UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

DENTSPLY SIRONA INC.,
Petitioner

v.

OSSEO IMAGING, LLC,
Patent Owner

Case IPR2025-00787

U.S. Patent No. 8,498,374

DECLARATION OF DR. OMID KIA IN SUPPORT OF PATENT OWNER PRELIMINARY RESPONSE

TABLE OF CONTENTS

TABLE OF AUTHORITIES

Page(s)

Cases

Statutes

EXHIBIT LIST

Exhibit #	*Description*
2019	Curriculum Vitae of Dr. Omid E. Kia
2020	Bossi, R. H., Cline, J. L., Costello, E. G., & Knutson, B. W. (1990, March). *X-Ray Computed Tomography of Castings* (Tech. Rep. ADA 222095). Defense Technical Information Center.
2021	Ning, R., & Kruger, R. A. (1996). Image intensifier-based computed tomography volume scanner for angiography. *Academic Radiology*, Volume 3, Issue 4, 1996, Pages 344-350, ISSN 1076-6332.
2022	DEXIS. (2025). *i-CAT FLX V-Series: Specifications*. https://dexis.com/en-us/i-cat-flx-v-series#specifications (Accessed June 26, 2025).
2023	(2004). *IS i-CAT Specifications*. https://web.archive.org/web/20040313135324/http:/www.imagingsciences.com/html/products/productFD.htm (Accessed July 4, 2025).

I, Dr. Omid Kia, declare as follows:

I. INTRODUCTION

1. I have been asked by counsel for Osseo Imaging, LLC ("Osseo" or "Patent Owner") to review U.S. Patent No. 8,498,374 (the "'374 Patent"), U.S. Patent No. 6,381,301 (the "'301 Patent"), and U.S. Patent No. 6,944,262 (the "'262 Patent") (collectively, the "Osseo Patents"); IPR2025-00771 (the "771 Petition"), IPR2025-00772 (the "772 Petition"), and IPR2025-00787 (the "787 Petition") (collectively, the "IPRs"); and Dentsply Sirona Inc. ("Dentsply" or "Petitioner")'s Declaration of Dr. Milan Sonka, Ph.D. ("Sonka Decl.") filed in connection with each IPR. *See* EX1001; EX1002; EX1003; EX1007. I have been asked to prepare and submit this expert declaration in support of Patent Owner's Preliminary Response to the IPRs.

2. The opinions provided are my own and are based on my analysis and work in this case, including my review of the documents and materials described in the IPRs, as well as on the education, experience, and skills I have acquired and developed throughout my career.

3. I am being compensated by the Patent Owner for the time I spend on this case. My compensation is not in any way dependent on the outcome of the dispute, and I have no other stake in the outcome.

II. QUALIFICATIONS

4. I am a Subject Matter Expert at Coastal Communication Consultants, Inc., a consulting firm based in Manassas, Virginia. I am an engineer with substantial experience in full lifecycle software development, large image/video-based hardware solutions and diagnostic imaging modalities.

5. I hold a Doctor of Philosophy in Electrical Engineering from University of Maryland at College Park, a Master of Science in Electrical Engineering from University of Illinois at Chicago and a Bachelor of Science Degree in Electrical Engineering from Catholic University of America.

6. I have designed or developed several medical devices including several that have been the subject of U.S. Patents and Published Patent Applications, including a digital radiographic device having a liner scanner (U.S. Pat. Nos. 8,662,749, 9,125,571 and 9,380,989), photogrammetric method and system for stitching and stabilizing camera images (U.S. Pat. No. 8,559,757) and cephalometric x-ray imaging apparatus (U.S. Pat. Pub. No. 2009/0196395). Additionally, I have been named as an inventor in over eighteen U.S. patents (with many patent applications pending).

7. My curriculum vitae is attached and includes a list of publications that I have authored, the patents granted to me, and the cases in which I have testified as an expert at trial or deposition. *See* EX2019.

III. LEVEL OF ORDINARY SKILL IN THE ART

8. In my opinion, a person of ordinary skill in the art (a "POSA") in 1999 would be an individual with a bachelor's degree in electrical and computer engineering or an equivalent technical degree, and with at least 3–5 years of experience in diagnostic imaging systems. I have used 1999 as the date of the invention because the '301 Patent was filed in 1999. I meet these criteria and consider myself a person with at least ordinary skill in the art pertaining to the '301 Patent, the '262 Patent, and the '374 Patent.

9. Dr. Sonka's definition of a POSA would "include a person with an advanced medical degree, such as an MD, DDS, or DMD if also combined with an undergraduate degree in Computer Science, Engineering, Medical Physics, Physics, or a related field, and/or an advanced degree in Computer Science, Engineering, Medical Physics, Physics, or a related field. *See* EX1007 at ¶ 53. I disagree with Dr. Sonka's definition for several reasons, including that I do not believe an advanced medical degree would be necessary or helpful, that its use of "and/or" is confusing as to what it modifies and why it is not simply "or", and that it omits any experience in diagnostic imaging systems as a supplement to or replacement for the advanced degrees. Nevertheless, I meet the criteria of a POSA even under Dr. Sonka's definition, at least because of my advanced degrees in electrical engineering.

IV. LEGAL UNDERSTANDINGS

10. In this section I describe my understanding of certain legal standards. I have been informed of these legal standards by Osseo's attorneys. I am not an attorney and I am relying only on instructions from Osseo's attorneys for these legal standards.

A. PRIOR ART UNDER 35 U.S.C. § 102

11. Applying pre-AIA law, it is my understanding that a patent claim is anticipated by the prior art under 35 U.S.C. § 102(a) if it was known or used by others in this country, or patented or described in a printed publication in this country or a foreign country, before it was invented by the patentee. Subject matter is publicly known or used if reasonably accessible to the interested public.

12. It is my understanding that a patent claim is anticipated under 35 U.S.C. § 102(b) if it was patented or published anywhere, or was in public use, on sale, or offered for sale, in the United States, more than one year prior to the filing date of the U.S. application for the patent. As I understand it, an invention is on sale when an embodiment of the invention is sold or offered for sale and the sale or offer to sell is primarily for profit rather than for experimental purposes.

13. As I further understand it, public use refers to any use of the claimed invention by a person other than the inventor who is under no limitation, restriction, or obligation of secrecy to the inventor. This inquiry depends on analysis of, for

example, the nature of and public access to activities involving the invention, any confidentiality obligations imposed upon observers, and whether the use is commercial or experimental. I also understand that, even if those skilled in the art do not understand how the device works, cannot see all the details of the device, or would not know how to make the device, the public use of the device still places in the public domain that device in the form that it was used publicly.

14. It is my understanding that a patent claim is anticipated under 35 U.S.C. § 102(e) if it was described in (1) an application for a patent, published under 35 U.S.C. § 122(b), that someone else filed in the United States before the invention by the patentee or (2) a patent granted on an application for a patent that someone else filed in the United States before the invention by the patentee, with an exception relating to certain international patent applications that is not relevant here.

B. ANTICIPATION UNDER 35 U.S.C. § 102

15. It is my understanding that a claim directed to subject matter that is not novel based on a single prior art reference is said to be "anticipated by the prior art" under 35 U.S.C. § 102.

16. It is my further understanding that for a claim to be invalid as anticipated by the prior art, every element of that claim must be found in a single prior art reference or product arranged as in the claim. It is my further understanding that for anticipation, each element of a claim must be found explicitly or inherently

in that prior art reference or product. In other words, in determining whether a single prior art reference or product anticipates a patent claim, one should take into consideration not only what is expressly disclosed in that reference or product, but also what inherently occurs as a natural result of the practice of the system or method disclosed in that prior art reference or product.

17. It is my further understanding that to establish such inherency, the missing descriptive matter must be necessarily present in the item of prior art and that it would be so recognized by persons of ordinary skill in the art; but that inherent anticipation does not require that a person of ordinary skill in the art at the time would have recognized the inherent disclosure.

C. OBVIOUSNESS UNDER 35 U.S.C. § 103

18. I understand that a patent cannot be properly granted for subject matter that would have been obvious to a person of ordinary skill in the art at the time of the alleged invention, and that a patent claim directed to such obvious subject matter is invalid under 35 U.S.C. § 103. It is also my understanding that in assessing the obviousness of claimed subject matter one should evaluate obviousness over the prior art from the perspective of one of ordinary skill in the art at the time the invention was made. The prior art must be viewed from the standpoint of what was known and understood by a person of ordinary skill in the art at the time of invention

– without the benefit of hindsight, and not from the perspective of either a layman or a genius in that art.

19. It is my further understanding that the question of obviousness is to be determined based on:

- The scope and content of the prior art;
- The difference or differences between the subject matter of the claim and the prior art (considering the manner in which a patentee and/or a Court has construed the scope of the claim);
- The level of ordinary skill in the art at the time of the alleged invention of the subject matter of the claim; and
- Any relevant secondary factors indicating non-obviousness, including evidence of any of the following:
    - Commercial success of the products or methods covered by the patent claims;
    - A long-felt need for the alleged invention;
    - Failed attempts by others to make the alleged invention;
    - Copying of the alleged invention by others in the field;
    - Unexpected results achieved by the alleged invention;
    - Praise of the alleged invention by the alleged infringer or others in the field;

- The taking of licenses under the patent by others and the nature of those licenses;
- Expressions of surprise by experts and those skilled in the art of the subject matter of the patent claim; and,
- Whether the patentee proceeded contrary to accepted wisdom of the prior art.

20. It is also my understanding that, to be relevant to the issue of obviousness, such secondary factors must have some nexus to the alleged invention as claimed.

21. It is also my understanding that the United States Supreme Court clarified the law of obviousness in the 2007 *KSR International Co. v. Teleflex Inc.*, 550 U.S. 398, 419 (2007) case ("*KSR*"). Based on *KSR*, to determine whether it would have been obvious to combine known elements in a manner claimed in a patent, one may consider such things as the interrelated teachings of multiple pieces of prior art, the effects of demands known to the design community or present in the marketplace, and the background knowledge of an individual having ordinary skill in the art. I also understand that a claim composed of several elements is not proved obvious merely by showing that each of its elements was independently known in the art.

22. It is further my understanding that according to *KSR*, determining obviousness is expansive and flexible. According to *KSR* there is no requirement for an obviousness analysis to find precise teachings that are directed to specific subject matter of a claim; rather, the common sense, inferences, and creative steps that a person of ordinary skill in the art would employ should be taken into account.

23. Despite this flexibility, I understand that the party proposing an obviousness combination must also show a motivation to combine the references. I understand that I may consider whether there was a reason that would have prompted a person of ordinary skill in the art to combine the elements or concepts from the prior art in the same manner claimed. I understand that I may also consider design incentives that might have prompted the claimed combination, and whether the combination achieved a predictable result by combining prior art elements according to their known functions. I also understand that I may consider whether there is some teaching, motivation, or suggestion in the prior art to make the claimed combination, although an explicit teaching, motivation, or suggestion is not required. I understand that teachings, suggestions, and motivations may also be found within the knowledge of a person of ordinary skill in the art. Further, I understand I must consider each reference as a whole, including portions that teach away from combining with the other reference(s).

D. CLAIM CONSTRUCTION

24. I have been instructed by counsel on the law regarding claim construction and patent claims. I understand that a patent may include two types of claims, independent claims and dependent claims. An independent claim stands alone and includes only the limitations it recites. A dependent claim can depend from an independent claim or another dependent claim. I understand that a dependent claim includes all the limitations that it recites in addition to all of the limitations recited in the claim from which it depends.

25. I have been instructed by counsel that claim terms should be given their ordinary and customary meaning within the context of the patent in which the terms are used, *i.e.*, the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention in light of what the patent teaches.

26. I understand that words or terms should be given their ordinary and accepted meaning unless it appears that the inventors were using them to mean something else. In making this determination, however, the claims, the patent specification, and the prosecution history are of paramount importance. Additionally, the specification and prosecution history must be consulted to confirm whether the patentee has acted as its own lexicographer (*i.e.*, provided its own special meaning to any disputed terms), or intentionally disclaimed, disavowed, or surrendered any claim scope.

27. I understand that in general, a term or phrase found in the introductory words of the claim, the preamble of the claim, should be construed as a limitation if it recites essential structure or steps, or is necessary to give life, meaning, and vitality to the claim. Conversely, a preamble term or phrase is not limiting where a patentee defines a structurally complete invention in the claim body and uses the preamble only to state a purpose or intended use for the invention. In making this distinction, one should review the entire patent to gain an understanding of what the inventors claim they actually invented and intended to encompass by the claims.

28. I understand that language in the preamble limits claim scope (i) if dependence on a preamble phrase for antecedent basis indicates a reliance on both the preamble and claim body to define the claimed invention; (ii) if reference to the preamble is necessary to understand limitations or terms in the claim body; or (iii) if the preamble recites additional structure or steps that the specification identifies as important.

V. OVERVIEW OF THE OSSEO PATENTS

A. BACKGROUND

29. The Osseo Patents, entitled "Dental and Orthopedic Densitometry Modeling System and Method," relate to orthopedic imaging systems and, more particularly, to systems that use scanning X-ray beam techniques to create and store tomographic and/or densitometric models of an object. *See* EX1001 at 1:25-27;

2:15-28; 3:19-20; Fig. 2; claims 1, 13, 21; *see also* EX1002 at 1:7-10; 2:1-15; 3:8-9; Fig. 2; claims 1, 10, 20; EX1003 at 1:15-19; 2:10-25; 3:18-19; Fig. 2, claim 1. In this regard, the systems include one or more controllers and/or computers that are coupled to X-ray equipment that capture multiple scans or slices of an object, for example, the facial anatomy of a patient, placed between an X-ray source and a detector array and that merge the scans or slices to create therefrom and store a tomographic model of the object. *See* EX1001 at Abstract; 2:22-25; 2:57-3:3; 3:60-4:16; 4:38-47; 4:58-60; claims 1, 5, 6, 11–13, 15, 19, 21; Figs. 1-2; *see also* EX1002 at Abstract; 2:9-11; 2:45-59; 3:55-4:5; 4:32-41; 4:53-55; Figs. 1-2; EX1003 at Abstract; 2:19-21; 2:54-3:1; 4:21-37; 4:63-5:5; 5:17-19; Figs. 1-2. In two of the Osseo Patents, the claimed systems create more specific types of models called densitometry models. *See* EX1002 at claims 1, 7-9; EX1003 at claim 1. In some of the claimed systems, the tomographic/densitometry models of the object obtained at different times are stored for comparison to assess, for example, changes in bone structure and/or density in the time between scanning sessions. *See* EX1001 at Abstract; 3:3-5; 3:14-16; 4:50-53; 5:9-11; 5:25-27; Fig. 2; claims 5-6, 11-12, 15, 19; *see also* EX1002 at Abstract; 2:59-61; 3:3-5; 4:44-46; 5:3-5; 5:18-21; Fig. 2; EX1003 at Abstract; 3:1-3; 3:13-15; 5:8-10; 5:32-34; 5:48-51; Fig. 2. In such instances, the system may use color-coding to represent differing bone densities in an image of the model for better visualization. *See* EX1001 at Abstract; 3:3-5; 4:51-

52; 5:27-32; *see also* EX1002 at Abstract; 2:59-61; 4:44-46; 5:21-25; EX1003 at Abstract; 3:1-3; 5:8-10; 5:51-55.

B. THE CHALLENGED CLAIMS

30. Petitioner challenges the validity of claims 1-24 of the ’374 Patent, claims 1-8 and 10-20 of the ’301 Patent, and claims 1, 2, 4, and 6 of the ’262 Patent (collectively, the “challenged claims”). Independent claim 1 of the ’301 Patent recites:

> A system for tomographically modeling dental and orthopedic structure densitometry, which includes:
>
> a) a controller with a microprocessor and a memory device connected to the microprocessor, said controller including means for storing a pre-existing tomographical dental/orthopedic densitometry model;
>
> b) an input device connected to the microprocessor;
>
> c) a positioning motor connected to the microprocessor and movable in response to from said microprocessor;
>
> d) X-ray equipment including an X-ray source and a detector array;
>
> e) conversion means for converting a signal from said detector array, said conversion means being connected to said detector array and to said microprocessor; and
>
> f) an output device connected to said microprocessor and adapted for receiving a tomographical densitometry model from said microprocessor.

EX1002 at 5:28-44. Claims 2-8 of the ’301 Patent depend directly or indirectly on claim 1.

31. Independent claim 10 of the ’301 Patent recites:

> A method of tomographically modeling dental and orthopedic densitometry, which includes the steps of:

a) providing a controller with a microprocessor and a memory device connected to said microprocessor;

b) providing an input device connected to said microprocessor;

c) inputting patient diagnostic parameters with said input device;

d) storing said diagnostic parameters in memory;

e) providing X-ray equipment with an X-ray source and an X-ray detector array;

f) positioning said X-ray equipment and a patient's dental/orthopedic structure relative to each other with said patient's dental/orthopedic structure between said source and said detector array;

g) emitting an X-ray beam from said source through said dental structure and to said detector array;

h) outputting a signal from said detector array to said microprocessor;

i) forming with said microprocessor a tomographical densitometry model of said dental/orthopedic structure;

j) providing an output device connected to said microprocessor, and

k) outputting said densitometry model to said output device.

EX1002 at 6:5-31. Claims 11-19 of the ’301 Patent depend directly or indirectly on claim 10.

32. Independent claim 20 of the ’301 Patent recites:

A method of tomographically modeling dental and orthopedic densitometry, which includes the steps of:

a) providing a controller with a microprocessor and a memory device connected to said microprocessor;

b) providing an input device connected to said microprocessor;

c) inputting with said input device dental or orthopedic patient diagnostic parameters, including a pre-existing densitometry model;

d) storing said diagnostic parameters in said memory device;

e) providing X-ray equipment connected to said microprocessor, said equipment including an X-ray source and an X-ray detector array;

f) positioning said X-ray equipment and a patient's dental or orthopedic structure relative to each other with said patient's dental or orthopedic structure located between said X-ray source and said detector array;

g) emitting an X-ray beam from said source at a first X-ray beam energy level, passing same through said dental or orthopedic structure, and detecting same with said detector array;

h) outputting a signal corresponding to said detected X-ray beam from said detector array;

i) digitizing said detector array output signal;

j) storing said digitized output signal in said memory device,

k) repeating steps f)-j) at a second X-ray beam energy level;

l) merging said stored output signals to form a present tomographical densitometry model of said dental or orthopedic structure;

m) comparing said present densitometry model with said pre-existing densitometry model;

n) adjusting said present densitometry model to account for patient parameters including age and gender;

o) providing an output device connected to said microprocessor;

p) color coding said present tomographical densitometry model with colors corresponding to dental or orthopedic structure density; and

q) outputting said color-coded model to said output device.

EX1002 at 7:5-8:25.

33. Independent claim 1 of the ’262 Patent recites:

A digital modeling system for creating dental or orthopedic models of patients, which system comprises:

a computer including a digital memory storing patient densitometry information, an input and an output;

a dental or orthopedic input device including an energy source and an energy sensor; said source and said sensor being placed with at least a portion of the patient's dental or orthopedic structure therebetween;

said sensor transferring signals to the computer input;

said signals representing densitometry of the patient's dental or orthopedic structure;

said computer creating, storing and comparing three-dimensional digital densitometry models without the use of fiducial markers of patient dental or orthopedic structure;

an output device connected to said computer output and communicating densitometry model comparison information;

> imaging software associated with said computer; and
>
> a display associated with said output device and displaying information pertaining to said densitometry model.

EX1003 at 8:64-10:3. Claims 2, 4, and 6 of the '262 Patent depend on claim 1.

34. Independent claim 1 of the '374 Patent recites:

> A system for tomographically modeling a dental structure, the system comprising:
>
> a controller with a microprocessor and a memory device connected to the microprocessor, said controller being adapted for storing computed tomographic models of a dental structure;
>
> an input device connected to the microprocessor;
>
> a positioning motor connected to the microprocessor and responsive to commands from said microprocessor;
>
> X-ray equipment including an X-ray source, a detector array, and a restricted beam device;
>
> a convertor for converting a signal from said detector array, said convertor being connected to said detector array and to said microprocessor;
>
> and an output device connected to said microprocessor and adapted for receiving a tomographic model from said microprocessor.

EX1001 at 5:34-50. Claims 2-12 of the '374 Patent depend directly or indirectly on claim 1.

35. Independent Claim 13 of the '374 Patent recites:

> A tomographic modeling system comprising:
>
> a controller with a microprocessor and a memory device connected to the microprocessor, said controller being adapted for creating, storing, and comparing 3D digital tomographic models of an object without the use of fiducial markers of said object;
>
> an input device connected to the microprocessor;
>
> a positioning motor connected to the microprocessor and responsive to commands from said microprocessor;
>
> X-ray equipment including an X-ray source, a detector array, and a restricted beam device;

> a convertor for converting a signal from said detector array, said convertor being connected to said detector array and to said microprocessor; and
>
> an output device connected to said microprocessor and adapted for receiving a tomographic model from said microprocessor.

EX1001 at 6:45-61. Claims 14-20 of the ’374 Patent depend directly or indirectly on claim 13.

36. Independent Claim 21 of the ’374 Patent recites:

> A system for tomographically modeling a dental structure, which system comprises:
>
> a controller with a microprocessor and a memory device connected to the microprocessor, said controller being adapted for creating, storing, and comparing 3D digital tomographic models of a dental structure without the use of fiducial markers of said dental structure;
>
> an input device connected to the microprocessor;
>
> a positioning motor connected to the microprocessor and responsive to commands from said microprocessor;
>
> X-ray equipment including an X-ray source, a detector array, and a restricted beam device;
>
> a convertor for converting a signal from said detector array, said convertor being connected to said detector array and to said microprocessor; and
>
> an output device connected to said microprocessor and adapted for receiving a tomographic model from said microprocessor.

EX1001 at 7:18-8:13. Claims 22-24 of the ’374 Patent depend directly or indirectly on claim 21.

VI. VALIDITY OF THE OSSEO PATENTS

37. Below, I address the allegations raised by Dr. Sonka regarding the validity of the Osseo Patents to articulate that the opinions laid out in this Report are

indeed correct and that the Osseo Patents are not invalid per the allegations set forth by Dr. Sonka.

A. ALLEGED ADMISSIONS IN THE SPECIFICATION OF THE OSSEO PATENTS

38. Petitioner cites to portions of the Osseo Patents which are alleged to be admissions of "prior art" regarding the technical concepts of tomography and densitometry. *See* IPR2025-00771 Petition at 12-13; *see also* IPR2025-00772 Petition at 13-14; IPR2025-00787 Petition at 13-14. I have reviewed the cited sections of the Osseo Patents and disagree with Petitioner that the statements in these sections rise to the level of admissions. The cited portions are to set forth background information leading up to the invention, including a discussion of the related art known to the applicant, any references to specific related art, and problems that are solved by the claimed inventions, and are not an admission that the technical concepts qualify as prior art under 35 U.S.C. § 102.

39. For example, Petitioner cites to the '301 Patent at 1:61-65, which states that "[t]omography or sectional radiography techniques using scanning X-ray beams have previously been employed for dental applications" and further to the '301 Patent at 2:1-8, which states that "[i]n the medical field, densitometry procedures are used for measuring bone morphology density (BMD) by utilizing scanning X-ray beam techniques….Medical applications of densitometry include the diagnosis and treatment of such bone diseases as osteoporosis." *See* IPR2025-00771 Petition at 12-

13. These sections however do not expressly state that these disclosures are "prior art" under 35 U.S.C. §102.

40. Furthermore, sectional radiographs differ from tomographic or densitometric models. The creation of radiograph slices is akin to creating radiographs at different angles. Slices can be made with different thicknesses with varying capability such as resolving small anatomy or capturing large anatomies. Thin slices can be used to generate thicker slices with varying capability such as reducing noise but removing fine detail. *See, e.g.,* EX2020 at 10.

41. Creation of a thicker slice may utilize many mathematical techniques to derive the intended purpose, such as capturing anatomical edges versus a whole anatomy. This problem is evident in the partial volume effect where a voxel contains only part of the anatomy which may be resolved by a thicker slice. For example, the average, median, or maximum of slices may be used for thick slices. *See, e.g.,* EX2021 at 347. Models, on the other hand, refer to regions of a 3-dimensional Computed Tomography ("CT") that contain bone material. A POSA would not have understood the Osseo Patents to be discussing tomographic models in the cited background sections. *See* EX1002 at 1:61-65; 2:1-8; *see also* EX1001 at 2:8-14; 2:15-21; EX1003 at 2:3-9; 2:10-18.

42. I therefore conclude that the sections in the Osseo Patents discussing the background of the invention do not disclose what is covered by the challenged claims.

B. ANTICIPATION AND/OR OBVIOUSNESS OF THE CHALLENGED CLAIMS BASED ON SPECIFIC PRIOR ART REFERENCES

43. Dr. Sonka argues that the Osseo Patents are invalid as anticipated or obvious in view of U.S. Patent No. 6,118,842 ("Arai"); Christopher Cann, "Precise Measurement of Vertebral Mineral Content Using Computed Tomography," Journal of Computer Assisted Tomography 4(4) 493500 (August 1980) ("Cann"); International Publication No. WO/94/10908 ("Pelc"); Stephen Rothman, DENTAL APPLICATIONS OF COMPUTERIZED TOMOGRAPHY: SURGICAL PLANNING OF IMPLANT PLACEMENT (Quintessence Books 1998) ("Rothman"); International Publication No. WO 01/39667 ("Massie"); U.S. Patent No. 5,533,080 ("Pelc '080"); U.S. Patent No. 6,363,163 ("Xu"); and International Publication No. WO 98/36683 ("Milestone") (collectively, the "Asserted References"). *See generally* EX1007; *see also* EX1013; EX1014; EX1015; EX1016; EX1017; EX1018; EX1019; EX1020. Specifically, the Osseo Patents are challenged under the following grounds:

44. The '301 Patent:

Ground 1. Arai anticipates claims 1–4, and 6 under 35 U.S.C. § 102.

Ground 2. Arai renders system claims 1–8 obvious under 35 U.S.C. § 103 in combination with Cann, (claims 5, 7, and 8).

Ground 3. Arai renders method claims 10–20 obvious under 35 U.S.C. § 103 in combination with Xu and/or Milestone, or additionally in combination with Cann, and in further combination with:

Pelc ’080 (claim 13); Rothman (claims 14– 17).

Ground 4. Pelc anticipates claims 1–6 under 35 U.S.C. § 102.

Ground 5. Pelc renders claims 1-6 obvious under 35 U.S.C. § 103 in combination with Cann.

Ground 6. Pelc (alone or in combination with Cann) renders claims 7-8 obvious under 35 U.S.C. § 103.

Ground 7. Pelc renders claims 10-20 obvious under 35 U.S.C. § 103 in combination with Rothman, Xu and/or Milestone, or additionally in combination with Cann.

See IPR2025-00771 Petition at 6-8.

The ’262 Patent:

Ground 1. The Massie Publication anticipates claims 1, 2, 4 and 6 under 35 U.S.C. §102, and renders claims 1, 2, 4 and 6 obvious under 35 U.S.C. §103 alone or in combination with Xu and/or Milestone (claims 2 and 4).

Ground 2. Arai renders claims 1, 2, 4 and 6 obvious under 35 U.S.C. §103 in combination with Xu and/or Milestone, and alternatively in further combination with Cann.

Ground 3. Pelc renders claims 1, 2, 4 and 6 obvious under 35 U.S.C. §103 in combination with Xu and/or Milestone, and alternatively in further combination with Cann.

See IPR2025-00772 Petition at 7-8.

The ’374 Patent:

Ground 1. Arai anticipates claims 1, 3, 7 and 9 under 35 U.S.C. § 102.

Ground 2. Arai renders claims 1–12 obvious under 35 U.S.C. § 103 alone or in combination with Cann, and in further combination with: Pelc ’080 (claims 4 and 10), Xu and/or Milestone (claims 5–6 and 11-12).

Ground 3. Arai renders claims 13–24 obvious under 35 U.S.C. § 103 in combination with Xu and/or Milestone, or additionally in combination with Cann, and in further combination with: Pelc ’080 (claims 16 and 20).

Ground 4. Pelc anticipates claims 1–4 and 7–10 under 35 U.S.C. § 102.

Ground 5. Pelc renders claims 1–12 obvious under 35 U.S.C. § 103 alone, in combination with Rothman, or in combination with Rothman and Cann, and in further combination with: Xu and/or Milestone (claims 5–6 and 11–12).

Ground 6. Pelc renders claims 13–24 obvious under 35 U.S.C. § 103 alone, in combination with Rothman, or in combination with Rothman and Cann, all in further combination with Xu and/or Milestone.

See IPR2025-00787 Petition at 7-8.

45. I understand that the United States District Court for the District of Delaware construed certain claim terms in *Osseo Imaging, LLC v. Planmeca USA Inc*., 1-17-cv-01386 (D. Del. 2017) (the "Planmeca Action")[1]. *See* EX1009, EX1010. I have applied these constructions to my analysis of the Osseo Patents and for purposes of my opinions in this Report.

46. I disagree with Dr. Sonka that each of the challenged claims are anticipated by any of the references or obvious by a combination thereof. Collectively, the Asserted References fail to disclose tomographic and densitometry modeling, including with regard to "merging information from multiple tomographic scans of an object to produce a representation of the subject, said representation depicting quantitative density differences of the object scanned, which is created by the microprocessor in the controller using densitometry from at least one focal plane." *See* EX1009 at 2.

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[1] Petitioner does not dispute the claim constructions from the Planmeca Action. *See* IPR2025-00771 Petition at 17.

1. Summary of the Asserted References

a) Arai

47. Arai discusses two imaging modes which *never operate simultaneously* – a CT mode and a panoramic tomographic mode. EX1013 at 2:36-49; *id.* at Abstract. In Arai, "the imaging mode is selected by the mode switching means, whereby the selected X-ray imaging can be conducted." *Id.* at 2:47-49. Arai either creates a CT image in the CT mode *or* a panoramic tomographic image in the panorama mode – it does not disclose creating a tomographic model using CT, and certainly never discloses a tomographic model showing dental structure densitometry as required by the challenged claims. *See id.* at 2:36-49.

b) Cann

48. Cann discloses methods for measuring density of vertebral mineral content – this is a completely different anatomy than human dental structures. *See generally* EX1014. Cann's measurement of bone density is targeted towards acquiring the correct measurement of mineral content rather than the creation of a model. *Id.*

49. Cann discusses positioning patients and using a calibration phantom in the field during a scan. *Id*. Cann's CT system utilizes thin slices with low interaxial cone angles. *See id.* at 494. This requires multiple rotations, wherein axial translation is achieved by moving the patient. *Id.* Even with these simplifications, Cann had to utilize a phantom to achieve suitable density measurements. *Id.*

c) Rothman

50. Rothman discusses the creation of cross-sectional images, not the creation of three-dimensional models. *See* EX1016 at 16. Rothman does not discuss the use of the "series of axial sections, or slices," for the generation of tomographic models. *See id.* at 14-15. Instead, the "axial CT data" is used in multiplanar reformation. *Id.*

d) Pelc '080

51. Pelc '080 discusses a body scanner. *See generally* EX1018. Pelc '080 fails to explain density, densitometry, mineral content, or any combination thereof. *Id*.

e) Xu

52. Xu discusses the application of subtraction using CT slices mainly to lungs. *See* EX1019 at Abstract. Xu had to consider only a limited variability in orientation since a patient would routinely be lying down for a CT scan of the lungs. While the variability in orientation is important to the target anatomy, the method of scanning is also crucial. In Xu, the bed supporting the patient acts as the reference point allowing a limited variability (since the lungs are within a known cavity in the human body). *See id.* at Fig. 5A. Xu does not discuss dental anatomical structures.

f) Milestone

53. Any models referred to in Milestone comprise recognized structures for analysis of anomalies, not a three-dimensional model. *See* EX1020 at 12:26-33. Milestone, like Xu, discusses scanning a patient's lungs. *See id.* at Fig. 1.

g) Pelc

54. Pelc discusses a whole-body scan – not densitometric modeling using tomographic scans. *See* EX1015 at 23:6-13. The imaging system in Pelc does not provide information regarding bone density as required by the challenged claims. In fact, Pelc fails to mention bone density or densitometry at all. *See generally id*.

2. Alleged Anticipation and/or Obviousness of the Osseo Patents by Arai and Other Asserted References

55. Petitioner argues that Arai anticipates and/or in combination with other references renders obvious the challenged claims. *See* IPR2025-00771 Petition at 7; *see also* IPR2025-00772 Petition at 7; IPR2025-00787 Petition at 7-8.

a) Arai Fails to Anticipate or Render Obvious the Challenged Claims Under the District Court's Claim Construction

56. I understand from the District Court's claim construction in the Planmeca Action that the terms "tomographic modeling" and "densitometry modeling" have been construed to mean "merging information from multiple tomographic scans of an object to produce a representation of the subject, said representation depicting quantitative density differences of the object scanned,

which is created by the microprocessor in the controller using densitometry from at least one focal plane." *See* EX1009 at 2. The Court defined "densitometry" as "quantitatively calculated bone density." *See* EX1009 at 2.

57. Based on my understanding of anticipation and obviousness (e.g., Section IV), I disagree with Dr. Sonka that Arai anticipates and/or in combination with other references renders obvious the challenged claims. Specifically, I disagree that the claim limitations directed to "tomographic models" and "densitometry modeling" are met by Arai or any of the other references cited by Petitioner.

b) The Preamble is Limiting

58. Petitioner argues that the preambles of Claims 1, 10, and 20 of the '301 Patent, Claim 1 of the '262 Patent, and Claims 1, 13, and 21 of the '374 Patent are "non-limiting statement[s] of purpose." IPR2025-00771 Petition at 30-31, 46, 55; IPR2025-00772 Petition at 24; IPR2025-00787 Petition at 33-34, 52. I disagree. I understand that a term or phrase found in the preamble of a claim should be construed as a limitation if it recites essential structure or steps, or is necessary to give life, meaning, and vitality to the claim.

59. The preambles of the independent claims of the challenged claims are limiting in that they recite essential structures as disclosed in the specifications of the Osseo Patents. *See* EX1002 at Abstract; 4:56-5:25; *see also* EX1001 at Abstract; 4:62-5:31; EX1003 at Abstract; 5:20-55. Claims 1, 10, and 20 of the '301 Patent

recite a system and method for "tomographically modeling dental and orthopedic [structure] densitometry," Claim 1 of the '262 Patent recites "a digital modeling system for creating dental or orthopedic models of patients," Claims 1 and 21 of the '374 Patent recite a "system for tomographically modeling a dental structure," and Claim 13 of the '374 Patent recites a "tomographic modeling system." EX1002 at claims 1, 10, 20; EX1001 at claim 1; EX1003 at claims 1, 13, 21. The preambles thus provide an understanding of the scope and meaning of the claim elements, consistent with the specifications that discuss models in the context of densitometric modeling. *See* EX1002 at Abstract; 1:7-10; 2:18-20; 2:39-49; 2:65-3:2; 3:55-4:54; 4:56-5:25; *see also* EX1001 at Abstract; 1:24-27; 2:31-32; 2:49-61; 3:9-13; 3:64-4:60; 4:62-5:31; EX1003 at Abstract; 1:15-19; 2:28-30; 2:48-59; 3:8-12; 4:21-5:19; 5:20-55.

c) Arai Does Not Discuss Densitometry or Tomographic Modeling as Required by the Challenged Claims

60. I have reviewed Arai, including with regard to the densitometry and tomographic modeling claim limitations. The sections of Arai cited by Petitioner do not discuss or even mention tomographic modeling, only tomographic imaging. *See* IPR2025-00771 Petition at 31-32 (citing EX1013 at 2:3-5 ("It is an object of the invention to provide an X-ray imaging apparatus which can conduct a partial CT imaging in addition to a panoramic ***tomographic imaging***."); 17:42-48 ("Plural sets of image information stored in the frame memory 240 are stored in the image

memory for arithmetic 241. A predetermined arithmetic process corresponding to the selected imaging mode is conducted on image information read out from the image memory for arithmetic 241, thereby generating a ***tomographic image*** of the selected mode.”)) (emphasis added); *see also* IPR2025-00772 Petition at 46, 54-55; IPR2025-00787 Petition at 34.

61. In tomography, a 3D cube of data is created representing the scanned volume. Each datapoint – referred to as a voxel – contains a numerical value. Processing the volume to represent a straight cut in the volume creates 2D slices which are then used to display an image. The same 3D cube of data is also used to separate regions having similar numerical values resulting in a different 3D dataset that can be visualized as a 3D model.

62. Arai fails to disclose “merging information from multiple tomographic scans of an object to produce a representation of the subject/said representation depicting quantitative density differences of the object scanned, which is created by the microprocessor in the controller using densitometry from at least one focal plane” as required by the Court’s claim construction for the term “tomographic model.” *See* EX1009 at 2.

63. Petitioner’s reliance on Dr. Sonka’s opinion on this issue is misplaced and lacking in factual support. *See* IPR2025-00771 Petition at 31-32 (citing EX1007 at ¶¶ 227, 348); *see also* IPR2025-00772 Petition at 47-48; IPR2025-00787 Petition

at 34-35. In his declaration, Dr. Sonka fails to identify any discussion of 3D tomographic models in Arai. Dr. Sonka's support is limited to his assertion that Arai's "'plural sets of image information' are tomographic slices of the imaged region, which Arai further teaches are combined by 'arithmetic 241,' (software) to generate a tomographic model." EX1007 at ¶ 252. The model which Dr. Sonka refers to does not contain bone density data and is therefore *not* a densitometric model as required by the Osseo Patents. Nor are the "3D model[s]" he refers to thereafter. EX1007 at ¶¶ 252-253. As such, Dr. Sonka's conclusory opinion that "the tomographic image generated by the system in Arai is a 3D image" lacks any factual support. EX1007 at ¶ 180.

64. Notably, Petitioner mischaracterizes Arai in a critical way. Petitioner alleges that Arai teaches use of CT to generate a tomographic model. *See* IPR2025-00771 Petition at 31; *see also* IPR2025-00772 Petition at 47; IPR2025-00787 Petition at 34. This is incorrect. Arai discusses two imaging modes which *never operate simultaneously* – a CT mode and a panoramic tomographic mode. EX1013 at 2:36-49; *id.* at Abstract. In Arai, "the imaging mode is selected by the mode switching means, whereby the selected X-ray imaging can be conducted." *Id.* at 2:47-49. Petitioner tries to bury this fact, erroneously stating that "Arai teaches a system for tomographically modeling dental structure densitometry." IPR2025-00771 Petition at 31; *see also* IPR2025-00787 Petition at 34. Arai either creates a

CT image in the CT mode *or* a panoramic tomographic image in the panorama mode – it does not disclose creating a tomographic model using CT, and certainly never discloses a tomographic model showing dental structure densitometry as required by the challenged claims. *See* EX1013 at 2:36-49.

65. Further, contrary to Petitioner's assertions, Arai does not discuss or even mention densitometry. *See generally* EX1013; *see also* IPR2025-00771 Petition at 31-32; *see also* IPR2025-00772 Petition at 47-48; IPR2025-00787 Petition at 34-35. The sole mention of "density" in Arai is regarding the estimation of subject density to dial in an X-ray energy. *See* EX1013 at 18:16-19 ("The embodiment is configured so that the exposure amount of X-rays emitted from the X-ray source is adjusted on the basis of the density of the image information stored in the frame memory"). There is no teaching of creating any model, particularly a densitometric model, in Arai. *See generally* EX1013.

d) Creating a Dental Model Based on Arai would not be Obvious

66. A POSA would not be taught or suggested to make a dental model as claimed based on Arai. Arai discusses using a cone or pyramid shaped x-ray beam, of the type used in Cone Beam Computed Tomography ("CBCT"). *See* EX1013 at 7:19-32; 26:39-43. This use of CBCT imposes a significant number of inaccuracies associated with cone beam geometry and various artifacts.

67. In a cone beam geometry, only the middle ray of the X-ray is perfectly orthogonal to the anatomy of the subject. This means that the anatomy in the center of rotation in the center beam undergoes perfectly aligned orthogonal beam to be observed at the detector. The rays above/below and right/left of the center beam interact with the anatomy at oblique angles; the higher the angle, the more degradation there is in the reconstructed data. This leads to a degradation of the accuracy of the data as the anatomy is analyzed in volumes that experience oblique X-ray angles.

68. This problem is further amplified when conducting scans of only a partial anatomy, whereby a smaller volume is captured around a point of interest. In this case, instead of the entire anatomy, *i.e.*, the human head, being centered for a rotating motion to define a volume for a field of view, it is now offset to be rotated off-center on the human head. This problem has two effects. One is that in certain projections, X-rays must travel across a longer portion of the body. A second effect is that because of the off-center geometry, the magnification of the X-rays is larger since the entire rotation needs to accommodate a human head. Furthermore, the system cannot guarantee an airgap around the subject for extremely small volumes; various reconstruction techniques apply a correction which also effects the accuracies of the outer high cone angles.

69. Beam hardening and X-ray energy profile also add inaccuracies to the reconstructed data – this requires special processing to be addressed properly. The processing of a full human head requires different types of processing than partial scans to correct for such inaccuracies.

70. Arai discusses the use of CT for dental purposes and explains issues revolving around implant operation. *See* EX1013 at 1:35-47; 23:6-11. One very important purpose of using CT or even CBCT is to understand the anatomy of the subject. Features such as the location of various nerve canals which may be damaged by an incorrect placement of an implant are extremely important. The size of the bone that is being operated on is also critical. However, none of these features require tomographic modeling, and particularly not densitometric modeling.

71. Arai discusses using three-dimensional datasets to navigate the anatomy and inform the user of these features which are very difficult to assess using a traditional panoramic imaging modality. *See* EX1013 at 1:35-47. Dr. Sonka fails to provide any citation from Arai that explains capturing bone density in any manner. Arai does not in fact provide any insight as to the need and purpose of utilizing bone density. *See generally* EX1013. Dr. Sonka merely states that it would have been obvious for a POSA to "understand Arai to generate quantitative information regarding density." *See* EX1007 at ¶ 229. Dr. Sonka fails to support this conclusory opinion, and I disagree with it for at least the reasons I have provided.

e) Pelc ’080 Fails to Address the Shortcomings of Arai

72. Dr. Sonka admits that Arai does not explicitly mention densitometry and instead attempts to utilize Pelc ’080 to connect CT to the calculation of bone density. *See* EX1007 at ¶ 229. However, Pelc ’080 also fails to explain density, densitometry, mineral content, or any combination thereof. *See generally* EX1018. Dr. Sonka does not even point to any portion of Pelc ’080 describing the admittedly missing element from Arai. *See* EX1007 at ¶ 229 (Dr. Sonka stating that “[t]he underlying data disclosed in Pelc ’080, like Arai, is quantitative in nature because each voxel forming each tomographic slice has an integer, and thus quantitative, value.”).

f) A POSA Would Not Combine Arai with Cann

73. Dr. Sonka further utilizes Cann to try to fill in the missing pieces of Arai. *See* EX1007 at ¶ 230 (citing EX1014 at 493) (“The usefulness of CT for measuring bone mineral in the vertebrae lies in its ability to quantitatively image a thin transverse slice through the abdomen…”). Cann’s CT system utilizes thin slices with low interaxial cone angles. *See* EX1014 at 494. This requires multiple rotations, wherein axial translation is achieved by moving the patient. *See id.* Even with these simplifications, Cann had to utilize a phantom to achieve suitable density measurements. *See id.*

74. Dr. Sonka opines that Arai in combination with Cann renders claim 7 of the '301 Patent obvious. *See* EX1007 at ¶ 378. However, a POSA would not consider combining the teachings of Cann with those of Arai. As discussed throughout this Report, Arai does not measure density. *See generally* EX1013. A POSA considering Arai would understand that the disclosure at best describes a CT scan that measures distances in the human dental structure, and not density. *See* EX1013 at 1:35-47. This is evident from numerous publications at the time that discuss various measurements and in particular locations of teeth and nerve canals so that an implant does not interfere with the nerve canal. Other measurements to support the work of implant placement are also relevant.

75. Cann discusses methods for measuring density of vertebral mineral content, which is a completely different anatomy than human dental structures. *See generally* EX1014. Furthermore, Cann's measurement of bone density is targeted towards acquiring the correct measurement of mineral content and not the creation of a model. *See generally* EX1014.

76. A POSA considering Cann would not be informed of two very important aspects of the density of hard tissue used for modeling that is present in human dental structure but absent from vertebral anatomy as disclosed by Cann. One aspect is the structure of trabecular bone. Cann discusses accuracy of density measurement in trabecular bone by placement of a region of interest ("ROI"). *See*

EX1014 at 496 ("The error in ROI positioning could contribute up to 15% of the overall error in the determination of vertebral mineral."); *id*. at Fig. 5. Cann further states, "[a] single (5 mm) scan obtained through the midportion of a vertebral body is not sufficient to determine mineral content." EX1014 at 499. "[A] single 10 mm thick original axial traverse slice does not provide the same density resolution as two 5 mm thick slices. …Only if a 10 mm thick scan can be positioned precisely to within 2 mm by external means should its use be considered." *Id.*

77. In contrast, voxel sizes, which are analogous to slice thickness, of sub-millimeter range are necessary to represent the structure of human dental anatomy. In 2004 and currently in 2025, this voxel size would typically be 0.4 mm. *See* EX2022 at 39; EX2023 at 1. Cann's discussion necessitating thicker slices at 10 mm for accurate density measurements would inform a POSA that the disclosed information is not relevant to modeling of the dental structure. *See* EX1014 at 499.

78. The combination of errors in measuring density, geometry of scanning, and resolution of the potential result as disclosed in Cann would inform a POSA that such techniques are not only irrelevant to human dental structure but are completely incompatible for use with Arai. *See generally* EX1014. As a chief scientist at Imaging Sciences International in 2004, I personally worked on creating dental models using CT with standard 0.4 mm, 0.2 mm, and even lower resolution scans by manually configuring the ISI i-CAT to 0.125 mm resolutions. *See* EX2019 at 3.

I would still observe inaccurate model creations for a number of reasons, including partial volume effect requiring even lower resolutions. The fact that the current i-CAT supports a 0.125 mm scan demonstrates that it is possible to build such models with much higher resolution that Cann discloses and more suitable for dental procedures through research and development. *See* EX2022 at 39.

79. Another relevant consideration is that human dental anatomy includes teeth, which are generally denser than bone. Cann does not disclose any relevant information regarding tooth density. *See generally* EX1014. Arai also does not include any discussion of density measurements. *See generally* EX1013. A POSA considering Arai in view of Cann would be completely uninformed regarding the use of tooth density in creating a model.

80. Given the comprehensive reasons above, it is my opinion that a POSA considering Arai in view of Cann would not be informed of any need or method of creating a densitometric model of the human dental structure. Furthermore, regarding claim 7 of the '301 Patent, a POSA considering Arai in view of Cann would not be informed of the range of anatomy to be color-coded. In particular, a POSA would not be informed that a color-coded methodology to render anatomies of different densities such as teeth, bone, and trabecular regions to support the appropriate display would even be possible without considering the disclosure of the '301 Patent. *See* EX1002 at 3:4-5; 4:41-46. A POSA would only consider color

coding after recognizing that a modeling of different anatomies should be visualized in different colors – this would require an understanding of anatomical modeling with respect to varying densities. On the other hand, measuring distances or rendering slices in a 3D dataset does not teach or suggest a separation of anatomy based on density.

g) A POSA Would Not Know to Utilize Densitometric Modeling Based on Arai

81. Dr. Sonka opines that a POSA would recognize that, in addition to measuring the thickness of the jaw, acquiring density measurements would also be helpful. *See* EX1007 at ¶ 231. However, measuring the size of the jaw and measuring the density of the bone in the jaw are two completely different concepts. The primary motivation discussed in Arai is to navigate the anatomy using a panoramic image, which requires utilizing size information and other factors as described above. *See generally* EX1013. Density information has nothing to do with navigation but rather site assessment.

82. Since Arai does not provide any description about bone density, a POSA would not be aware of the problem. *See generally* EX1013. As such, a solution to the problem would certainly not be obvious. Moreover, based on the points discussed above, a POSA would not know to utilize densitometric modeling based on Arai. Based on Arai, it would not have been obvious for a POSA to seek densitometric accuracy and pursue a densitometric model from a CT.

83. In sum, Dr. Sonka's opinion that it would have been obvious for a POSA to add a densitometric model to Arai merely because Arai performs a CT scan is not supported due to known problems associated with using a CBCT, especially a ROI CBCT.

h) Dr. Sonka's Declaration Contains Inconsistencies Regarding Arai

84. With respect to the "without the use of fiducial markers" limitation in claims 13 and 21 of the '374 Patent, Dr. Sonka opines that the CT system in Arai does not use a fiducial marker. *See* EX1007 at ¶ 278. However, Dr. Sonka goes on to say that a later Arai patent, U.S. Patent No. 6,243,439 ("Arai 439"), *does* disclose fiducial markers to improve accuracy. *See id.* This indicates that the older Arai disclosure describes a system that is less accurate. Dr. Sonka's opinion that in view of the advancements throughout the 1990s, a POSA would understand the need for fiducial markers decreased and was often unnecessary for obtaining accurate comparisons is incorrect. *See id.* The named inventors of Arai 439, who were arguably more informed than a POSA, had to add fiducial markers to improve accuracy.

i) Arai in Combination with Cann and Other Asserted References Fails to Render the Osseo Patents Obvious

85. Dr. Sonka alleges that Arai in combination with Cann, and in further combination with Xu and/or Milestone renders certain challenged claims obvious.

See EX1007 at ¶ 260. Xu does not disclose dental anatomical structures, but rather discusses the application of subtraction mainly to lungs. *See* EX1019 at Abstract. Xu had to consider only a limited variability in orientation since a patient would routinely be lying down for a CT scan of the lungs. While the variability in orientation is important to the target anatomy, the method of scanning is also crucial. In Xu, the bed supporting the patient acts as the reference point allowing a limited variability (since the lungs are within a known cavity in the human body). *See* EX1019 at Fig. 5A.

86. As an example of anatomical implications, the range of variabilities would be completely different if the bed was used but it was the patient's legs being scanned rather than the lungs. Because the legs do not have to limit their location as the lungs do, significant variability in subtraction is introduced. More importantly, a patient sitting on a chair instead of lying on a bed introduces a large amount of variability for scanning dental structures. A POSA would understand that the process discussed in Xu would not easily be adaptable for use with dental structures.

87. Dr. Sonka opines that Milestone teaches "creating three-dimensional models." EX1007 at ¶ 217 (citing EX1020 at Abstract). However, the abstract makes no mention of creating three-dimensional models. *See* EX1020 at Abstract. Any models referred to in Milestone comprise recognized structures for analysis of anomalies rather than a three-dimensional model. *See* EX1020 at 12:26-33 ("…the

processor (or more appropriately the software operating within the processor) can determine the structures that depend from the trachea and properly identify them according to the selected model….an abnormality is, in its broadest sense, a difference (deviation) between the scanned data and the normative data which requires closer inspection by a physician.”). Furthermore, Milestone, like Xu, discusses scanning a patient’s lungs. *See* EX1020 at Fig. 1. A POSA would understand that the process discussed in Milestone would not easily be adaptable for use with dental structures.

88. Dr. Sonka states that Rothman “provides several examples of software capable of processing the collected data to create three-dimensional tomographic models of dental structures.” EX1007 at ¶ 207 (citing EX1016 at 14-30). Based on my review of Rothman, it is my conclusion that the cited section does not discuss the creation of three-dimensional models; rather, this discussion is limited to the creation of cross-sectional images. *See* EX1016 at 16 (“The first part of this process is for the computer to dig into the stack of axial slices and identify all the picture elements along each of the drawn cross-sectional oblique lines. These picture elements are then rearranged into images and displayed as a sequence of oblique cross sections, which are numbered from right to left.”).

89. Notably, Dr. Sonka repeatedly refers to Rothman’s “series of axial sections, or slices,” as data that “can be reconstructed in a tomographic model of the

patient's dental structures." EX1007 at ¶ 208 (citing EX1016 at 14-15). In fact, Rothman does not discuss the use of the "series of axial sections, or slices," for the generation of tomographic models. Instead, the "axial CT data" is used in multiplanar reformation. *See* EX1016 at 14-15.

3. Alleged Anticipation and/or Obviousness of the Osseo Patents by Pelc

90. Dr. Sonka purports that Pelc "teaches the creation of a tomographic model assembled from at least two planes of data"; however, nowhere in the section of the specification identified by Dr. Sonka does Pelc discuss a tomographic model. EX1007 at ¶ 204 (citing EX1015 at 25:36-26:3). In addition, the imaging system in Pelc does not provide information regarding bone density as required by the challenged claims. *See* Petition at 32 (citing EX1007 at ¶¶ 70, 92-94, 229, 348). Pelc fails to mention bone density or densitometry at all. *See generally* EX1015.

91. Pelc discusses a whole-body scan – not densitometric modeling using tomographic scans. *See* EX1015 at 23:6-13. The word "model" is used only twice in Pelc – once to describe the curvature of the spine and a second time to model the dual energy calibration using phantoms of known densities. *See* EX1015 at 26:11-14; 40:1-6. Pelc does not disclose generating a dental densitometric model using tomographic scans. *See generally* EX1015. Dr. Sonka's assertion that Pelc relates

to CT modeling is incorrect – CT scans are not inherently related to modeling, and certainly not to dental densitometric modeling. *See* EX1007 at ¶ 295.

4. Alleged Anticipation and/or Obviousness of the '262 Patent by Massie

92. Dr. Sonka opines that claims 1, 2, 4, and 6 of the '262 Patent are anticipated and/or rendered obvious by Massie. *See* EX1007 at ¶¶ 521-555. In forming this opinion, Dr. Sonka is "assuming that [Massie] is prior art (*i.e.*, assuming the '262 patent's priority date is January 24, 2003)." EX1007 at ¶ 521. I disagree that Massie is prior art.

93. The '262 Patent issued from U.S. Patent App. No. 10/351,567 (the "'567 Application"), filed on January 24, 2003. The '567 Application was filed as a continuation-in-part application ("CIP"), claiming priority through a chain of applications to U.S. Patent App. No. 09/452,348 (the "'348 Application"), filed on December 1, 1999. *See* EX1003 at 1:8-12. Based on my review of the '567 Application and the '348 Application, I conclude that the CIP patent claims, including the energy source/energy sensor limitations, are supported by the original application as filed. *See, e.g.,* EX1002 at Abstract ("X-ray equipment including an X-ray source and an X-ray detector array are connected to a positioning motor for movement relative to a patient's dental or orthopedic structure in response to signals from the microprocessor."); *see also id.* at 4:23-31 ("The X-ray equipment 12 includes an X-ray beam source 14 and a detector array 16."); 4:60-64 ("The method

steps include positioning a patient and positioning the X-ray equipment relative to the patient, i.e. with the patient's dental/orthopedic structure to be examined located between the X-ray source 14 and the detector array 16.”).

94. It is therefore my opinion that the ’262 Patent is entitled to the priority date from its parent, *i.e.*, December 1, 1999, and is not limited to claiming priority from its January 24, 2003 filing date. Because Massie was published on June 7, 2001, it cannot qualify as prior art in the present proceeding. *See* EX1017.

VII. CONCLUSION

95. In my opinion, the challenged claims in the Osseo Patents are not invalid as set forth in this Report. Specifically, the challenged claims of the Osseo Patents are valid over the prior art.

I hereby certify and declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful and false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

Date: July 15, 2025

Dr. Omid Kia

CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. §§ 42.6(e)(4) and 42.205(b), the undersigned certifies that on July 16, 2025, a true and correct copy of the DECLARATION OF DR. OMID KIA IN SUPPORT OF PATENT OWNER PRELIMINARY RESPONSE was served by filing this document through the PTAB E2E portal and via email to the following counsel for the Petitioner:

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