, 796:16,
797:1, 799:10,
801:21, 801:24,
803:21, 807:1,
810:22, 811:13,
811:24, 812:15,
813:9, 814:3,
817:15, 818:10,
819:15, 820:21,
822:10, 823:24,
825:24, 826:13,
827:5, 827:16,
827:19, 828:9,
829:11, 830:12,
831:22, 832:12,
833:2, 834:1,
834:12, 835:3,
835:13, 836:14,
836:25, 839:24,
841:17, 842:22,
843:12, 845:19,
847:22, 849:5,
851:10, 851:17,
852:14, 853:16,
854:1, 854:13,
856:12, 856:21,
857:7, 857:24,

858:16, 859:1,
859:14, 859:19,
860:14, 860:22,
861:19, 862:3,
862:10, 862:14,
863:18, 866:8,
867:8, 868:5,
868:13, 869:2,
870:16, 872:19,
873:7, 874:5, 875:1,
875:22, 876:10,
876:20, 877:10,
879:1, 879:21,
879:25, 880:24,
881:3, 881:13,
881:16, 883:1,
883:6, 883:19,
884:2, 885:3,
885:19, 887:24,
888:24, 890:10,
892:3, 892:10,
892:17, 893:15,
894:4, 895:3,
896:25, 897:18,
898:24, 901:21,
902:1, 902:22,
918:19, 952:16,
954:12, 955:25,
958:4, 996:1,
1014:16, 1015:6,
1019:9, 1023:21,
1024:1
PELC [1] - 774:7
Pelc's [1] - 777:9
pen [2] - 923:3, 923:6
pending [2] - 956:10,
996:4
penetrate [2] - 801:16,
891:18
penetrated [1] - 787:7
penetrating [2] -
787:6, 798:11
people [20] - 766:15,
768:10, 780:8,
782:20, 784:14,
787:9, 788:20,
799:12, 823:15,
831:10, 871:8,
904:9, 918:12,
933:1, 936:12,
956:22, 983:24,
984:4, 991:7, 991:9
per [12] - 791:23,
792:2, 792:4,
794:25, 795:18,
861:10, 872:11,
872:17, 881:25,
882:4, 882:5, 921:8
percent [19] - 767:22,
767:25, 769:4,

769:7, 769:24,
771:10, 771:14,
771:18, 866:6,
895:12, 896:1,
896:22, 909:11,
937:22, 938:2,
1000:6, 1000:14,
1001:18, 1004:4
percentage [1] -
769:14
perception [1] -
799:21
percolating [1] -
1029:18
perfect [1] - 799:16
perfectly [1] - 1005:20
perform [4] - 833:9,
839:2, 896:25, 898:7
performance [1] -
779:20
performed [1] -
788:17
performing [2] -
820:5, 835:20
perhaps [3] - 926:23,
994:6, 1001:23
period [1] - 758:24
permission [1] - 812:6
person [56] - 780:11,
787:22, 788:3,
788:5, 788:6,
788:19, 789:8,
789:13, 789:21,
822:23, 830:22,
830:24, 831:4,
831:6, 831:15,
832:16, 832:20,
838:17, 842:5,
842:16, 846:21,
848:2, 848:16,
848:20, 848:21,
861:7, 862:3, 862:8,
863:9, 873:7, 874:1,
874:2, 874:5,
880:17, 883:11,
886:2, 886:19,
887:20, 889:9,
890:7, 892:4,
918:12, 922:14,
940:14, 951:14,
960:14, 960:16,
983:4, 988:5,
988:19, 989:4,
989:5, 990:21,
993:10, 994:4, 994:7
person's [2] - 941:5,
983:17
personally [3] -
916:11, 917:4,
940:22

pertains [1] - 842:6
Peschel [2] - 811:9,
851:12
PESCHEL [46] - 754:6,
773:23, 774:10,
774:12, 775:14,
775:17, 776:17,
776:24, 781:11,
781:19, 785:6,
785:11, 785:19,
785:20, 790:12,
790:18, 790:21,
793:1, 793:7,
793:10, 794:12,
794:18, 794:21,
796:9, 796:15,
807:15, 811:11,
811:12, 827:24,
828:5, 828:8,
834:21, 835:2,
849:18, 850:14,
851:13, 851:14,
868:20, 869:1,
870:9, 870:15,
899:7, 955:8,
985:12, 994:17,
1008:7
Ph.D [2] - 954:24,
956:13
phenomenon [1] -
786:20
Philadelphia [1] -
899:16
photograph [1] -
788:14
photon [5] - 815:13,
817:16, 817:20,
818:3, 942:2
photons [3] - 940:3,
942:8, 942:11
phrase [1] - 804:3
physical [5] - 761:10,
762:8, 762:17,
831:8, 831:12
physician [1] - 823:16
physicians [1] - 904:8
physicist [2] - 778:4,
789:1
physicists [2] -
784:17, 785:1
physics [11] - 777:17,
777:19, 778:24,
779:2, 782:19,
782:22, 782:23,
787:4, 816:14,
916:16
physiology [1] - 789:2
pick [1] - 877:21
picking [1] - 824:9
picture [9] - 787:20,

787:25, 788:4,
797:8, 806:13,
872:24, 891:6,
912:24, 933:15
pictures [1] - 890:19
piece [2] - 892:17,
987:3
pieces [1] - 824:11
Pienkowski [12] -
754:25, 755:2,
755:7, 760:4, 761:8,
763:17, 766:10,
769:21, 769:23,
770:9, 827:13,
915:23
pioneers [1] - 789:14
pixels [3] - 855:19,
1006:10, 1006:12
place [5] - 899:8,
907:24, 951:22,
1004:21, 1023:1
placed [3] - 854:20,
878:1, 891:9
places [3] - 860:1,
860:2, 1022:11
placing [1] - 833:21
Plaintiff [2] - 753:4,
753:24
plaintiff [12] - 809:5,
1009:11, 1010:24,
1012:2, 1015:19,
1019:20, 1027:17,
1027:24, 1028:3,
1028:8, 1028:16,
1029:3
plaintiffs [4] - 793:2,
794:13, 1027:1,
1028:1
plaintiffs [3] - 949:21,
1020:7, 1027:19
plan [3] - 767:18,
957:16, 1019:19
plane [3] - 800:7,
819:14, 855:24
planes [2] - 800:15,
800:17
PLANMECA [1] -
753:6
Planmeca [71] -
755:18, 755:21,
758:16, 761:8,
761:9, 762:7,
762:16, 762:24,
766:20, 766:24,
767:21, 767:24,
768:3, 768:24,
769:10, 769:14,
769:17, 769:24,
770:14, 773:13,
773:24, 775:6,

785:24, 786:1,
786:6, 786:7,
804:16, 812:4,
826:14, 826:22,
827:8, 828:14,
828:19, 828:24,
830:6, 830:8, 847:7,
859:10, 892:20,
896:10, 896:24,
897:11, 897:15,
902:15, 927:3,
936:1, 939:24,
940:4, 940:13,
946:14, 950:17,
950:20, 956:14,
957:13, 957:21,
957:24, 961:17,
997:2, 997:9, 998:6,
998:7, 998:17,
998:23, 1002:7,
1012:17, 1020:23,
1021:24
Planmeca's [8] -
786:5, 827:6,
842:10, 842:12,
957:15, 962:6,
962:12, 1021:17
plans [2] - 828:20,
829:1
play [2] - 811:4, 811:5
played [1] - 810:25
plurality [1] - 856:5
point [33] - 802:16,
814:13, 814:14,
835:13, 848:9,
875:1, 880:20,
884:18, 888:3,
891:22, 914:22,
921:15, 935:16,
937:1, 937:6,
942:17, 946:20,
952:20, 963:15,
968:17, 972:4,
973:22, 982:16,
989:17, 996:2,
1002:22, 1003:12,
1008:8, 1010:23,
1011:1, 1019:8,
1019:12, 1019:13
pointed [3] - 873:2,
919:8, 1021:16
pointer [2] - 919:9,
970:7
pointing [3] - 865:3,
875:20, 878:5
points [13] - 763:12,
779:8, 814:12,
824:10, 824:21,
865:20, 865:22,
935:22, 947:19,

<p>947:23, 947:25, 948:8</p> <p>pokey [1] - 991:12</p> <p>political [1] - 775:1</p> <p>polystyrene [4] - 816:16, 933:8, 939:16</p> <p>population [1] - 838:16</p> <p>portion [8] - 854:20, 873:1, 927:22, 947:3, 971:10, 991:22, 1018:18, 1022:13</p> <p>portions [2] - 878:4, 954:15</p> <p>position [11] - 756:9, 756:20, 757:15, 876:6, 876:7, 923:14, 924:17, 947:5, 952:24, 953:9, 1028:1</p> <p>positioning [22] - 834:2, 853:16, 853:17, 853:20, 853:22, 854:2, 854:4, 854:10, 861:25, 876:21, 876:22, 876:24, 877:2, 877:11, 896:6, 896:9, 896:12, 896:13, 976:18, 976:21, 976:25, 977:3</p> <p>positions [3] - 926:8, 926:16, 926:18</p> <p>possession [2] - 886:3, 886:21</p> <p>possibility [1] - 890:18</p> <p>possible [1] - 925:11</p> <p>possibly [2] - 791:4, 831:23</p> <p>postmenopausal [1] - 794:5</p> <p>potassium [1] - 861:11</p> <p>pounds [1] - 921:22</p> <p>power [1] - 891:24</p> <p>powerful [1] - 891:25</p> <p>practice [5] - 782:23, 814:16, 828:25, 840:8, 1017:15</p> <p>practiced [1] - 812:13</p> <p>practicing [2] - 818:1, 1029:7</p> <p>praise [1] - 843:10</p> <p>praised [1] - 1024:22</p> <p>precise [4] - 790:6, 790:7, 909:15,</p>	<p>918:25</p> <p>precisely [2] - 942:4, 946:6</p> <p>precision [1] - 872:23</p> <p>predates [1] - 899:6</p> <p>predictability [1] - 890:1</p> <p>predictable [1] - 866:21</p> <p>preexisting [2] - 792:9, 864:10</p> <p>prefer [3] - 1026:3, 1026:23, 1027:4</p> <p>preferably [1] - 1030:6</p> <p>prejudicial [1] - 756:8</p> <p>preliminary [2] - 796:23, 808:4</p> <p>preparation [1] - 910:21</p> <p>prepare [1] - 1029:20</p> <p>prepared [2] - 777:2, 777:10</p> <p>presence [3] - 889:23, 899:14, 1005:12</p> <p>present [17] - 786:11, 786:13, 809:18, 811:22, 839:15, 840:8, 843:14, 846:13, 859:20, 865:13, 923:17, 924:10, 958:22, 959:20, 959:24, 1012:17, 1020:18</p> <p>presentation [7] - 896:8, 923:10, 924:14, 975:16, 976:6, 976:17, 1005:13</p> <p>presentations [1] - 823:19</p> <p>presented [25] - 782:14, 797:6, 814:15, 826:14, 851:4, 870:6, 871:1, 873:4, 889:23, 915:15, 924:8, 924:25, 933:13, 935:4, 943:7, 959:9, 960:6, 960:10, 961:2, 1010:24, 1010:25, 1015:2, 1019:24, 1020:6</p> <p>presenting [5] - 829:20, 959:17, 960:6, 966:3, 1014:13</p> <p>presents [2] - 796:22, 796:23</p> <p>preserve [2] - 994:11, 995:5</p>	<p>preserves [1] - 994:14</p> <p>press [1] - 900:6</p> <p>pressure [1] - 931:25</p> <p>presumably [3] - 870:23, 924:6, 964:3</p> <p>pretend [1] - 995:4</p> <p>pretrial [3] - 950:6, 1027:17, 1028:23</p> <p>pretty [10] - 769:4, 817:12, 850:18, 901:10, 1012:24, 1013:11, 1019:9, 1019:10, 1019:18, 1030:3</p> <p>previous [8] - 754:17, 776:11, 832:17, 872:1, 873:10, 961:19, 964:17, 999:23</p> <p>previously [4] - 837:6, 844:21, 850:1, 881:18</p> <p>price [2] - 770:21, 771:1</p> <p>pricing [1] - 770:24</p> <p>primarily [2] - 778:9, 874:11</p> <p>primary [5] - 982:4, 982:24, 983:3, 983:17, 984:10</p> <p>principal [1] - 1019:1</p> <p>principles [1] - 994:10</p> <p>print [1] - 901:14</p> <p>priority [1] - 869:6</p> <p>prism [1] - 940:8</p> <p>privilege [1] - 772:18</p> <p>privileged [1] - 757:18</p> <p>prize [3] - 787:4, 789:1</p> <p>probed [2] - 891:11, 941:6</p> <p>problem [13] - 757:1, 761:1, 799:21, 801:4, 898:22, 925:10, 928:3, 938:6, 940:6, 995:17, 1008:5, 1017:7, 1022:18</p> <p>problems [2] - 805:2, 894:13</p> <p>procedural [1] - 1026:22</p> <p>procedures [3] - 837:24, 913:16, 964:6</p> <p>proceed [6] - 754:22, 759:23, 774:9, 785:17, 851:11, 985:13</p> <p>proceedings [1] - 870:25</p>	<p>process [8] - 812:8, 825:2, 863:2, 863:6, 893:2, 900:24, 920:13, 920:15</p> <p>processed [2] - 860:10, 874:17</p> <p>processing [8] - 820:9, 875:19, 876:15, 881:7, 884:8, 884:11, 980:14</p> <p>processors [1] - 834:2</p> <p>produce [8] - 798:2, 800:15, 804:7, 819:10, 862:24, 864:4, 866:25, 1005:24</p> <p>produced [13] - 757:6, 757:7, 758:21, 795:17, 797:12, 797:20, 806:18, 818:6, 846:8, 856:3, 865:12, 872:22, 878:23</p> <p>produces [1] - 862:23</p> <p>producing [3] - 836:17, 864:3, 868:8</p> <p>product [18] - 761:14, 761:15, 768:19, 769:17, 769:18, 779:17, 779:18, 830:8, 843:16, 895:1, 1002:8, 1021:17, 1021:20, 1021:24, 1024:10, 1024:11</p> <p>products [4] - 761:17, 761:21, 768:6, 768:14</p> <p>ProFace [1] - 894:22</p> <p>professionalism [1] - 900:21</p> <p>professor [8] - 778:25, 787:18, 904:3, 904:4, 954:24, 956:13, 957:11, 957:22</p> <p>proficiency [1] - 987:19</p> <p>proficient [1] - 987:13</p> <p>profit [8] - 767:22, 767:25, 768:3, 769:9, 769:14, 769:20, 769:25, 770:14</p> <p>program [11] - 801:8, 801:9, 888:21, 890:8, 986:25, 987:6, 987:7, 988:18, 988:20,</p>	<p>988:21, 988:23</p> <p>programing [12] - 888:20, 987:16, 987:19, 988:3, 988:5, 988:11, 988:15, 988:17, 989:1, 989:4, 989:6, 989:16</p> <p>programmed [1] - 986:22</p> <p>programmer [4] - 948:21, 986:25, 988:21, 988:22</p> <p>programs [1] - 987:11</p> <p>progress [3] - 808:10, 977:6, 1000:18</p> <p>project [1] - 779:23</p> <p>projected [2] - 849:12, 863:4</p> <p>projection [14] - 798:5, 798:10, 798:12, 798:14, 799:9, 801:7, 804:19, 805:1, 805:2, 807:8, 819:23, 820:13, 820:15, 860:11</p> <p>projections [8] - 804:18, 804:24, 804:25, 805:7, 805:11, 805:14, 820:12, 820:20</p> <p>projects [2] - 780:14, 878:18</p> <p>ProMax [67] - 761:11, 761:17, 761:20, 762:18, 763:2, 763:5, 764:6, 764:10, 766:19, 766:21, 766:25, 767:21, 767:24, 768:4, 769:10, 769:25, 771:13, 786:12, 795:23, 807:4, 811:14, 811:15, 811:18, 812:10, 812:14, 812:16, 813:10, 814:15, 815:2, 817:15, 817:19, 818:4, 818:11, 818:19, 818:25, 820:3, 822:3, 822:6, 822:12, 825:24, 826:16, 826:18, 826:25, 828:22, 828:25, 830:16, 843:23, 894:15, 894:18, 915:19, 916:6, 917:7,</p>
--	---	---	--	---

<p>943:15, 944:21, 946:23, 954:5, 956:2, 956:8, 956:14, 956:16, 956:17, 957:12, 957:13, 957:19, 997:9, 998:24, 1002:8</p> <p>promotions [5] - 768:14, 768:21, 770:15, 771:12, 811:21</p> <p>pronounce [1] - 954:25</p> <p>proper [2] - 757:3, 860:4</p> <p>properties [1] - 932:25</p> <p>property [2] - 798:18, 798:19</p> <p>proportional [1] - 921:24</p> <p>proposed [3] - 950:20, 1000:9, 1001:15</p> <p>proposing [1] - 994:18</p> <p>proposition [2] - 759:8, 759:12</p> <p>prosecution [2] - 785:22, 974:24</p> <p>prosecutor [1] - 1029:8</p> <p>proteins [2] - 938:4, 939:10</p> <p>prove [6] - 811:25, 812:3, 812:4, 842:11, 842:12, 959:12</p> <p>provide [12] - 768:18, 775:7, 786:14, 838:25, 886:6, 888:1, 892:19, 900:25, 909:5, 932:24, 1004:16, 1021:12</p> <p>provided [6] - 755:14, 812:15, 849:23, 861:24, 989:22, 1014:8</p> <p>provides [4] - 879:13, 879:15, 881:10, 920:20</p> <p>providing [3] - 853:5, 853:6, 932:23</p> <p>pseudo [3] - 849:15, 859:12</p> <p>PTX-438 [1] - 810:4</p> <p>PTX-485 [1] - 810:4</p> <p>publications [5] - 776:9, 782:10, 789:15, 832:17,</p>	<p>874:3</p> <p>publish [7] - 776:19, 781:17, 790:18, 793:7, 794:18, 828:6, 954:13</p> <p>published [9] - 790:8, 791:2, 792:21, 794:6, 796:5, 841:2, 847:13, 870:24, 954:15</p> <p>publishing [1] - 870:25</p> <p>pull [10] - 851:15, 945:14, 969:25, 974:17, 982:21, 983:12, 983:16, 984:7, 989:3, 995:24</p> <p>pulled [2] - 773:4, 970:1</p> <p>pulling [1] - 1003:25</p> <p>pulsed [1] - 894:20</p> <p>purchase [6] - 764:6, 764:10, 765:22, 766:11, 766:18, 766:20</p> <p>purchased [8] - 761:20, 763:2, 763:5, 766:13, 766:14, 766:22, 767:1, 769:17</p> <p>purchasing [1] - 769:1</p> <p>purple [2] - 971:9, 971:10</p> <p>purpose [6] - 847:4, 874:19, 903:3, 912:22, 915:21, 935:9</p> <p>purposes [14] - 838:13, 887:4, 894:2, 905:16, 925:4, 931:19, 954:9, 955:21, 968:11, 988:25, 997:20, 998:14, 1003:2, 1003:10</p> <p>pursuing [1] - 786:22</p> <p>put [47] - 764:25, 768:16, 789:19, 797:22, 797:23, 799:2, 808:3, 813:1, 824:23, 829:18, 830:11, 832:19, 853:4, 855:19, 920:11, 923:3, 924:14, 925:11, 925:12, 932:8, 933:3, 941:5, 950:25, 952:15, 958:1, 959:16, 960:17, 960:21,</p>	<p>972:22, 976:2, 977:2, 979:24, 979:25, 981:3, 982:8, 996:16, 997:23, 997:25, 998:14, 1001:12, 1001:20, 1002:6, 1005:13, 1007:6, 1009:1, 1013:4, 1014:24</p> <p>puts [2] - 1007:4, 1007:5</p> <p>putting [5] - 899:24, 923:6, 948:3, 957:3, 957:17</p> <p>PX [2] - 793:6, 794:17</p> <p>PX-100 [1] - 924:14</p> <p>PX-37 [1] - 755:8</p> <p>PX-438 [2] - 810:11, 811:6</p> <p>PX-485 [2] - 810:11, 811:6</p> <p>PX-55 [1] - 767:8</p> <p>PX-90 [1] - 946:17</p> <p>PX-98 [3] - 793:2, 793:5, 924:13</p>	<p>951:8, 951:10, 951:13, 951:15</p> <p>quantitatively [39] - 789:17, 802:21, 802:23, 803:13, 803:18, 804:13, 806:24, 807:6, 813:14, 813:17, 814:16, 814:19, 815:1, 815:8, 817:13, 818:5, 819:11, 823:23, 846:11, 846:16, 846:23, 862:5, 865:9, 865:11, 865:22, 867:1, 872:6, 882:20, 920:11, 920:19, 920:21, 936:4, 943:10, 945:7, 945:10, 945:13, 945:25, 946:8, 949:5</p> <p>quantity [2] - 889:21, 920:17</p> <p>quantum [1] - 941:25</p> <p>quarter [1] - 1028:19</p> <p>questioned [1] - 764:4</p> <p>questioning [1] - 782:25</p> <p>questions [22] - 755:3, 758:13, 760:6, 760:9, 760:11, 760:16, 770:4, 773:11, 774:2, 850:8, 899:7, 902:24, 929:2, 952:7, 991:6, 996:6, 999:16, 1003:11, 1004:10, 1005:12, 1008:3</p> <p>quickly [2] - 892:17, 1009:13</p> <p>quite [14] - 768:5, 774:19, 776:14, 777:24, 779:2, 784:13, 816:24, 872:14, 902:23, 913:9, 917:4, 918:14, 919:19, 937:15</p> <p>QURESHI [12] - 754:6, 809:10, 809:14, 809:20, 810:1, 810:10, 810:13, 899:18, 1008:16, 1008:20, 1019:14, 1025:13</p>	<p style="text-align: center;">R</p> <p>radiation [11] - 780:21, 783:8, 786:24, 801:16, 872:23, 878:18, 878:24, 879:14, 879:16, 891:22, 894:21</p> <p>radiographic [1] - 963:18</p> <p>radiographs [1] - 865:12</p> <p>radiography [3] - 798:5, 837:5, 845:2</p> <p>radiologic [1] - 782:18</p> <p>radiological [4] - 782:21, 784:17, 916:16, 916:22</p> <p>radiologist [3] - 782:21, 789:9, 789:10</p> <p>radiologists [1] - 782:24</p> <p>radiology [4] - 777:19, 796:6, 871:10, 904:2</p> <p>Radiology [1] - 778:10</p> <p>range [11] - 910:3, 939:19, 940:9, 940:12, 940:15, 941:19, 941:20, 941:21, 942:5, 942:8</p> <p>rate [2] - 807:24, 921:10</p> <p>rather [3] - 892:25, 893:19, 975:7</p> <p>ratio [3] - 816:4, 816:23, 935:15</p> <p>rationale [2] - 803:15, 803:16</p> <p>ray [147] - 779:24, 779:25, 780:17, 782:23, 783:19, 783:24, 784:3, 787:12, 788:2, 797:9, 797:11, 797:18, 797:20, 797:21, 799:12, 800:23, 814:7, 815:13, 816:17, 817:16, 817:20, 831:17, 833:17, 833:18, 833:22, 835:8, 835:17, 835:18, 836:1, 836:8, 836:17, 836:21, 837:6, 838:1, 838:10, 839:14, 839:17, 839:19, 839:21,</p>
Q				
<p>QCT [8] - 789:14, 814:11, 815:9, 881:19, 943:13, 943:17, 943:22, 944:13</p> <p>qualification [1] - 831:20</p> <p>qualifications [5] - 831:2, 831:4, 831:24, 832:9, 988:8</p> <p>qualifies [1] - 988:7</p> <p>qualitative [1] - 826:11</p> <p>quality [1] - 907:17</p> <p>quantifies [1] - 882:10</p> <p>quantitative [36] - 783:15, 789:11, 803:16, 804:8, 814:9, 814:10, 822:7, 823:22, 825:17, 826:11, 831:18, 846:25, 847:24, 866:7, 874:23, 881:11, 881:18, 881:19, 881:21, 918:23, 919:24, 920:3, 936:9, 946:24, 949:1, 950:10, 950:12, 950:22, 951:2, 951:5, 951:6,</p>				

839:22, 840:8, 845:12, 845:13, 845:15, 846:7, 847:23, 848:5, 849:12, 849:13, 854:8, 854:14, 854:15, 854:16, 854:24, 854:25, 855:3, 855:6, 855:8, 855:11, 855:21, 855:22, 855:23, 856:1, 856:18, 858:19, 859:8, 863:5, 868:7, 868:8, 871:16, 872:3, 874:16, 877:14, 877:15, 877:17, 877:20, 877:21, 877:22, 878:11, 878:13, 878:17, 878:18, 878:23, 878:24, 879:1, 879:9, 890:16, 891:8, 891:16, 906:10, 911:21, 913:18, 916:12, 917:1, 921:10, 926:3, 926:9, 926:11, 926:13, 926:15, 939:25, 940:4, 940:11, 941:12, 941:13, 941:19, 942:7, 945:24, 963:19, 971:9, 971:10, 971:13, 972:16, 972:22, 972:24, 977:7, 977:9, 977:11, 977:16, 992:5, 992:6, 992:11, 992:14, 992:17, 993:3, 993:4, 993:12, 993:16, 993:22, 994:14, 995:3, 995:8, 1002:19, 1003:6, 1006:13, 1006:14, 1007:4, 1007:11 rays [46] - 786:18, 786:23, 786:25, 787:1, 787:3, 787:6, 787:17, 797:20, 797:21, 797:24, 797:25, 798:1, 798:11, 798:16, 798:21, 798:25, 799:7, 799:20, 814:4, 815:14, 831:16, 831:18, 856:3, 891:11,	909:9, 940:11, 940:14, 941:2, 941:3, 941:4, 941:6, 941:9, 941:19, 942:25, 943:13, 944:21, 945:3, 945:11, 946:2, 992:8, 993:14, 995:12, 995:17 RE162 [1] - 838:2 reach [1] - 889:5 reaching [1] - 830:16 read [46] - 759:4, 759:7, 759:11, 764:19, 764:22, 764:24, 765:19, 772:2, 802:14, 806:1, 807:23, 808:17, 818:15, 821:7, 833:2, 834:4, 873:1, 879:8, 892:5, 914:3, 914:4, 915:6, 915:18, 915:22, 915:24, 930:10, 944:1, 944:2, 949:25, 950:4, 953:13, 953:16, 954:14, 955:6, 955:9, 955:13, 956:25, 964:3, 994:11, 994:13, 1019:5, 1026:23, 1027:2, 1027:4 readily [1] - 887:18 reading [9] - 772:4, 772:5, 772:6, 808:18, 892:3, 931:18, 956:23, 993:10, 1005:14 reads [2] - 952:20, 953:9 ready [2] - 759:24, 849:24 real [2] - 864:5, 932:4 realize [1] - 786:21 realized [3] - 786:23, 787:5, 789:16 really [19] - 767:17, 778:16, 798:6, 804:6, 824:15, 840:18, 849:2, 884:24, 887:8, 893:4, 901:6, 907:3, 946:17, 957:17, 958:18, 997:8, 1016:8, 1019:19, 1022:3 reason [14] - 798:15, 808:17, 813:9, 820:25, 884:22,	890:16, 910:16, 935:7, 943:6, 946:6, 955:25, 960:11, 1010:15, 1021:11 reasonable [1] - 777:24 reasons [13] - 805:17, 811:20, 812:15, 812:18, 812:25, 813:3, 813:6, 818:18, 820:22, 823:7, 826:14, 885:20, 1018:2 rebates [2] - 768:16, 768:18 rebuttal [7] - 1027:19, 1028:12, 1028:14, 1028:17, 1028:19, 1029:4 recalling [1] - 760:4 receive [3] - 755:21, 858:4, 859:3 received [18] - 755:17, 755:20, 756:14, 757:9, 776:7, 776:22, 781:15, 784:11, 784:15, 790:16, 793:5, 794:16, 796:13, 810:12, 828:3, 834:25, 868:24, 870:13 receives [5] - 767:22, 768:3, 769:10, 769:24 recent [4] - 872:21, 873:2, 873:5 receptor [2] - 798:2, 799:4 recess [11] - 809:9, 810:16, 849:25, 850:1, 850:5, 850:6, 899:9, 899:21, 952:1, 1009:3, 1030:17 recognitions [1] - 784:11 recognize [4] - 784:24, 830:7, 913:13, 1020:16 recognized [2] - 798:6, 1020:19 recollection [2] - 762:15, 860:12 reconstructed [3] - 789:21, 806:16, 920:8 reconstructing [1] - 804:24 reconstruction [20] -	779:20, 783:14, 801:8, 801:9, 804:21, 804:22, 805:7, 806:3, 806:8, 819:25, 820:3, 820:18, 833:23, 860:5, 894:18, 894:19, 898:15, 973:15, 998:24, 1002:15 record [16] - 760:13, 774:4, 817:16, 818:3, 834:1, 837:17, 860:14, 869:22, 878:4, 899:13, 974:23, 974:24, 1010:15, 1023:9, 1025:19, 1026:20 recross [1] - 770:6 RECROSS [1] - 770:7 RECROSS- EXAMINATION [1] - 770:7 red [21] - 813:22, 824:20, 824:22, 861:2, 901:1, 926:2, 926:3, 928:1, 928:3, 928:4, 928:9, 934:1, 940:19, 940:23, 940:24, 940:25, 947:23, 948:3, 971:15, 1009:22, 1018:14 redirect [1] - 763:10 REDIRECT [1] - 763:15 redisplay [1] - 826:24 reduce [3] - 780:21, 783:8, 894:21 reduced [3] - 872:23, 921:11, 1017:14 refer [15] - 783:2, 793:19, 793:20, 793:21, 793:23, 857:4, 858:6, 858:13, 859:22, 861:1, 862:16, 864:19, 902:19, 995:8, 1027:11 reference [33] - 841:21, 847:12, 848:9, 859:24, 861:5, 861:8, 873:20, 873:22, 876:22, 883:22, 910:18, 910:22, 925:9, 925:13, 925:18, 943:18, 944:4, 956:13,	958:25, 959:7, 959:22, 963:11, 967:1, 967:24, 968:20, 981:15, 982:1, 982:4, 982:6, 986:9, 989:19, 989:21, 1019:10 referenced [2] - 846:13, 846:14 references [32] - 832:19, 837:8, 837:10, 848:4, 848:12, 848:15, 855:21, 862:9, 867:5, 867:9, 871:12, 873:9, 873:25, 875:3, 875:24, 881:1, 883:13, 885:4, 885:8, 924:9, 924:20, 925:11, 966:9, 966:11, 967:9, 968:3, 968:4, 970:5, 970:10, 970:11, 974:20, 982:4 referencing [3] - 865:14, 874:19, 920:25 referring [13] - 802:23, 846:2, 851:23, 860:15, 861:12, 916:21, 961:14, 983:2, 993:3, 993:22, 997:1, 997:6, 997:7 refers [5] - 829:19, 858:3, 909:17, 973:1, 995:12 reflect [1] - 899:13 refresh [2] - 755:12, 762:15 refurbish [1] - 768:12 regarding [5] - 854:2, 856:1, 861:20, 873:21, 889:5 region [11] - 783:6, 822:21, 856:10, 882:2, 884:19, 884:21, 884:23, 887:14, 897:15, 904:25, 920:9 registered [1] - 947:12 relate [1] - 828:16 related [21] - 778:17, 779:19, 781:7, 781:8, 782:16, 783:16, 783:18, 786:13, 795:19, 805:6, 843:17,
--	---	---	---	---

<p>860:4, 869:7, 915:15, 921:24, 942:2, 943:6, 943:8, 957:1, 1012:18 relates [6] - 821:24, 828:14, 840:11, 882:8, 964:5, 1014:20 relating [1] - 880:24 relative [4] - 803:3, 803:12, 803:17, 889:25 relatively [1] - 874:24 relevance [17] - 1021:3 relevant [17] - 778:21, 783:4, 786:15, 842:23, 856:13, 858:22, 883:6, 898:19, 946:1, 954:14, 967:12, 967:14, 975:5, 981:9, 982:12, 989:13, 989:17 reliable [3] - 779:22, 910:13, 919:9 relied [1] - 772:17 rely [7] - 800:12, 807:10, 834:18, 909:5, 909:14, 909:23, 1022:4 relying [1] - 758:22 remaining [2] - 798:23, 850:4 remains [1] - 772:15 remember [25] - 755:9, 755:14, 760:23, 764:7, 764:11, 764:15, 767:10, 767:15, 902:10, 911:4, 917:20, 928:13, 928:15, 932:7, 936:6, 939:24, 945:1, 945:5, 962:12, 976:19, 980:3, 1014:15, 1014:17, 1017:6, 1021:17 remind [6] - 754:19, 826:13, 861:16, 928:21, 991:20, 1005:2 remiss [1] - 1025:24 remote [3] - 863:3, 863:5 removal [2] - 897:15, 1002:14 remove [1] - 1023:3 removed [2] - 1012:16, 1022:12</p>	<p>removing [1] - 995:6 render [2] - 860:3, 885:11 rendered [2] - 885:4, 885:16 renderings [1] - 797:12 renders [2] - 844:11, 867:5 renumber [1] - 1025:4 repeat [6] - 766:23, 795:6, 802:11, 808:20, 813:13, 956:11 repeated [1] - 808:14 repeatedly [1] - 803:11 repetitive [1] - 808:13 replace [1] - 1001:15 replacing [1] - 874:14 report [8] - 775:22, 786:11, 808:10, 809:11, 872:5, 899:23, 989:12 reported [2] - 865:19, 872:5 reporter [2] - 969:4, 969:14 reporter's [1] - 1008:14 reporting [1] - 956:16 reports [6] - 785:23, 802:10, 802:12, 802:15, 872:8, 967:8 represent [10] - 803:9, 820:15, 847:17, 858:6, 859:5, 898:14, 921:3, 926:4, 935:8, 1005:16 representation [6] - 804:7, 804:8, 819:10, 819:11, 860:8, 863:1 representative [2] - 898:23, 912:1 representing [4] - 759:7, 775:6, 854:23, 902:4 represents [2] - 820:14, 827:1 reproduce [1] - 809:4 reproducibility [2] - 861:23, 862:1 reproducibly [3] - 884:20, 884:23, 885:1 reproduction [1] - 787:11 request [5] - 809:14,</p>	<p>950:10, 950:17, 950:25, 969:8 require [12] - 767:21, 814:25, 818:24, 860:22, 862:19, 878:24, 884:2, 884:12, 886:14, 889:10, 890:8, 891:24 required [10] - 811:25, 824:15, 826:11, 828:23, 852:15, 854:11, 859:15, 877:15, 882:9, 889:22 requirement [20] - 767:23, 804:17, 851:23, 852:15, 853:12, 854:14, 857:5, 857:21, 861:2, 863:11, 876:20, 879:6, 881:13, 881:16, 883:2, 883:5, 886:14, 886:25, 888:25, 990:19 requirements [27] - 814:24, 819:19, 820:23, 821:4, 827:2, 827:3, 855:6, 856:18, 857:25, 862:15, 862:17, 862:22, 863:16, 864:8, 875:8, 875:23, 876:17, 877:11, 879:2, 879:23, 880:24, 881:1, 883:6, 883:14, 883:20, 885:5, 888:12 requires [14] - 787:23, 814:17, 815:11, 826:6, 847:15, 856:23, 857:2, 858:12, 864:11, 864:17, 931:8, 974:5, 974:7, 1021:20 review [1] - 1027:16 research [23] - 778:15, 778:16, 778:17, 778:19, 779:9, 780:2, 780:14, 780:16, 782:14, 786:19, 788:1, 794:7, 869:21, 871:1, 872:6, 904:18, 904:20, 905:3, 905:13, 905:22, 910:20,</p>	<p>910:25, 1005:6 researched [2] - 910:17, 911:2 researchers [1] - 870:19 researching [1] - 905:15 reserve [1] - 981:24 residence [1] - 780:3 resident [2] - 777:22, 782:18 residents [1] - 782:20 resolution [5] - 779:21, 1005:19, 1005:20, 1007:19, 1007:21 resolve [1] - 808:8 resonance [1] - 785:2 respect [59] - 757:19, 779:9, 786:1, 803:22, 813:2, 818:20, 819:4, 821:1, 826:3, 829:23, 830:19, 831:5, 833:3, 839:20, 844:13, 851:18, 851:25, 852:3, 854:2, 859:1, 866:17, 871:21, 875:7, 882:17, 885:13, 887:9, 889:4, 889:14, 889:16, 890:3, 890:6, 891:1, 892:19, 898:6, 898:24, 904:19, 914:12, 922:1, 944:13, 952:22, 952:23, 953:15, 953:17, 953:18, 958:19, 960:12, 970:19, 981:8, 983:24, 988:9, 988:14, 990:20, 991:3, 993:7, 999:25, 1004:1, 1015:13 respond [2] - 786:10, 1026:19 responded [1] - 771:3 responding [1] - 828:13 response [6] - 757:19, 827:6, 853:18, 1013:6, 1013:7, 1020:8 responses [1] - 786:5 responsible [1] - 787:19 responsive [2] -</p>	<p>853:21, 877:7 rest [4] - 778:1, 830:23, 853:22, 937:22 rested [1] - 1013:3 restricted [4] - 855:1, 855:9, 856:15, 878:24 restricting [2] - 856:15, 856:16 results [6] - 796:23, 843:8, 866:4, 866:21, 870:20, 873:15 resume [1] - 776:13 return [3] - 765:23, 766:3, 901:21 reverse [1] - 799:2 review [10] - 760:25, 785:21, 802:10, 802:12, 811:8, 827:7, 915:12, 915:21, 955:12, 1030:5 reviewed [7] - 782:13, 785:22, 827:20, 829:14, 905:21, 914:24, 915:5 reviewing [2] - 846:19, 956:9 revision [1] - 900:12 revisions [1] - 808:2 Rho [2] - 816:13 Richard [5] - 779:4, 787:25, 844:18, 869:19, 869:20 rid [5] - 783:11, 814:8, 990:23, 1018:5, 1018:7 right-hand [1] - 1000:2 rights [1] - 782:3 ring [1] - 907:15 rise [10] - 754:13, 807:19, 810:15, 810:17, 850:2, 899:11, 951:24, 952:2, 1005:9, 1009:4 ROBERT [1] - 753:22 Roentgen [1] - 798:3 ROI [2] - 897:15, 1002:15 Romexis [14] - 761:9, 761:11, 761:19, 762:8, 762:16, 762:23, 762:25, 822:11, 847:9, 897:3, 915:20, 917:8, 946:14,</p>
--	--	--	---	--

<p>946:18 RONALD [1] - 753:18 Rontgen [1] - 786:19 room [5] - 809:16, 811:6, 931:24, 984:11, 1009:1 root [3] - 766:2, 934:3, 938:3 roots [1] - 908:19 rotate [7] - 800:25, 801:1, 824:24, 836:20, 836:21, 855:24, 856:7 rotated [1] - 883:24 rotates [2] - 824:12, 854:4 rotating [1] - 856:9 rotation [3] - 854:9, 856:6, 947:5 ROUGH [1] - 753:6 roughly [3] - 902:9, 918:7, 1028:19 round [1] - 962:18 row [1] - 976:15 royalties [1] - 893:12 rule [4] - 912:25, 913:1, 1026:9, 1026:10 ruled [2] - 1025:8, 1025:9 ruling [2] - 949:13, 1018:4 run [1] - 1027:7</p>	<p>scaling [2] - 816:1, 817:3 scan [36] - 783:8, 788:6, 789:20, 789:21, 800:16, 804:17, 804:18, 804:19, 804:20, 807:8, 819:22, 820:20, 822:25, 895:9, 895:16, 895:17, 895:19, 903:21, 907:18, 911:20, 911:25, 920:7, 920:14, 928:13, 929:6, 929:12, 929:18, 930:1, 930:12, 931:6, 931:9, 931:19, 996:23, 997:1, 997:4 Scandinavian [1] - 794:6 scanned [10] - 791:15, 791:16, 795:14, 804:9, 805:10, 815:13, 819:12, 823:21, 920:4 scanner [21] - 784:5, 788:14, 788:15, 795:10, 806:16, 846:7, 848:8, 848:18, 872:1, 872:2, 872:10, 872:13, 872:14, 872:21, 872:22, 872:25, 918:2, 920:16, 920:20, 941:5, 1005:23 scanners [4] - 848:19, 866:3, 874:22, 903:20 scanning [8] - 837:6, 838:1, 874:6, 895:18, 913:17, 918:7, 920:6, 963:19 scans [35] - 791:20, 804:6, 804:15, 804:23, 805:7, 805:12, 806:4, 806:17, 811:17, 813:7, 818:25, 819:9, 820:2, 820:19, 824:3, 824:8, 826:17, 883:23, 883:24, 911:18, 911:20, 928:12, 929:21, 930:7, 930:22, 931:1, 931:6, 931:8, 931:10, 931:21,</p>	<p>931:25, 932:1, 939:22, 1005:14 SCARA [2] - 896:21, 896:23 scheduled [1] - 900:8 school [6] - 777:23, 778:1, 778:2, 844:19, 904:9, 1012:3 science [7] - 831:8, 831:12, 905:6, 921:3, 932:20, 932:23 Science [4] - 777:15, 777:17, 777:18, 944:17 sciences [1] - 944:8 Sciences [2] - 778:5, 945:21 scientific [7] - 776:8, 784:24, 787:15, 793:18, 844:6, 846:2, 1018:19 scientists [1] - 944:13 scope [12] - 829:20, 842:18, 886:13, 886:15, 886:16, 886:17, 993:5, 993:8, 994:2, 994:3, 994:4 screen [7] - 764:25, 765:1, 825:6, 849:13, 869:2, 875:13, 924:14 screens [1] - 849:13 scroll [2] - 980:23, 983:8 search [5] - 906:22, 907:5, 959:5, 959:6 searches [1] - 959:3 seat [1] - 1005:11 seated [10] - 754:15, 807:21, 810:19, 850:7, 850:22, 899:14, 899:22, 901:19, 952:11, 1009:5 second [26] - 787:25, 797:5, 810:3, 818:18, 820:24, 820:25, 821:15, 824:11, 827:17, 832:24, 834:12, 839:3, 867:8, 867:10, 868:14, 914:21, 933:2, 936:24, 947:15, 950:13, 969:1, 984:22, 991:15, 994:16, 1012:15,</p>	<p>1020:5 secondary [12] - 842:20, 842:23, 842:25, 843:2, 843:4, 1020:3, 1020:9, 1020:10, 1022:2, 1022:7, 1024:4 section [10] - 800:11, 821:18, 862:14, 872:4, 882:2, 888:16, 912:16, 919:14, 949:12 sectional [1] - 963:18 sections [3] - 808:13, 812:18, 861:16 see [147] - 759:15, 761:1, 762:6, 762:9, 762:13, 769:9, 770:24, 771:6, 771:15, 775:24, 782:18, 784:22, 787:20, 787:25, 788:4, 788:14, 788:18, 791:7, 791:13, 791:17, 791:19, 797:3, 797:8, 798:9, 798:13, 799:4, 800:3, 800:8, 812:11, 812:19, 813:25, 816:23, 817:16, 817:19, 818:22, 819:5, 823:23, 824:19, 825:9, 825:25, 829:21, 829:22, 833:19, 835:17, 835:25, 836:8, 836:17, 839:3, 839:16, 839:17, 845:11, 845:14, 845:17, 854:4, 854:5, 854:6, 855:11, 858:20, 860:1, 861:23, 862:25, 866:3, 870:22, 872:2, 875:10, 875:17, 876:5, 876:13, 876:25, 877:17, 878:10, 878:21, 879:13, 880:4, 880:8, 881:6, 883:10, 888:3, 890:14, 894:6, 895:22, 903:21, 906:9, 911:16, 911:18, 911:19, 911:25, 912:8,</p>	<p>915:18, 919:2, 919:7, 919:10, 922:13, 926:2, 929:3, 929:6, 929:8, 929:13, 929:16, 929:19, 930:13, 930:14, 932:13, 940:13, 946:17, 947:16, 947:25, 949:6, 949:21, 952:23, 954:15, 954:23, 955:1, 955:5, 956:12, 967:5, 970:2, 970:13, 972:15, 973:2, 975:11, 976:14, 982:21, 982:24, 982:25, 983:14, 983:17, 983:18, 984:10, 986:9, 986:14, 989:19, 989:25, 990:15, 996:16, 1005:7, 1005:19, 1006:3, 1008:23, 1012:14, 1015:16, 1016:7, 1018:10, 1019:13, 1022:8, 1030:6, 1030:13 seeing [2] - 835:22, 1014:17 seek [3] - 755:21, 757:17, 758:15 seeking [2] - 756:24, 757:25 seeks [1] - 838:25 SEELIG [1] - 753:20 select [1] - 947:21 selected [2] - 824:21, 933:13 sell [8] - 761:9, 761:16, 762:7, 762:25, 768:12, 771:19, 812:4 selling [3] - 761:10, 762:8, 762:17 sells [3] - 767:21, 767:24, 768:4 send [5] - 760:1, 768:19, 900:10, 900:12, 1025:23 sending [1] - 876:6 senior [1] - 778:4 sense [10] - 808:16, 808:20, 884:24, 891:13, 895:21, 915:2, 932:6, 943:9, 956:20, 962:23 sensitive [1] - 847:19 sensor [27] - 835:18,</p>
S				
<p>S's [1] - 767:4 safety [1] - 1006:21 sake [4] - 958:23, 992:4, 1006:22, 1008:14 sale [2] - 769:10, 769:14 sales [7] - 767:4, 767:18, 768:15, 768:17, 769:15, 769:25, 770:15 sample [1] - 997:6 San [2] - 789:10, 871:11 satisfied [2] - 984:25, 1024:20 satisfies [1] - 930:6 saw [10] - 771:13, 810:7, 864:24, 865:18, 873:18, 876:24, 896:8, 896:11, 898:5, 906:14 scaled [1] - 815:5</p>				

836:18, 854:19,
854:20, 854:22,
877:23, 878:2,
878:13, 879:9,
891:9, 894:20,
897:16, 992:6,
992:18, 992:24,
992:25, 993:3,
993:4, 1002:14,
1002:17, 1003:6,
1003:7, 1003:16,
1003:17, 1004:2,
1004:3, 1004:8
sensors [3] - 833:18,
876:6, 1002:25
sent [5] - 755:9,
755:18, 809:15,
828:11, 900:11
sentence [2] - 956:19,
956:20
separate [5] - 783:10,
800:19, 897:19,
928:7, 960:7
separately [2] -
761:14, 761:17
separation [1] - 893:3
September [1] -
902:12
series [1] - 929:2
server [2] - 820:3,
998:24
service [1] - 776:7
set [20] - 768:7, 777:2,
801:11, 811:3,
855:17, 864:7,
869:15, 899:16,
927:5, 927:7, 930:5,
930:6, 966:4, 969:6,
988:9, 1006:3,
1006:4, 1009:21,
1016:18, 1025:10
Seth [1] - 902:3
SETH [1] - 753:21
sets [7] - 864:4, 864:5,
948:9, 948:10,
966:7, 972:7, 984:18
seven [15] - 812:20,
847:15, 855:25,
858:3, 859:1,
866:17, 868:22,
885:13, 885:17,
905:19, 1023:15,
1023:16, 1023:17
several [4] - 793:18,
848:15, 923:10,
944:23
sexual [1] - 837:5
shadow [8] - 922:5,
922:9, 922:11,
922:21, 922:24,

936:6, 936:8, 936:10
shall [1] - 1029:23
shaped [1] - 1007:5
share [1] - 870:19
shared [1] - 789:1
sheets [1] - 1007:13
shelf [1] - 875:20
shielded [1] - 797:23
shift [1] - 824:24
shine [4] - 797:21,
798:23, 922:5,
922:14
shines [1] - 940:14
shining [1] - 798:16
shoots [1] - 1006:15
shopping [2] - 962:8,
963:2
short [2] - 828:20,
829:1
shortcut [2] - 851:20,
875:5
shortening [1] -
808:12
shortly [1] - 900:1
shot [1] - 825:6
show [30] - 759:9,
768:16, 773:1,
798:15, 800:11,
805:13, 836:2,
861:22, 875:2,
887:24, 890:19,
893:1, 901:3,
912:18, 939:18,
944:14, 945:9,
945:12, 953:10,
962:19, 967:10,
970:19, 977:3,
977:15, 978:10,
1015:16, 1021:3,
1021:20, 1027:24,
1030:4
showed [21] - 788:24,
806:11, 806:14,
807:10, 818:2,
822:10, 825:4,
826:24, 840:22,
841:9, 891:7,
892:14, 959:8,
968:22, 976:7,
976:8, 976:11,
977:7, 978:13,
978:16, 979:6
showing [47] - 783:20,
788:12, 788:23,
789:15, 789:20,
791:5, 795:5, 797:1,
801:3, 805:16,
813:21, 815:19,
816:12, 822:21,
823:4, 825:2, 825:4,

835:15, 836:6,
837:17, 840:20,
845:7, 846:1, 852:7,
852:9, 853:2, 853:7,
854:2, 855:14,
855:20, 855:22,
865:6, 865:15,
866:12, 867:15,
869:2, 871:12,
872:19, 875:16,
878:9, 879:7,
881:23, 882:12,
884:14, 884:15,
937:4, 968:12
shown [24] - 767:13,
767:15, 797:10,
805:20, 822:24,
823:11, 823:22,
826:9, 826:10,
856:6, 871:19,
871:25, 875:8,
889:4, 891:6, 894:6,
897:13, 911:24,
947:20, 970:25,
972:9, 985:19,
986:3, 998:4
shows [19] - 764:6,
768:14, 773:2,
791:8, 795:10,
816:15, 968:18,
975:17, 976:10,
976:11, 976:21,
976:25, 977:11,
977:20, 977:25,
978:4, 978:6,
978:17, 1013:8
side [24] - 761:4,
763:9, 771:21,
771:24, 773:18,
795:11, 823:18,
824:18, 825:13,
825:19, 877:19,
891:4, 891:20,
893:18, 900:11,
971:2, 971:3,
1006:24, 1006:25,
1028:24
side-bar [4] - 761:4,
763:9, 771:21,
771:24
side-by-side [4] -
823:18, 824:18,
825:13, 825:19
sidebar [2] - 756:1,
773:10
sides [1] - 761:2
Siemens [4] - 795:10,
795:17, 806:16,
835:9
signal [4] - 856:24,

857:2, 857:12,
857:13
signals [9] - 807:23,
853:9, 853:25,
854:22, 854:23,
863:2, 863:6,
864:25, 874:17
significant [1] -
891:24
Silicon [1] - 774:18
similar [5] - 845:22,
848:5, 866:4,
928:11, 937:25
similarities [1] -
845:21
similarly [8] - 806:14,
817:9, 821:13,
825:15, 833:21,
866:1, 879:11,
940:11
simply [1] - 802:21
simultaneous [1] -
801:11
simultaneously [1] -
814:18
single [14] - 787:24,
798:12, 800:16,
804:16, 804:19,
819:25, 830:7,
841:21, 856:3,
862:9, 940:7,
940:15, 942:9
sit [1] - 1029:10
site [1] - 1014:16
sites [1] - 872:9
sitting [1] - 825:2
situation [1] - 1003:1
six [15] - 812:21,
821:7, 821:13,
833:6, 856:2, 856:4,
856:5, 856:12,
864:18, 877:21,
879:12, 985:5,
985:18, 985:19
six-way [2] - 856:4,
856:12
size [4] - 766:25,
771:4, 942:16,
962:18
skeleton [2] - 921:14,
921:16
skill [6] - 830:22,
830:24, 831:3,
831:4, 831:6,
831:20, 831:25,
832:1, 832:3, 832:9,
832:16, 832:20,
842:5, 842:17,
846:21, 848:2,
848:16, 848:21,

848:22, 849:6,
858:24, 861:7,
862:4, 862:8, 863:9,
873:8, 873:24,
874:1, 874:2, 874:6,
880:14, 880:17,
882:19, 883:11,
883:16, 886:2,
886:20, 887:20,
889:10, 889:25,
890:7, 892:4,
951:14, 960:14,
960:16, 986:16,
988:2, 988:5, 988:7,
988:9, 988:14,
988:20, 988:24,
990:3, 990:10,
990:21, 993:10,
993:18, 993:24,
994:5, 994:8
skills [5] - 988:11,
989:1, 989:4, 989:7,
989:16
skipping [1] - 989:20
skull [1] - 868:9
slice [6] - 799:16,
799:17, 799:18,
820:14, 820:15,
861:15
slices [2] - 862:24,
920:5
slide [19] - 778:6,
780:12, 783:20,
784:22, 788:13,
788:22, 791:5,
795:5, 796:25,
798:4, 800:20,
803:21, 805:5,
805:16, 806:15,
811:20, 813:21,
814:13, 814:14,
815:19, 815:20,
817:22, 819:2,
819:15, 821:4,
822:2, 822:15,
823:10, 823:24,
825:3, 825:4,
826:20, 826:24,
830:12, 831:1,
833:10, 833:11,
834:7, 835:13,
836:5, 837:17,
837:21, 838:5,
838:23, 839:11,
840:9, 840:10,
840:20, 840:22,
841:3, 842:14,
846:1, 847:3,
851:15, 852:7,
853:2, 854:1,

<p>854:13, 855:5, 855:14, 855:20, 856:17, 858:16, 860:15, 861:4, 861:12, 862:10, 864:7, 865:6, 865:14, 866:12, 867:15, 871:21, 872:19, 874:18, 875:9, 875:14, 876:10, 878:5, 878:8, 878:16, 879:6, 880:6, 881:6, 881:23, 882:12, 884:13, 885:22, 886:4, 886:22, 888:10, 889:5, 890:4, 890:11, 890:24, 892:22, 894:6, 895:22, 896:5, 897:13, 903:10, 904:16, 905:19, 906:13, 906:15, 913:8, 914:20, 914:23, 915:3, 916:17, 917:19, 917:24, 918:19, 924:12, 924:24, 925:23, 925:25, 932:7, 943:11, 946:10, 952:15, 952:21, 953:7, 953:8, 958:4, 959:25, 961:1, 961:13, 961:19, 961:21, 961:23, 962:13, 963:5, 964:5, 964:17, 966:5, 969:17, 969:21, 970:25, 974:17, 975:16, 975:20, 976:6, 976:7, 976:10, 976:11, 976:17, 976:24, 977:6, 977:11, 977:19, 977:22, 977:24, 978:3, 978:6, 978:12, 978:16, 978:24, 978:25, 979:1, 979:4, 980:4, 980:11, 984:23, 986:8, 991:5, 995:24, 996:16, 996:22, 1000:19, 1000:21, 1001:10, 1001:24, 1002:1, 1002:12</p> <p>slides [14] - 777:2, 777:5, 777:9, 777:10, 857:24,</p>	<p>903:3, 952:16, 960:17, 977:23, 980:25, 996:18, 1000:16, 1000:17, 1000:19</p> <p>slightly [1] - 797:4</p> <p>slow [1] - 969:7</p> <p>slower [1] - 1000:20</p> <p>small [8] - 760:15, 765:4, 765:6, 783:6, 783:12, 811:1, 927:21, 938:9</p> <p>smaller [3] - 764:6, 781:9, 783:7</p> <p>smallest [1] - 766:13</p> <p>smart [1] - 786:20</p> <p>SmartPan [1] - 800:10</p> <p>smoke [1] - 991:13</p> <p>snippet [1] - 810:9</p> <p>so-called [6] - 960:1, 960:8, 960:11, 961:15, 962:13, 1015:24</p> <p>soccer [3] - 962:4, 962:6, 962:13</p> <p>societies [2] - 776:8, 784:24</p> <p>society [3] - 784:17, 785:2, 785:4</p> <p>soft [14] - 783:10, 783:11, 816:16, 870:21, 871:22, 908:20, 933:7, 934:6, 934:11, 934:17, 934:18, 937:6, 938:4, 939:9</p> <p>software [55] - 761:9, 762:8, 762:16, 762:23, 762:25, 779:20, 822:11, 833:16, 833:23, 847:7, 847:9, 859:11, 859:21, 859:22, 859:25, 860:8, 860:9, 860:13, 860:19, 874:11, 874:16, 880:21, 881:4, 881:9, 881:13, 888:16, 897:3, 897:7, 898:13, 898:14, 898:15, 898:18, 898:19, 915:20, 917:8, 961:24, 978:14, 978:18, 978:19, 986:11, 986:18, 986:21, 987:3, 987:9, 987:11, 987:22, 989:22,</p>	<p>990:4, 990:5, 990:6, 990:11, 990:12, 991:1, 991:2</p> <p>sold [8] - 761:14, 762:16, 769:18, 771:12, 771:15, 812:4, 895:5, 997:9</p> <p>solely [3] - 960:8, 960:9, 960:22</p> <p>solutions [2] - 865:25, 954:16</p> <p>solving [2] - 801:10, 820:7</p> <p>someone [15] - 807:25, 892:3, 921:13, 921:15, 922:3, 944:2, 948:21, 954:23, 988:2, 988:6, 988:8, 988:14, 988:24, 989:15, 1008:25</p> <p>sometime [2] - 808:25, 1030:5</p> <p>sometimes [3] - 768:18, 768:22, 857:25</p> <p>somewhat [2] - 808:13, 973:16</p> <p>somewhere [1] - 912:13</p> <p>son [1] - 774:15</p> <p>Song [1] - 983:20</p> <p>soon [4] - 787:5, 890:20, 1027:20, 1029:13</p> <p>sorry [58] - 755:6, 765:12, 775:23, 785:10, 802:11, 805:6, 819:18, 821:16, 834:4, 837:14, 841:14, 863:21, 865:2, 868:3, 878:11, 880:4, 886:19, 889:18, 892:14, 897:4, 897:25, 914:17, 914:20, 917:6, 917:24, 919:7, 921:14, 925:3, 925:24, 927:8, 929:14, 930:22, 932:5, 938:24, 943:24, 949:18, 954:14, 957:23, 962:10, 962:11, 966:4, 967:8, 967:11, 968:18, 969:10, 971:21, 977:22, 992:25, 993:17,</p>	<p>995:1, 995:8, 1000:15, 1002:1, 1005:15, 1008:22, 1028:7</p> <p>sort [10] - 776:12, 836:2, 873:11, 923:9, 925:4, 927:2, 929:3, 933:20, 947:8, 1019:1</p> <p>sought [6] - 756:7, 756:12, 756:14, 757:8, 757:17, 842:2</p> <p>sounds [2] - 938:8, 1011:21</p> <p>source [89] - 779:25, 783:19, 783:25, 784:3, 797:9, 800:13, 818:4, 833:7, 833:22, 835:17, 836:1, 836:17, 836:21, 839:22, 845:13, 845:15, 846:7, 854:8, 854:16, 854:19, 854:20, 854:25, 855:8, 855:12, 855:22, 856:3, 856:4, 877:18, 877:20, 877:21, 878:1, 878:11, 878:13, 878:17, 878:23, 889:13, 889:14, 890:11, 890:13, 890:15, 890:16, 890:17, 890:19, 891:1, 891:3, 891:7, 891:8, 891:9, 891:15, 891:16, 892:1, 892:7, 915:12, 915:16, 915:17, 915:18, 915:21, 926:3, 926:8, 926:10, 926:18, 927:16, 977:8, 992:5, 992:11, 992:14, 992:15, 992:22, 993:3, 993:4, 993:9, 993:15, 993:17, 993:19, 993:21, 993:22, 994:13, 994:14, 995:11, 995:19, 1006:13, 1006:14</p> <p>source-he [1] - 993:17</p> <p>sources [8] - 833:18, 836:8, 848:5, 915:24, 993:6, 993:12, 993:13</p>	<p>south [1] - 774:22</p> <p>speaks [1] - 892:3</p> <p>specialist [1] - 766:10</p> <p>specialists [3] - 764:9, 766:22, 767:2</p> <p>specializing [1] - 764:5</p> <p>specific [10] - 798:5, 803:19, 833:17, 835:23, 888:18, 902:24, 905:18, 910:10, 986:23, 1020:17</p> <p>specifically [10] - 770:18, 778:20, 852:20, 853:17, 854:15, 904:13, 905:15, 906:6, 906:19, 957:6</p> <p>specification [7] - 869:15, 891:25, 892:6, 910:10, 991:24, 993:11, 993:15</p> <p>specifications [1] - 837:1</p> <p>specifics [1] - 986:13</p> <p>specifying [1] - 824:16</p> <p>spell [2] - 774:3, 978:11</p> <p>spent [3] - 767:14, 911:3, 1019:7</p> <p>sphere [1] - 927:22</p> <p>SPIE [1] - 785:3</p> <p>spinal [1] - 944:5</p> <p>spine [8] - 791:14, 791:16, 845:3, 912:3, 919:16, 919:21, 921:13</p> <p>spines [1] - 919:23</p> <p>square [1] - 760:18</p> <p>staff [1] - 1025:17</p> <p>stand [11] - 754:18, 851:10, 887:24, 901:22, 922:5, 922:8, 975:7, 991:8, 991:11, 1015:10, 1029:8</p> <p>standard [15] - 814:18, 814:19, 838:17, 841:19, 865:25, 887:4, 890:21, 897:7, 898:17, 898:19, 910:4, 984:25, 1013:14, 1016:17</p> <p>standards [14] - 789:19, 789:20, 789:22, 789:23,</p>
--	--	--	---	--

791:12, 795:14,
795:20, 861:17,
872:4, 881:20,
920:10, 920:25,
932:18, 933:3
standing [5] - 773:8,
814:17, 850:4,
923:14, 926:24
stands [5] - 759:8,
759:12, 793:16,
823:13, 957:8
Stanford [5] - 778:6,
778:9, 780:13,
781:24, 904:1
Stark [1] - 931:16
start [13] - 808:1,
841:24, 844:14,
849:19, 851:19,
855:5, 895:8,
916:10, 946:25,
986:7, 1000:9,
1009:6, 1010:17
started [3] - 771:11,
786:22, 903:11
starting [3] - 800:8,
929:17, 1023:1
startled [1] - 788:20
starts [1] - 1022:14
state [9] - 774:3,
777:23, 844:8,
889:24, 923:9,
925:4, 938:18,
1017:3, 1017:16
statement [14] -
766:12, 770:1,
956:7, 957:18,
961:2, 963:6, 963:8,
963:17, 964:9,
967:3, 990:21,
995:12, 1016:8,
1020:25
statements [1] -
961:10
STATES [1] - 753:1
States [6] - 753:14,
762:12, 762:20,
762:21, 769:1,
774:22
statistical [1] - 767:3
steering [1] - 891:23
step [10] - 773:15,
812:7, 816:19,
848:1, 857:14,
871:13, 879:19,
888:23, 1015:24
stepping [1] - 969:9
stick [2] - 947:14,
1028:18
still [15] - 754:19,
808:8, 851:10,

869:23, 894:1,
926:25, 935:24,
963:3, 992:10,
1001:1, 1005:4,
1007:13, 1008:8,
1008:24, 1026:11
stitching [7] - 895:23,
895:24, 896:4,
897:14, 962:7,
962:8, 962:18
stop [2] - 951:22,
1004:22
storage [2] - 784:8,
865:1
stored [2] - 853:9,
864:25
storing [26] - 821:10,
833:23, 852:2,
864:8, 864:9,
864:12, 864:18,
864:20, 864:22,
866:9, 884:2, 884:4,
884:10, 884:11,
884:12, 884:17,
885:5, 980:4, 980:5,
980:7, 980:12,
980:14, 980:15,
980:19, 980:21,
980:22
straight [1] - 757:20
strange [1] - 786:20
strategy [1] - 959:16
Street [1] - 753:11
stretch [1] - 991:8
strife [1] - 775:1
strike [2] - 1019:24,
1019:25
striking [1] - 1012:11
strongly [2] - 894:1,
994:3
structural [1] - 852:14
structure [13] -
783:13, 833:22,
835:25, 836:3,
845:20, 854:21,
854:24, 860:4,
864:14, 873:21,
878:1, 895:20,
911:20
structures [2] - 910:2,
1003:4
student [2] - 905:13,
905:14
students [2] - 782:17,
904:7
studies [3] - 780:2,
861:24, 916:15
stuff [6] - 914:11,
934:1, 964:25,
982:8, 1001:1,

1014:16
sub [3] - 787:23,
823:25, 824:2
subject [21] - 763:8,
797:10, 841:22,
842:2, 842:3, 842:6,
951:21, 995:21,
1012:19, 1012:22,
1013:2, 1013:12,
1013:25, 1016:4,
1016:17, 1016:21,
1016:25, 1017:24,
1018:2, 1025:6,
1029:23
subject's [1] - 845:3
subject/said [1] -
804:8
submerged [1] - 788:4
submit [1] - 850:11
submits [1] - 869:11
submitted [1] - 851:1
subset [3] - 927:21,
929:11, 933:13
substance [1] -
890:25
success [11] - 843:6,
843:17, 843:20,
843:21, 843:23,
1020:22, 1021:21,
1024:9, 1024:11,
1024:18, 1024:19
successful [4] -
843:16, 1021:14,
1024:17, 1024:22
sufficient [9] - 824:17,
876:17, 886:1,
889:9, 897:19,
897:23, 947:12,
979:13, 1021:5
sufficiently [1] - 913:7
suggest [1] - 873:19
suggested [3] -
873:16, 949:21,
949:22
suit [3] - 775:7,
985:10, 985:15
suitable [2] - 947:25,
990:15
sum [1] - 905:24
summarize [8] -
769:9, 777:5, 782:9,
807:1, 840:9,
892:10, 955:12,
957:2
summarized [1] -
780:13
summarizing [2] -
817:22, 817:24
summary [10] -
811:20, 822:5,

826:4, 826:20,
833:10, 834:11,
840:9, 847:2,
893:15, 958:6
super [1] - 798:10
superimposed [1] -
799:9
superimposition [11] -
799:20, 801:5,
801:10, 805:2,
820:13, 823:25,
824:2, 825:7,
825:22, 826:4,
898:22
superior [1] - 843:8
supplemented [1] -
991:23
supplementing [1] -
991:25
support [3] - 886:6,
886:9, 888:14
supports [1] - 836:20
suppose [3] - 817:1,
893:7, 921:21
supposed [15] -
764:24, 804:4,
887:11, 887:12,
887:22, 888:20,
888:23, 889:11,
943:10, 949:16,
994:1, 999:4,
999:16, 1003:2,
1003:13
surface [2] - 908:8,
940:24
surfaces [1] - 947:24
surgeons [1] - 765:2
surprise [4] - 907:1,
907:4, 907:10, 938:2
surprised [3] - 907:20,
911:13, 918:17
surprising [2] -
866:24, 867:2
suspect [3] - 831:22,
907:5, 935:5
sustain [4] - 759:14,
1010:12, 1011:6,
1017:20
sustaining [1] - 761:2
sustains [1] - 758:18
swear [1] - 774:2
switch [1] - 795:21
switched [1] - 780:17
sworn [1] - 774:7
symmetrical [1] -
1005:20
synthesize [1] - 860:8
system [55] - 767:24,
769:10, 779:24,
780:1, 781:8, 784:3,

787:20, 797:7,
806:15, 807:9,
811:18, 812:10,
812:24, 818:8,
820:7, 836:22,
844:25, 845:17,
846:24, 847:9,
848:11, 849:17,
862:9, 862:23,
871:19, 883:14,
894:15, 894:18,
897:4, 911:19,
915:19, 917:9,
927:3, 930:5,
940:13, 942:18,
953:2, 954:5,
956:14, 957:12,
957:13, 998:1,
998:6, 998:7,
998:17, 1003:3,
1003:5, 1003:8,
1007:16, 1024:24
Systems [1] - 778:3
systems [48] - 762:18,
763:2, 763:5, 767:1,
767:21, 768:4,
770:15, 779:13,
786:12, 795:23,
807:4, 811:14,
811:15, 811:21,
812:11, 812:14,
812:16, 813:10,
814:15, 817:15,
817:19, 818:12,
818:19, 818:25,
820:4, 822:3, 822:6,
822:12, 825:24,
828:22, 828:25,
830:17, 833:15,
843:23, 848:4,
849:14, 895:5,
899:5, 903:12,
903:13, 905:9,
905:10, 907:4,
943:15, 944:21,
956:3, 956:8, 957:19

T

tab [6] - 762:2, 775:18,
775:23, 868:1,
928:21
Tab [22] - 755:13,
775:18, 775:23,
781:1, 790:1,
792:16, 794:1,
796:2, 796:4,
827:17, 829:11,
829:13, 834:12,
867:25, 868:1,
868:13, 870:2,

<p>902:16, 911:9, 949:8, 949:9</p> <p>table [31] - 767:8, 784:4, 784:6, 788:6, 791:18, 792:1, 816:15, 865:18, 896:21, 932:12, 932:15, 933:4, 933:12, 935:4, 937:4, 937:8, 976:2, 976:14, 977:2, 977:14, 978:2, 978:9, 978:23, 979:22, 980:19, 980:24, 1002:6, 1002:11, 1019:8</p> <p>tables [1] - 817:25</p> <p>talented [1] - 831:11</p> <p>talks [4] - 823:25, 856:14, 881:7, 916:17</p> <p>targeted [1] - 769:7</p> <p>targets [1] - 768:18</p> <p>taught [7] - 782:15, 782:23, 805:8, 841:22, 874:8, 906:10, 913:6</p> <p>Tawast [5] - 755:18, 828:13, 828:19, 829:3, 830:6</p> <p>teach [7] - 801:24, 802:2, 859:14, 904:13, 906:11, 912:23, 912:24</p> <p>teaches [4] - 848:12, 859:11, 918:22, 966:15</p> <p>teaching [5] - 776:6, 782:16, 861:8, 904:1, 904:6</p> <p>teachings [5] - 782:10, 846:21, 866:20, 873:20, 883:12</p> <p>technic [1] - 788:2</p> <p>technical [8] - 786:1, 786:3, 786:15, 891:22, 892:19, 893:18, 893:19, 897:1</p> <p>technically [1] - 1013:3</p> <p>technique [9] - 783:10, 789:16, 795:16, 796:22, 846:10, 871:25, 884:20, 929:9, 1007:14</p> <p>techniques [15] - 780:4, 780:5, 780:9,</p>	<p>792:10, 799:14, 815:9, 837:6, 860:12, 874:8, 909:1, 913:18, 926:23, 926:24, 963:19, 1015:14</p> <p>technological [2] - 892:23, 898:6</p> <p>technology [22] - 786:17, 792:9, 797:17, 833:11, 849:4, 872:21, 896:21, 896:23, 932:18, 932:24, 954:16, 1005:19, 1006:1, 1006:2, 1013:10, 1013:12, 1013:24, 1015:7, 1016:15, 1016:23, 1020:20</p> <p>teeth [24] - 895:19, 906:22, 908:1, 908:6, 908:7, 908:14, 908:15, 908:17, 908:19, 910:19, 911:17, 912:15, 913:4, 918:13, 919:18, 934:14, 938:19, 938:20, 938:25, 939:2, 942:14, 942:15, 1003:25</p> <p>temple [1] - 824:23</p> <p>temporal [1] - 823:13</p> <p>temporomandibular [2] - 823:14, 823:17</p> <p>ten [17] - 781:3, 865:4, 880:4, 896:1, 899:10, 899:20, 900:11, 922:5, 922:8, 951:23, 1000:14, 1001:18, 1008:14, 1008:23, 1029:5, 1029:13, 1029:15</p> <p>tend [1] - 764:6</p> <p>tender [2] - 785:7, 785:11</p> <p>tends [1] - 870:18</p> <p>tens [2] - 927:12</p> <p>tenure [2] - 761:8, 780:3</p> <p>term [15] - 800:2, 803:23, 804:1, 816:2, 819:4, 822:7, 828:20, 829:1, 829:25, 843:3, 855:3, 865:25, 889:8, 929:13</p> <p>terminology [1] -</p>	<p>908:18</p> <p>terms [16] - 804:4, 812:17, 813:3, 818:20, 818:21, 818:22, 819:5, 838:20, 861:10, 863:10, 883:5, 883:7, 889:20, 890:12, 909:9, 939:5</p> <p>test [2] - 944:11, 1015:24</p> <p>tested [4] - 943:16, 943:20, 944:1, 944:2</p> <p>testified [21] - 762:24, 774:8, 792:6, 802:5, 814:23, 818:10, 827:10, 827:14, 839:4, 839:25, 882:7, 893:21, 894:4, 944:23, 965:18, 967:15, 974:22, 991:15, 995:25, 1001:14, 1020:19</p> <p>testify [3] - 938:1, 997:19, 1002:10</p> <p>testifying [1] - 1003:11</p> <p>testimony [39] - 755:4, 761:25, 762:1, 764:14, 765:9, 765:12, 766:5, 767:7, 771:17, 776:11, 777:3, 777:11, 785:23, 801:20, 802:14, 803:6, 805:11, 810:22, 825:19, 825:20, 829:6, 853:22, 862:15, 893:24, 961:19, 995:21, 1001:17, 1001:19, 1004:7, 1004:15, 1011:1, 1011:2, 1013:1, 1015:4, 1015:7, 1017:10, 1017:16, 1023:21, 1024:14</p> <p>testing [1] - 903:18</p> <p>Texas [1] - 1018:21</p> <p>text [20] - 797:3, 836:9, 837:4, 839:3, 849:10, 853:8, 854:6, 855:10, 860:2, 864:24, 872:20, 876:25, 879:8, 879:12, 880:9, 888:6, 888:9, 926:7, 972:4, 990:24</p> <p>texts [1] - 852:8</p>	<p>that-he [1] - 990:17</p> <p>THE [236] - 753:1, 753:2, 753:13, 754:15, 754:21, 754:22, 755:25, 756:2, 756:9, 756:12, 756:20, 757:2, 757:10, 757:15, 757:20, 758:1, 758:23, 759:5, 759:9, 759:13, 759:20, 759:23, 760:7, 760:17, 761:5, 763:10, 763:14, 770:6, 771:23, 771:25, 772:4, 772:9, 772:20, 773:2, 773:7, 773:12, 773:15, 773:18, 773:22, 773:25, 774:5, 774:9, 775:16, 776:20, 776:22, 781:13, 781:15, 781:18, 785:15, 785:17, 790:14, 790:16, 790:20, 793:3, 793:5, 793:9, 794:14, 794:16, 794:20, 796:11, 796:13, 807:13, 807:17, 807:21, 808:10, 808:14, 809:2, 809:8, 809:13, 809:17, 809:22, 809:25, 810:3, 810:8, 810:11, 810:14, 810:19, 828:1, 828:3, 828:7, 834:23, 834:25, 849:21, 850:4, 850:7, 850:15, 850:22, 868:22, 868:24, 870:11, 870:13, 899:8, 899:13, 899:19, 899:22, 900:4, 900:6, 900:14, 900:19, 901:7, 901:13, 901:19, 950:2, 950:8, 950:9, 951:22, 952:3, 952:6, 952:11, 954:10, 955:11, 955:16, 955:20, 955:23, 957:2, 969:1, 969:10, 969:13, 985:13, 991:6, 994:16,</p>	<p>994:20, 994:23, 996:9, 996:13, 996:14, 999:17, 999:18, 1004:21, 1004:25, 1005:11, 1005:15, 1005:16, 1005:23, 1005:25, 1006:5, 1006:6, 1006:8, 1006:9, 1006:11, 1006:13, 1006:16, 1006:18, 1006:20, 1006:21, 1006:24, 1006:25, 1007:2, 1007:5, 1007:8, 1007:10, 1007:17, 1007:20, 1007:23, 1007:25, 1008:2, 1008:5, 1008:6, 1008:11, 1008:12, 1008:18, 1008:22, 1008:24, 1009:5, 1009:15, 1009:18, 1010:4, 1010:21, 1011:5, 1011:12, 1011:16, 1011:21, 1012:5, 1012:11, 1012:14, 1013:6, 1013:15, 1013:20, 1014:2, 1014:5, 1014:9, 1014:12, 1014:15, 1014:24, 1015:5, 1015:11, 1015:16, 1015:19, 1016:1, 1016:9, 1017:2, 1017:23, 1018:6, 1018:9, 1019:5, 1019:15, 1020:5, 1020:9, 1020:13, 1021:7, 1022:6, 1022:14, 1022:17, 1022:25, 1023:5, 1023:14, 1023:17, 1023:19, 1023:20, 1024:2, 1024:6, 1024:13, 1025:1, 1025:9, 1025:14, 1025:20, 1026:3, 1026:8, 1026:15, 1026:18, 1026:25, 1027:6, 1027:10, 1027:15, 1028:1, 1028:5, 1028:8, 1028:14, 1028:25, 1029:3, 1029:6, 1029:19, 1029:25, 1030:4, 1030:13, 1030:17</p> <p>the;884 [1] - 867:23</p> <p>theirs [1] - 1027:24</p> <p>themselves [1] -</p>
--	--	---	---	--

<p>964:14</p> <p>theoretically [4] - 815:10, 815:11, 815:22, 1006:9</p> <p>theories [1] - 960:3</p> <p>theory [6] - 802:18, 803:23, 814:22, 819:16, 952:17, 960:7</p> <p>therefore [1] - 898:19</p> <p>they've [4] - 757:6, 760:5, 810:7, 872:6</p> <p>thickness [1] - 798:19</p> <p>thigh [1] - 911:22</p> <p>thinking [3] - 915:9, 928:19, 931:17</p> <p>thinks [2] - 948:14, 1019:20</p> <p>third [5] - 761:20, 821:3, 896:5, 974:5, 1028:19</p> <p>Third [1] - 756:5</p> <p>THOMAS [1] - 753:21</p> <p>thousands [4] - 927:15, 927:17, 927:23, 928:9</p> <p>thread [2] - 932:7, 936:25</p> <p>three [52] - 766:16, 783:3, 791:17, 800:4, 801:24, 812:15, 816:17, 817:8, 817:11, 821:11, 824:9, 824:10, 826:13, 832:7, 832:19, 838:1, 845:1, 860:8, 862:24, 862:25, 864:12, 865:19, 865:20, 865:22, 870:23, 902:9, 902:12, 911:19, 920:5, 947:19, 947:23, 948:8, 958:9, 959:25, 960:3, 960:18, 963:9, 963:13, 964:9, 964:21, 984:18, 985:10, 985:15, 987:4, 991:3, 991:16, 1012:20, 1017:7, 1024:8</p> <p>three-dimensional [1] - 845:1</p> <p>three-year [1] - 902:12</p> <p>threshold [3] - 1013:13, 1014:1, 1016:17</p> <p>throughout [3] -</p>	<p>768:13, 768:25, 1025:16</p> <p>Thursday [1] - 753:9</p> <p>tied [1] - 1024:11</p> <p>timeline [1] - 873:3</p> <p>timely [1] - 849:23</p> <p>Timo [1] - 786:7</p> <p>tip [1] - 758:3</p> <p>tire [1] - 893:7</p> <p>tires [3] - 893:10, 893:12, 893:14</p> <p>tissue [30] - 783:10, 783:11, 816:16, 860:9, 865:9, 870:21, 871:22, 884:25, 885:1, 908:20, 921:9, 933:8, 934:4, 934:6, 934:7, 934:11, 934:12, 934:17, 934:18, 935:2, 937:7, 939:9, 942:12, 942:15, 942:20, 942:24, 943:1, 943:3</p> <p>tissues [2] - 863:1, 938:4</p> <p>title [5] - 791:7, 868:6, 868:7, 918:25, 954:19</p> <p>titled [2] - 871:15, 871:22</p> <p>TMJ [5] - 823:11, 823:12, 823:13, 823:15</p> <p>today [29] - 759:22, 775:5, 777:2, 777:11, 793:19, 811:22, 814:3, 826:14, 837:11, 839:4, 893:24, 908:24, 925:7, 925:16, 925:22, 959:9, 959:22, 960:10, 967:12, 967:14, 989:9, 995:22, 1000:9, 1001:14, 1001:19, 1015:7, 1023:25, 1025:25</p> <p>today's [2] - 1001:19, 1006:2</p> <p>together [15] - 768:16, 798:20, 801:7, 824:5, 825:8, 825:9, 832:19, 855:2, 870:19, 925:12, 929:11, 931:3, 962:1, 1015:21</p> <p>tolerate [1] - 969:3</p>	<p>tomogram [2] - 792:21, 979:5</p> <p>tomograms [2] - 883:9, 883:10</p> <p>tomographic [77] - 791:13, 800:14, 804:5, 804:14, 804:15, 804:19, 804:20, 804:23, 804:25, 805:1, 805:12, 806:4, 806:17, 811:17, 813:2, 813:25, 814:1, 818:25, 819:4, 819:9, 819:22, 819:24, 820:2, 820:10, 820:12, 820:14, 820:19, 820:20, 821:15, 826:17, 830:3, 830:4, 831:9, 831:14, 844:25, 864:5, 864:10, 866:25, 883:8, 883:17, 883:23, 883:24, 920:5, 928:12, 929:6, 929:12, 929:19, 930:7, 930:21, 931:3, 931:5, 931:6, 931:8, 931:9, 931:10, 931:19, 931:21, 932:1, 951:3, 951:11, 971:25, 972:6, 974:7, 974:9, 974:11, 974:12, 974:13, 979:9, 979:10, 979:11, 979:12, 979:15, 987:22</p> <p>tomographical [2] - 858:5, 859:4</p> <p>tomographically [1] - 1003:3</p> <p>tomography [121] - 778:20, 779:9, 779:10, 779:15, 780:22, 783:17, 783:18, 785:8, 785:13, 788:12, 788:23, 789:3, 789:6, 789:12, 790:8, 792:24, 794:10, 795:22, 795:24, 795:25, 796:18, 799:10, 799:14, 799:22, 800:1, 800:2, 800:4, 800:12, 800:18,</p>	<p>800:21, 801:1, 801:25, 802:2, 813:7, 814:10, 814:17, 831:17, 833:20, 837:3, 837:5, 838:24, 839:1, 839:4, 840:6, 841:1, 841:4, 841:6, 841:10, 841:14, 841:15, 846:9, 846:11, 846:16, 846:23, 861:22, 862:5, 870:21, 871:2, 871:23, 872:7, 873:17, 873:20, 881:19, 882:21, 895:9, 895:10, 896:17, 896:18, 903:14, 904:19, 905:7, 906:10, 918:23, 919:1, 919:25, 920:3, 925:24, 926:23, 926:24, 927:11, 927:13, 927:19, 929:22, 930:2, 930:13, 931:1, 932:1, 963:18, 963:23, 964:16, 964:22, 964:25, 965:15, 965:16, 966:13, 966:18, 967:4, 967:24, 968:13, 973:5, 973:7, 973:8, 973:10, 973:23, 974:1, 974:3, 974:4, 974:5, 974:6, 974:15, 979:19, 979:21, 979:23, 979:25, 989:14, 996:23, 998:1, 998:17, 999:11, 1000:7</p> <p>tomorrow [4] - 1005:5, 1005:7, 1008:19, 1008:20</p> <p>tomosynthesis [20] - 779:10, 780:18, 800:7, 831:17, 862:23, 904:20, 927:12, 929:18, 930:1, 930:12, 930:25, 973:2, 973:4, 973:6, 973:9, 973:13, 973:14, 973:17, 974:1, 974:3</p> <p>tomosynthetic [2] - 860:10, 860:11</p> <p>tongue [1] - 758:3</p>	<p>took [3] - 787:9, 817:1, 902:22</p> <p>tooth [15] - 919:17, 919:19, 919:20, 933:15, 933:19, 934:3, 934:5, 937:11, 937:24, 939:3, 939:5, 939:14, 942:24, 942:25</p> <p>top [7] - 793:14, 796:8, 797:10, 827:22, 828:11, 845:12, 1004:17</p> <p>topic [3] - 764:14, 771:21, 778:17</p> <p>topics [1] - 782:15</p> <p>total [2] - 906:2, 1000:14</p> <p>totally [1] - 958:12</p> <p>touched [2] - 844:8, 867:15</p> <p>toward [1] - 797:25</p> <p>trabecular [1] - 794:4</p> <p>track [1] - 884:25</p> <p>trade [1] - 768:15</p> <p>training [7] - 779:6, 782:20, 811:2, 916:12, 916:14, 916:15</p> <p>transcript [6] - 770:10, 902:13, 928:17, 928:20, 928:22, 1001:17</p> <p>transcripts [2] - 786:5, 915:22</p> <p>transfer [1] - 954:16</p> <p>transferred [1] - 863:3</p> <p>transferring [1] - 854:22</p> <p>transform [3] - 857:14, 1016:23, 1016:24</p> <p>transformed [1] - 1014:21</p> <p>transforming [1] - 857:12</p> <p>transforms [2] - 857:12, 1017:11</p> <p>translate [1] - 836:19</p> <p>translates [1] - 824:12</p> <p>transmission [3] - 893:9, 893:10, 990:15</p> <p>transmitted [3] - 798:17, 800:24, 990:14</p> <p>transparent [1] - 825:9</p> <p>traveling [1] - 891:21</p>
--	---	--	---	---

<p>travels [1] - 921:11</p> <p>treat [1] - 855:2</p> <p>treating [2] - 804:20, 820:19</p> <p>treatment [2] - 824:4</p> <p>Trial [1] - 753:10</p> <p>trial [16] - 765:12, 766:5, 784:19, 785:23, 787:23, 788:11, 818:11, 850:25, 927:3, 930:19, 941:24, 956:22, 1001:20, 1012:18, 1014:23, 1025:16</p> <p>tried [3] - 910:24, 935:6, 974:2</p> <p>true [12] - 802:22, 818:15, 819:22, 820:2, 834:10, 860:8, 862:25, 931:7, 941:19, 944:16, 959:11, 985:25</p> <p>try [12] - 768:15, 799:24, 805:13, 824:5, 825:9, 943:25, 954:24, 974:19, 975:8, 975:9, 1000:8, 1029:20</p> <p>trying [17] - 786:22, 798:15, 805:12, 815:21, 847:2, 914:20, 927:17, 929:6, 930:20, 941:14, 950:14, 952:9, 962:22, 966:5, 999:12, 1004:7, 1016:14</p> <p>tube [18] - 797:20, 797:21, 800:23, 849:12, 849:13, 858:19, 859:8, 863:5, 926:11, 926:13, 926:15, 939:25, 940:4, 940:12, 941:19, 942:7, 972:24, 1006:18</p> <p>tuition [1] - 777:23</p> <p>tumor [1] - 788:20</p> <p>TUNNELL [1] - 754:3</p> <p>turbine [2] - 903:21</p> <p>turn [25] - 765:14, 775:18, 781:1, 784:7, 790:1, 792:16, 794:1, 796:2, 800:20, 802:4, 803:21,</p>	<p>811:4, 813:9, 818:18, 827:5, 827:16, 829:11, 834:12, 844:1, 844:4, 867:25, 868:1, 870:2, 958:4</p> <p>turned [1] - 776:5</p> <p>turning [1] - 838:23</p> <p>turns [1] - 1007:16</p> <p>twenty [1] - 758:11</p> <p>twice [1] - 808:17</p> <p>two [96] - 769:2, 774:15, 774:17, 779:5, 784:15, 795:9, 798:20, 799:5, 799:17, 799:18, 799:19, 799:22, 800:9, 800:11, 807:7, 812:7, 812:24, 812:25, 813:1, 813:6, 814:3, 814:6, 814:12, 816:13, 820:22, 822:8, 823:1, 823:2, 823:9, 823:15, 823:22, 824:3, 824:8, 824:12, 825:8, 825:19, 833:13, 837:22, 839:17, 840:14, 840:16, 844:1, 845:9, 845:20, 848:4, 860:10, 864:4, 866:3, 866:4, 866:6, 868:3, 871:6, 871:8, 878:6, 879:7, 886:23, 887:1, 887:16, 905:24, 924:13, 935:22, 943:12, 945:16, 945:18, 945:19, 946:3, 946:5, 947:8, 948:8, 948:9, 948:23, 949:3, 950:2, 955:4, 964:24, 965:2, 966:7, 966:23, 970:20, 970:21, 971:6, 972:2, 972:20, 974:20, 977:14, 985:16, 986:2, 986:3, 993:11, 1015:24, 1020:21, 1022:18, 1029:20, 1030:1</p> <p>two-step [2] - 812:7, 1015:24</p> <p>type [6] - 780:19, 795:22, 800:1,</p>	<p>891:8, 908:15, 944:20</p> <p>types [6] - 779:14, 780:14, 816:7, 833:11, 843:13, 974:1</p> <p>typically [5] - 764:10, 766:22, 767:1, 927:11, 927:14</p> <p>typing [1] - 900:25</p>	<p>889:10, 890:9</p> <p>unexpected [3] - 843:8, 843:10, 873:15</p> <p>unfortunately [1] - 816:2</p> <p>Union [1] - 954:20</p> <p>Unit [5] - 795:17, 816:1, 816:20, 817:2, 865:19</p> <p>unit [8] - 771:18, 836:9, 836:11, 875:11, 876:6, 877:4, 877:21, 921:8</p> <p>UNITED [1] - 753:1</p> <p>United [6] - 753:14, 762:12, 762:20, 762:21, 768:25, 774:22</p> <p>units [44] - 761:10, 762:9, 762:17, 791:11, 791:20, 801:18, 801:21, 802:20, 803:7, 803:9, 803:10, 803:20, 806:18, 806:21, 807:5, 813:17, 813:20, 815:3, 815:4, 815:7, 815:22, 815:24, 816:19, 817:2, 818:5, 818:7, 822:21, 823:4, 833:24, 881:20, 932:9, 935:11, 935:13, 936:10, 936:12, 956:17, 956:18, 956:19, 956:21, 957:7, 957:9</p> <p>University [7] - 777:16, 778:7, 784:21, 789:10, 844:19, 871:10, 904:2</p> <p>unless [6] - 759:15, 760:19, 924:21, 974:14, 974:16, 984:5</p> <p>unpredictability [1] - 890:1</p> <p>unrelated [1] - 897:21</p> <p>unsolved [1] - 843:6</p> <p>unsuccessful [1] - 843:7</p> <p>up [81] - 760:18, 760:19, 767:8, 767:13, 768:8, 769:19, 773:4, 773:12, 774:20, 774:23, 788:11,</p>	<p>789:16, 793:14, 801:12, 808:4, 808:17, 809:2, 809:3, 811:3, 812:19, 815:23, 816:2, 817:25, 823:14, 824:8, 829:18, 830:11, 851:15, 863:21, 877:21, 887:24, 892:24, 898:11, 902:19, 906:24, 907:8, 915:3, 915:11, 932:8, 937:18, 937:19, 938:3, 939:25, 940:18, 941:4, 945:15, 947:9, 948:9, 952:6, 952:15, 960:17, 966:5, 969:25, 970:1, 970:7, 972:12, 974:17, 979:10, 982:21, 983:12, 983:16, 984:7, 989:3, 991:11, 992:3, 994:20, 995:24, 996:16, 1000:14, 1001:21, 1002:6, 1005:13, 1006:3, 1006:4, 1007:15, 1010:10, 1026:25, 1029:8, 1029:11</p> <p>update [2] - 808:6, 872:5</p> <p>updates [2] - 762:23, 762:25</p> <p>upgrade [3] - 897:5, 897:10</p> <p>upgrades [1] - 762:25</p> <p>upper [1] - 940:18</p> <p>USA [6] - 753:6, 755:21, 761:8, 762:7, 762:16, 762:24</p> <p>USA's [1] - 770:14</p> <p>useful [2] - 787:8, 909:1</p> <p>usefulness [1] - 893:2</p> <p>user [18] - 807:10, 824:2, 824:13, 824:16, 826:6, 832:23, 847:12, 849:17, 866:17, 880:19, 880:23, 946:15, 946:18, 947:8, 947:11, 948:3, 948:7</p> <p>users [1] - 948:17</p>
U				
<p>U.S [10] - 761:9, 776:10, 780:24, 839:16, 869:7, 869:24, 914:3, 932:19, 932:20, 932:21</p> <p>U.S.C [2] - 773:5, 773:6</p> <p>UCSF [1] - 789:11</p> <p>Ukraine [2] - 955:1, 956:13</p> <p>Ukrainian [2] - 957:11, 957:22</p> <p>ultimate [1] - 826:21</p> <p>ultimately [1] - 834:7</p> <p>unable [1] - 830:6</p> <p>unaffected [1] - 986:3</p> <p>uncivil [1] - 969:13</p> <p>under [22] - 754:19, 768:11, 773:4, 773:5, 778:22, 779:5, 788:1, 806:6, 806:8, 806:12, 831:11, 832:9, 869:21, 904:17, 930:15, 931:23, 931:24, 932:21, 955:4, 956:4, 979:24, 1014:1</p> <p>undergraduate [1] - 778:18</p> <p>underlined [1] - 804:6</p> <p>underlying [1] - 998:9</p> <p>understood [10] - 935:16, 952:17, 955:25, 956:1, 958:6, 996:1, 996:8, 997:1, 997:19, 1017:22</p> <p>undisputed [1] - 1021:24</p> <p>undo [2] - 801:9, 817:2</p> <p>undoing [1] - 816:20</p> <p>undoubtedly [1] - 989:7</p> <p>undue [3] - 815:25,</p>	<p>891:8, 908:15, 944:20</p> <p>types [6] - 779:14, 780:14, 816:7, 833:11, 843:13, 974:1</p> <p>typically [5] - 764:10, 766:22, 767:1, 927:11, 927:14</p> <p>typing [1] - 900:25</p>	<p>889:10, 890:9</p> <p>unexpected [3] - 843:8, 843:10, 873:15</p> <p>unfortunately [1] - 816:2</p> <p>Union [1] - 954:20</p> <p>Unit [5] - 795:17, 816:1, 816:20, 817:2, 865:19</p> <p>unit [8] - 771:18, 836:9, 836:11, 875:11, 876:6, 877:4, 877:21, 921:8</p> <p>UNITED [1] - 753:1</p> <p>United [6] - 753:14, 762:12, 762:20, 762:21, 768:25, 774:22</p> <p>units [44] - 761:10, 762:9, 762:17, 791:11, 791:20, 801:18, 801:21, 802:20, 803:7, 803:9, 803:10, 803:20, 806:18, 806:21, 807:5, 813:17, 813:20, 815:3, 815:4, 815:7, 815:22, 815:24, 816:19, 817:2, 818:5, 818:7, 822:21, 823:4, 833:24, 881:20, 932:9, 935:11, 935:13, 936:10, 936:12, 956:17, 956:18, 956:19, 956:21, 957:7, 957:9</p> <p>University [7] - 777:16, 778:7, 784:21, 789:10, 844:19, 871:10, 904:2</p> <p>unless [6] - 759:15, 760:19, 924:21, 974:14, 974:16, 984:5</p> <p>unpredictability [1] - 890:1</p> <p>unrelated [1] - 897:21</p> <p>unsolved [1] - 843:6</p> <p>unsuccessful [1] - 843:7</p> <p>up [81] - 760:18, 760:19, 767:8, 767:13, 768:8, 769:19, 773:4, 773:12, 774:20, 774:23, 788:11,</p>	<p>789:16, 793:14, 801:12, 808:4, 808:17, 809:2, 809:3, 811:3, 812:19, 815:23, 816:2, 817:25, 823:14, 824:8, 829:18, 830:11, 851:15, 863:21, 877:21, 887:24, 892:24, 898:11, 902:19, 906:24, 907:8, 915:3, 915:11, 932:8, 937:18, 937:19, 938:3, 939:25, 940:18, 941:4, 945:15, 947:9, 948:9, 952:6, 952:15, 960:17, 966:5, 969:25, 970:1, 970:7, 972:12, 974:17, 979:10, 982:21, 983:12, 983:16, 984:7, 989:3, 991:11, 992:3, 994:20, 995:24, 996:16, 1000:14, 1001:21, 1002:6, 1005:13, 1006:3, 1006:4, 1007:15, 1010:10, 1026:25, 1029:8, 1029:11</p> <p>update [2] - 808:6, 872:5</p> <p>updates [2] - 762:23, 762:25</p> <p>upgrade [3] - 897:5, 897:10</p> <p>upgrades [1] - 762:25</p> <p>upper [1] - 940:18</p> <p>USA [6] - 753:6, 755:21, 761:8, 762:7, 762:16, 762:24</p> <p>USA's [1] - 770:14</p> <p>useful [2] - 787:8, 909:1</p> <p>usefulness [1] - 893:2</p> <p>user [18] - 807:10, 824:2, 824:13, 824:16, 826:6, 832:23, 847:12, 849:17, 866:17, 880:19, 880:23, 946:15, 946:18, 947:8, 947:11, 948:3, 948:7</p> <p>users [1] - 948:17</p>	

<p>uses [5] - 799:22, 818:5, 881:19, 927:4, 972:3</p> <p>utilizing [3] - 837:25, 839:1, 913:17</p>	<p>1029:18, 1029:19, 1029:20, 1029:21, 1030:1, 1030:9</p> <p>version [4] - 932:19, 1010:6, 1014:7, 1025:22</p> <p>versus [1] - 987:1</p> <p>vertebra [7] - 861:9, 887:15, 919:5, 919:6, 919:14, 919:15</p> <p>vertebrae [2] - 791:20, 865:20</p> <p>vertebral [6] - 790:7, 791:14, 882:3, 912:14, 919:1, 919:4</p> <p>vertical [10] - 855:12, 855:17, 855:23, 856:2, 856:4, 1006:7, 1006:15, 1007:3, 1007:4, 1007:6</p> <p>vertically [2] - 896:12, 1007:3</p> <p>vessels [1] - 780:10</p> <p>video [8] - 809:18, 809:23, 810:9, 810:24, 811:2, 880:11, 880:15</p> <p>videos [3] - 809:11, 809:15, 810:24</p> <p>view [26] - 765:21, 765:22, 765:23, 766:4, 766:13, 766:15, 766:16, 768:10, 784:13, 802:19, 819:21, 819:23, 819:25, 820:13, 824:4, 836:7, 891:23, 927:2, 960:13, 960:15, 973:13, 973:14, 981:5, 989:15, 997:11, 1024:3</p> <p>viewing [4] - 847:8, 847:9, 863:4, 997:3</p> <p>views [5] - 805:6, 805:7, 805:8, 805:14, 928:9</p> <p>violence [1] - 775:1</p> <p>violet [1] - 940:20</p> <p>visible [2] - 795:12, 941:21</p> <p>visit [1] - 787:19</p> <p>visited [2] - 779:1, 807:22</p> <p>visual [6] - 849:12, 858:19, 863:4, 901:7, 989:23, 990:7</p>	<p>vitae [4] - 775:25, 776:2, 776:4, 776:5</p> <p>voice [2] - 842:24, 1013:20</p> <p>voltage [1] - 939:25</p> <p>VOLUME [1] - 753:4</p> <p>volume [27] - 764:7, 765:1, 765:4, 765:6, 766:3, 766:11, 766:25, 770:19, 770:22, 771:4, 771:18, 797:12, 819:16, 819:19, 822:25, 824:8, 866:25, 882:5, 887:12, 887:13, 895:23, 895:24, 896:3, 921:8, 936:3, 947:20, 947:21</p> <p>volumes [5] - 825:8, 825:19, 947:4, 947:24, 949:3</p> <p>volumetric [1] - 796:21</p> <p>voxel [1] - 801:13</p>	<p>941:20, 941:21, 942:5</p> <p>ways [9] - 787:14, 814:4, 814:6, 943:12, 945:17, 945:18, 945:19, 945:24, 972:3</p> <p>Webber [115] - 832:22, 837:13, 837:15, 844:5, 844:15, 844:17, 844:18, 844:21, 844:22, 844:24, 845:9, 845:10, 845:11, 845:17, 845:23, 846:12, 846:23, 847:23, 848:6, 848:9, 848:12, 848:14, 848:18, 848:25, 849:7, 849:9, 849:10, 849:11, 852:8, 853:1, 854:2, 854:5, 854:10, 855:6, 855:7, 855:10, 855:15, 855:21, 855:25, 856:18, 857:14, 857:22, 858:17, 858:18, 858:21, 858:23, 859:5, 859:7, 859:24, 860:2, 860:5, 860:15, 860:20, 861:6, 862:7, 862:21, 862:23, 863:8, 864:22, 865:4, 865:8, 866:9, 866:16, 866:20, 923:12, 953:4, 960:2, 965:25, 966:3, 969:19, 969:21, 969:22, 970:14, 970:16, 970:22, 971:2, 971:16, 971:22, 971:23, 972:12, 972:15, 972:16, 974:1, 974:18, 975:3, 975:6, 975:11, 975:17, 976:7, 976:21, 977:7, 977:9, 977:20, 978:4, 978:13, 979:1, 979:24, 980:5, 980:20, 981:1, 981:6, 981:12, 981:14, 981:23, 982:2, 982:3, 982:6, 982:9, 982:14,</p>	<p>982:18, 984:19, 997:24, 1007:14, 1019:11</p> <p>website [1] - 933:5</p> <p>weighed [1] - 1018:25</p> <p>weighs [1] - 921:22</p> <p>weight [13] - 816:11, 895:13, 896:1, 896:2, 921:23, 936:22, 939:6, 957:9, 997:16, 997:17, 998:21, 998:22, 1004:4</p> <p>WEINGART [18] - 753:22, 754:24, 756:10, 756:14, 756:17, 757:4, 757:14, 758:2, 758:12, 759:16, 759:21, 760:13, 761:6, 761:7, 763:7, 770:8, 771:20, 773:11</p> <p>welcome [1] - 996:14</p> <p>well-known [4] - 858:24, 884:24, 965:2, 990:8</p> <p>wheels [3] - 893:9, 893:11</p> <p>whereby [1] - 891:10</p> <p>wherein [5] - 855:6, 862:21, 876:2, 877:14, 884:4</p> <p>white [6] - 762:4, 762:5, 940:8, 940:12, 971:18, 972:11</p> <p>whole [29] - 759:7, 778:16, 809:23, 810:9, 811:1, 842:4, 855:18, 882:2, 886:14, 887:9, 927:7, 930:10, 940:12, 940:15, 941:19, 942:5, 962:5, 981:4, 1002:18, 1007:12, 1016:2, 1017:8, 1019:8, 1019:12, 1019:13, 1021:9, 1021:11, 1029:11</p> <p>wholesale [2] - 770:21, 771:1</p> <p>wide [1] - 1007:11</p> <p>widely [2] - 874:15, 887:18</p> <p>wider [1] - 1006:22</p> <p>width [1] - 1006:16</p> <p>wife [1] - 774:14</p> <p>wife's [2] - 787:10,</p>
V		W		
<p>valid [12] - 786:14, 830:14, 893:23, 893:25, 894:2, 894:3, 997:21, 997:23, 998:8, 998:15, 999:13, 1024:17</p> <p>validated [1] - 861:22</p> <p>validity [5] - 898:22, 994:11, 994:14, 995:5, 998:25</p> <p>validly [1] - 830:7</p> <p>Valley [1] - 774:18</p> <p>value [17] - 893:6, 893:13, 893:16, 894:16, 894:17, 896:18, 897:19, 898:2, 898:4, 898:8, 898:10, 898:23, 999:1, 999:3, 999:6, 1000:6, 1003:13</p> <p>values [20] - 789:22, 795:17, 803:7, 803:10, 814:18, 815:5, 818:5, 818:14, 826:8, 826:9, 865:19, 879:14, 879:16, 879:19, 909:19, 909:20, 920:8, 920:10, 941:11, 943:23</p> <p>variability [2] - 935:17, 935:19</p> <p>variation [2] - 862:1, 866:5</p> <p>variations [2] - 803:2, 865:24</p> <p>varies [1] - 816:24</p> <p>variety [4] - 782:15, 894:17, 894:24, 918:11</p> <p>various [9] - 776:8, 799:24, 804:4, 818:23, 819:5, 851:21, 860:2, 862:15, 876:7</p> <p>vary [2] - 947:25, 963:14</p> <p>venn [3] - 800:4, 800:9, 974:2</p> <p>verdict [7] - 1010:11,</p>	<p>wait [4] - 760:16, 969:1, 1005:1, 1005:3</p> <p>waiting [1] - 900:23</p> <p>waive [1] - 817:12</p> <p>Wake [1] - 844:19</p> <p>walk [3] - 875:2, 916:9, 935:5</p> <p>walked [5] - 820:21, 866:13, 952:16, 968:22, 968:24</p> <p>WALKER [1] - 754:5</p> <p>walking [1] - 863:19</p> <p>wants [6] - 771:5, 808:9, 917:16, 1009:10, 1019:19, 1019:25</p> <p>WASIF [1] - 754:6</p> <p>waste [1] - 1010:16</p> <p>watch [1] - 773:16</p> <p>water [17] - 787:24, 788:4, 816:16, 816:18, 817:5, 918:2, 918:6, 933:7, 937:2, 937:6, 937:9, 937:12, 938:2, 938:8, 940:20, 940:22</p> <p>wavelength [4] - 941:18, 941:22, 942:3</p> <p>wavelengths [4] -</p>			

<p>798:3 wild [1] - 1017:20 Wilhelm [1] - 786:19 willfulness [18] - 757:21, 758:22, 759:14, 760:14, 772:17, 1010:11, 1010:13, 1010:14, 1010:16, 1010:23, 1010:25, 1011:2, 1011:9, 1011:17, 1026:1, 1026:2, 1029:21 willing [2] - 975:12, 981:11 Wilmington [1] - 753:12 wings [1] - 894:25 wireless [1] - 892:1 Wisconsin [4] - 774:22, 774:23, 777:16, 777:22 witness [9] - 754:17, 773:22, 775:15, 811:10, 901:21, 954:9, 955:10, 956:9, 957:1 WITNESS [24] - 754:21, 773:18, 774:5, 950:9, 969:10, 994:23, 996:13, 999:18, 1005:15, 1005:23, 1006:5, 1006:8, 1006:11, 1006:16, 1006:18, 1006:21, 1006:25, 1007:5, 1007:10, 1007:20, 1007:25, 1008:5, 1008:11, 1008:24 witnesses [2] - 786:6, 803:8 women [1] - 794:6 wondered [1] - 941:24 wondering [1] - 965:14 word [24] - 766:8, 769:22, 813:23, 813:24, 829:2, 853:23, 865:10, 906:22, 907:7, 907:10, 907:13, 907:19, 907:20, 907:23, 909:16, 911:13, 915:25, 947:12, 947:14, 951:1, 972:2, 1028:3, 1028:9, 1028:11 words [14] - 765:25,</p>	<p>766:1, 803:8, 805:9, 805:15, 834:8, 838:13, 851:20, 945:9, 950:11, 951:4, 986:22, 1007:3, 1016:3 works [5] - 800:21, 849:4, 915:20, 983:4, 1006:14 workshop [3] - 870:17, 870:18, 870:20 world [5] - 766:3, 932:4, 998:15, 998:16, 998:20 worldwide [1] - 874:23 worse [1] - 1016:20 worth [2] - 900:16, 1005:17 write [2] - 983:11, 987:3 writing [1] - 874:21 written [30] - 755:21, 756:15, 833:3, 833:6, 885:23, 885:25, 886:1, 886:6, 886:9, 886:13, 886:24, 888:1, 888:8, 888:13, 888:25, 889:2, 892:5, 954:23, 958:16, 984:24, 985:9, 987:11, 987:24, 990:18, 995:3, 1001:13, 1001:17, 1017:5, 1026:15, 1026:16 wrote [3] - 931:17, 956:25, 957:11</p>	<p>835:8, 835:17, 835:18, 836:1, 836:8, 836:17, 836:21, 837:6, 838:1, 838:10, 839:14, 839:17, 839:19, 839:21, 839:22, 840:8, 845:12, 845:13, 845:15, 846:7, 847:23, 848:5, 854:8, 854:14, 854:15, 854:16, 854:24, 854:25, 855:3, 855:6, 855:8, 855:11, 855:21, 855:22, 855:23, 856:1, 856:18, 868:7, 868:8, 871:16, 872:3, 874:16, 877:14, 877:15, 877:17, 877:20, 877:21, 877:22, 878:11, 878:13, 878:17, 878:18, 878:23, 878:24, 879:1, 879:9, 890:16, 891:8, 891:16, 906:10, 911:21, 913:18, 916:12, 917:1, 921:10, 926:3, 926:9, 926:11, 926:13, 926:15, 939:25, 940:4, 940:11, 941:12, 941:13, 941:19, 942:7, 945:24, 963:19, 971:9, 971:10, 971:13, 972:16, 972:22, 972:24, 977:7, 977:9, 977:11, 977:16, 992:5, 992:6, 992:11, 992:14, 992:17, 993:3, 993:4, 993:12, 993:16, 993:22, 994:14, 995:3, 995:8, 1002:19, 1003:6, 1006:13, 1006:14, 1007:4, 1007:11 x-rays [42] - 786:18, 787:6, 787:17, 797:20, 797:21, 797:24, 797:25, 798:1, 798:11, 798:16, 798:21, 798:25, 799:7,</p>	<p>799:20, 814:4, 815:14, 831:16, 831:18, 856:3, 891:11, 909:9, 940:11, 940:14, 941:2, 941:3, 941:4, 941:6, 941:9, 941:19, 942:25, 943:13, 944:21, 945:3, 945:11, 946:2, 992:8, 993:14, 995:12, 995:17 X-rays [2] - 787:1, 787:3 Xing [1] - 1001:1</p>
X			Y
	<p>X'd [2] - 996:21, 1001:22 X's [2] - 812:24, 813:1 x-ray [142] - 779:24, 779:25, 780:17, 782:23, 783:19, 783:24, 784:3, 787:12, 788:2, 797:9, 797:11, 797:18, 797:20, 797:21, 799:12, 800:23, 814:7, 815:13, 816:17, 817:16, 817:20, 831:17, 833:17, 833:18, 833:22,</p>		<p>year [7] - 768:13, 769:6, 778:16, 784:15, 793:22, 873:6, 902:12 years [12] - 758:11, 769:3, 774:15, 778:14, 779:5, 782:24, 788:18, 831:13, 832:7, 902:9, 917:3, 933:11 yellow [1] - 971:16 yes's [1] - 977:3 yesterday [27] - 755:4, 755:7, 755:14, 762:3, 762:24, 764:4, 764:18, 765:10, 765:12, 765:16, 766:6, 767:7, 767:9, 771:13, 771:14, 771:17, 800:10, 803:3, 803:11, 810:25, 818:7, 822:17, 825:4, 828:10, 847:6, 847:8, 893:21 young [1] - 773:17 yourself [6] - 774:13, 799:19, 805:23, 956:6, 987:24, 988:2</p>
X		Z	<p>zoom [3] - 871:4, 983:12, 984:7</p>