

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

KAVO DENTAL TECHNOLOGIES, LLC,
Petitioner,

v.

OSSEO IMAGING, LLC,
Patent Owner.

IPR2020-00659
Patent 8,498,374 B2

Before GEORGIANNA W. BRADEN, NABEEL U. KHAN, and
SCOTT B. HOWARD, *Administrative Patent Judges*.

BRADEN, *Administrative Patent Judge*.

DECISION
Institution of *Inter Partes* Review
37 C.F.R. § 314(a)

I. INTRODUCTION

Kavo Dental Technologies, LLC¹ (“Petitioner”) filed a Petition requesting an *inter partes* review of claims 1–24 of U.S. Patent No. 8,498,374 B2 (Ex. 1001, “the ’374 patent”). Paper 2 (“Pet.”). Osseo Imaging, LLC² (“Patent Owner”) filed a Preliminary Response. Paper 6 (“Prelim. Resp.”).

Under the statute, an *inter partes* review may not be instituted unless the information presented in the petition and the preliminary response shows “there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.” 35 U.S.C. § 314(a). Moreover, the Supreme Court has held that a decision under § 314 may not institute review on fewer than all claims challenged in the petition. *SAS Inst., Inc. v. Iancu*, 138 S. Ct. 1348, 1355–56 (2018); *see also PGS Geophysical AS v. Iancu*, 891 F.3d 1354, 1360 (Fed. Cir. 2018) (interpreting the statute to require “a simple yes-or-no institution choice respecting a petition, embracing all challenges included in the petition”).

After considering the Petition, the Preliminary Response, and associated evidence, we determine Petitioner has satisfied the threshold requirement set forth in 35 U.S.C. § 314(a). Thus, based on the information

¹ Petitioner identifies itself and its corporate relatives: Kerr Corporation; Sybron Dental Specialties, Inc.; DCII US Holdings, LLC; DCII North America, LLC; Ormco Corporation; Dental Imaging Technologies Corporation; and Envista Holdings Corporation as the real parties-in-interest pursuant to 37 C.F.R. § 42.8. Pet. 2.

² Patent Owner identifies only itself as the real party-in-interest pursuant to 37 C.F.R. § 42.8. Paper 3, 1.

presented, and under *SAS* and *PGS Geophysical AS*, we institute an *inter partes* review of claims 1–24 of the '374 patent.

II. BACKGROUND

A. *Related Proceedings*

Petitioner informs us of two pending district court proceedings based on the '374 patent, one of which involves Petitioner. Pet. 2–3. Patent Owner informs us of the pending district court proceeding against Petitioner: *Osseo Imaging, LLC. v. Kavo Dental Technologies, LLC*, Case No. 3:19- cv-00174-MOC-DSC (W.D.N.C.), filed April 5, 2019. Paper 3 (Patent Owner's Mandatory Notices), 1.

B. *Background of Technology and the '374 Patent*

The '374 patent was filed on September 14, 2012, issued on July 20, 2013, and is titled “Dental and Orthopedic Densitometry Modeling System and Method.” Ex. 1001, codes (22), (45), (54). The '374 patent states that “[t]omography or sectional radiography techniques using scanning X-ray beams have previously been employed for dental applications.” *Id.* at 2:8–10. The '374 patent further states that “[i]n the medical field, densitometry procedures are used for measuring bone morphology density (BMD) by utilizing scanning X-ray beam techniques.” *Id.* at 2:15–17. According to the '374 patent, “[t]he present invention utilizes such densitometry modeling and mapping techniques for dental applications.” *Id.* at 2:31–32.

The '374 patent describes systems and methods directed to a “densitometry modeling using a controller with a microprocessor and a memory device connected to the microprocessor.” *Id.* at code (57). According to the '374 patent, “[t]he controller controls the operation of X-ray equipment, which is adapted for scanning patients' dental and orthopedic

structures along preprogrammed scan paths. The X-ray output is processed by the microprocessor for creating a densitometry model.” *Id.* at 2:57–61.

One embodiment disclosed in the ’374 patent is Figure 1, which is reproduced below.

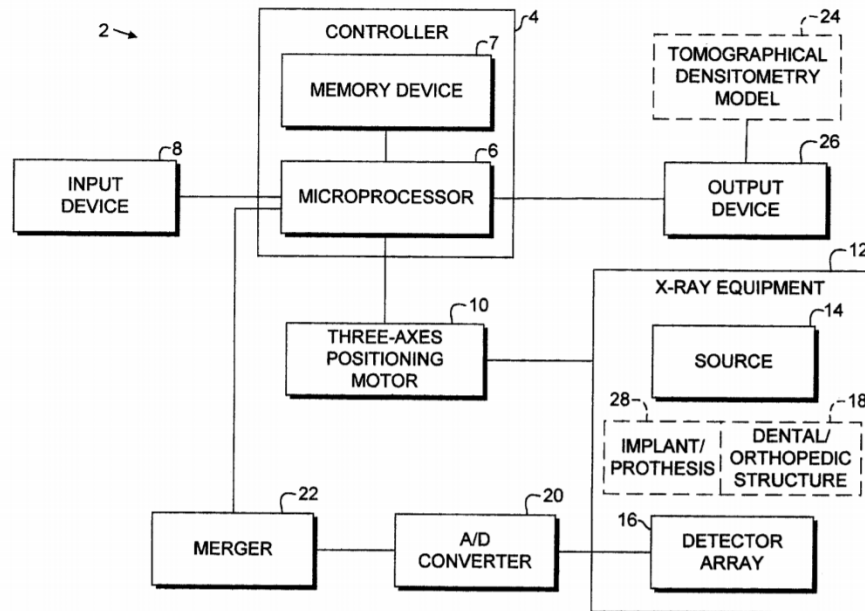


Fig. 1

Figure 1 “is a schematic, block diagram of a dental and orthopedic densitometry modeling system embodying the present invention.” Ex. 1001, 3:43–45. Dental and orthopedic densitometry modeling system 2 includes, *inter alia*, controller 4, X-ray equipment 12, analog-to-digital converter 20, and merger device 22. *See generally id.* at 3:66–4:38, Fig. 1. “The microprocessor 6, using data from the merger device 22, creates a tomographical densitometry model 24 which is transmitted to an output device or devices 26.” *Id.* at 4:42–45.

Another embodiment disclosed in the ’374 patent is Figure 2, which is reproduced below.

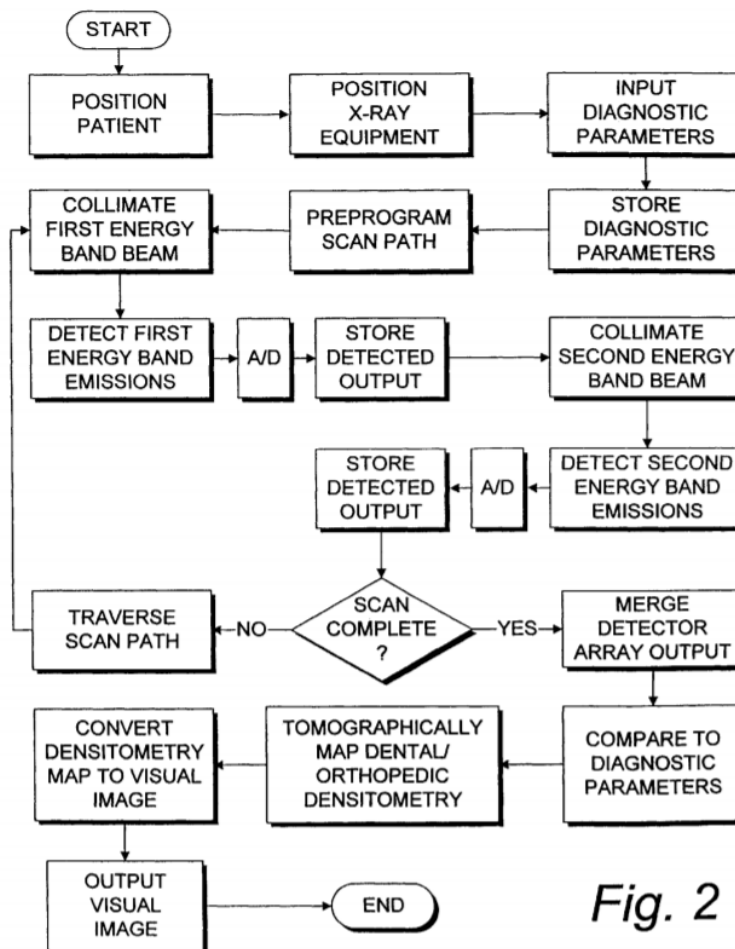


Fig. 2

Figure 2 “is a flowchart of a dental and orthopedic densitometry modeling method embodying the present invention.” Ex. 1001, 3:46–47. As described in Figure 2, once the scanning is complete, the X-ray equipment is positioned 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.” *Id.* at 4:67–5:3. The ’374 patent discloses that diagnostic parameters are put into the system and stored in the computer’s memory device. *Id.* at 5:4–10. Then a “scan path for the X-ray equipment is preprogrammed in the computer.” *Id.* at 5:10–11. The ’374 patent teaches the use in dental applications of a previously known method of dual-energy

X-ray beams for medical densitometry. *Id.* at 5:12–20. The '374 patent explains that “dual-energy densitometry can result in a more accurate patient model.” *Id.* at 5:20–22. The '374 patent states that the “X-ray equipment then traverses the preprogrammed scan path and the first/second energy band steps are repeated until the scanning procedure is complete. The digitized detector array output is merged and compared to the diagnostic parameters which are stored in the computer's memory.” *Id.* at 5:23–27.

C. Illustrative Claims

As noted above, Petitioner challenges claims 1–24, with claims 1, 13, and 21 being independent. Challenged independent claim 1 is illustrative of the challenged claims and is reproduced below:

1. 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.

Ex. 1001, 5:34–50.

D. The Asserted Challenges to Patentability and Evidence of Record

The information presented in the Petition sets forth proposed challenges to the patentability of claims 1–24 of the ’374 patent under 35 U.S.C. §§ 102 and 103 as follows (*see* Pet. 4–5):³

Reference(s)/Basis	35 U.S.C. §⁴	Challenged Claim(s)
Arai ⁵	§ 102	1, 3, 7, 9
Arai	§ 103	1–12
Arai, Cann ⁶	§ 103	1–12
Arai, Cann, Pelc ’080 ⁷	§ 103	4, 10
Arai, Cann, Xu ⁸	§ 103	5, 6, 11, 12

³ Petitioner supports its challenges with the Declaration of Andrew Maidment, Ph.D. (“Dr. Maidment”). Ex. 1007.

⁴ The Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (September 16, 2011) (“AIA”), included revisions to 35 U.S.C. §§ 102, 103 that became effective on March 16, 2013. Because the ’374 patent issued from an application filed before March 16, 2013, we apply the pre-AIA versions of the statutory bases for unpatentability.

⁵ U.S. Patent No. 6,118,842, issued Sep. 12, 2000 (Ex. 1013, “Arai”).

⁶ Cann, C. E., & Genant, H. K. (1980). Precise Measurement of Vertebral Mineral Content Using Computed Tomography. *Journal of Computer Assisted Tomography*, 4(4), 493–500. doi: 10.1097/00004728-198008000-00018 (Ex. 1014, “Cann”).

⁷ U.S. Patent No. 5,533,080, issued July 2, 1996 (Ex. 1018, “Pelc’080”).

⁸ U.S. Patent No. 6,363,163, issued Mar. 26, 2002, filed Feb. 23, 1998 (Ex. 1019, “Xu”).

Reference(s)/Basis	35 U.S.C. §⁴	Challenged Claim(s)
Arai, Cann, Xu, Milestone ⁹	§ 103	5, 6, 11, 12
Arai, Cann, Milestone	§ 103	5, 6, 11, 12
Arai, Cann, Applicant admitted prior art ¹⁰	§ 103	2, 3, 8, 9
Aria and Xu	§ 103	13–24
Aria, Xu, Milestone	§ 103	13–24
Aria, Xu, Cann	§ 103	13–24
Arai, Xu, Pelc '080	§ 103	16, 20
Arai, Xu, Cann, Pelc '080	§ 103	16, 20
Arai, Xu, Milestone, Cann, Pelc '080	§ 103	16, 20
Arai, Xu, Milestone, Pelc '080	§ 103	16, 20
Arai, Xu, Cann, Applicant admitted prior art	§ 103	14, 18, 22, 24
Arai, Xu, Milestone, Cann, Applicant admitted prior art	§ 103	14, 18, 22, 24

⁹ WO 98/36683, published Aug. 27, 1998 (Ex. 1020, “Milestone”).

¹⁰ Petitioner identifies the following Applicant Admitted Prior Art (AAPA): “The '374 patent admits that the use of dual-energy X-ray beams for medical densitometry applications was known (citing Ex. 1026, Bisek, U.S. Patent No. RE 36,162).” See Pet. 42 (citing Ex. 1001, 5:18–22).

Reference(s)/Basis	35 U.S.C. §⁴	Challenged Claim(s)
Aria, Milestone	§ 103	13–24
Aria, Milestone, Cann	§ 103	13–24
Arai, Milestone, Cann, Pelc '080	§ 103	16, 20
Arai, Milestone, Pelc '080	§ 103	16, 20
Arai, Milestone, Cann, Applicant admitted prior art	§ 103	14, 18, 22, 24
Arai, Milestone, Applicant admitted prior art	§ 103	14, 18, 22, 24
Pelc ¹¹	§ 102	1–4, 7–10
Pelc	§ 103	1–24
Pelc, Rothman ¹²	§ 103	1–24
Pelc, Rothman, Cann	§ 103	1–24
Pelc, Rothman, Xu	§ 103	5, 6, 11, 12
Pelc, Rothman, Cann, Xu	§ 103	5, 6, 11, 12
Pelc, Rothman, Milestone	§ 103	5, 6, 11, 12

¹¹ WO 94/10908, published May 26, 1994 (Ex. 1015, “Pelc”).

¹² Rothman, S. L. G., (1998) *Dental applications of computerized tomography: surgical planning for implant placement*. Chicago, IL: Quintessence Publishing Co. (Ex. 1016, “Rothman”).

Reference(s)/Basis	35 U.S.C. §⁴	Challenged Claim(s)
Pelc, Rothman, Cann, Milestone	§ 103	5, 6, 11, 12
Pelc, Rothman, Xu, Milestone	§ 103	5, 6, 11, 12
Pelc, Rothman, Cann, Xu, Milestone	§ 103	5, 6, 11, 12
Pelc, Rothman, and knowledge of a person of ordinary skill in the art at the time of the invention	§ 103	7
Pelc, Rothman, Cann, and knowledge of a person of ordinary skill in the art at the time of the invention	§ 103	7
Pelc, Rothman, Xu, and knowledge of a person of ordinary skill in the art at the time of the invention	§ 103	17, 23
Pelc, Rothman, Cann, Xu, and knowledge of a person of ordinary skill in the art at the time of the invention	§ 103	17, 23
Pelc, Rothman, Milestone, and knowledge of a person of ordinary skill in the art at the time of the invention	§ 103	17, 23
Pelc, Rothman, Cann, Milestone, and knowledge of a person of ordinary skill in the art at the time of the invention	§ 103	17, 23
Pelc, Rothman, Xu, Milestone, and knowledge of a person of ordinary skill in the art at the time of the invention	§ 103	17, 23

Reference(s)/Basis	35 U.S.C. § ⁴	Challenged Claim(s)
Pelc, Rothman, Cann, Xu, Milestone, and knowledge of a person of ordinary skill in the art at the time of the invention	§ 103	17, 23

III. PRELIMINARY MATTERS

A. Analysis of Discretionary Denial Under 35 U.S.C. § 314(a)

Patent Owner states that the '374 patent is the subject of two pending district court litigations. Patent Owner asserted the '374 patent against Planmeca USA Inc. in the first case (“the Planmeca proceeding”), while in the second case Patent Owner sued Petitioner for infringement of the '374 patent (“the Kavo proceeding”).¹³ Prelim. Resp. 3–4. Patent Owner argues we should exercise discretion under 35 U.S.C. § 314(a) and deny institution based on the trial scheduled for October 2020¹⁴ in the Planmeca proceeding, a proceeding to which Petitioner is not a party. Prelim. Resp. 1–12. Petitioner, however, is a party in the Kavo proceeding that is stayed currently.

Per our email authorization (Paper 7), Petitioner filed a Preliminary Reply to address this issue from Patent Owner’s Preliminary Response (“Pet.

¹³ Claims 1–4, 6–10, 12–24 of the '374 patent are at issue in both the Kavo and Planmeca proceedings. *Compare* Ex. 2001 (*Osseo Imaging, LLC. v. Planmeca, USA, Inc.*, Case No. 1:17- cv-01386-LPS (D. Del.)), *with* Ex. 2008 (*Osseo Imaging, LLC. v. Kavo Dental Technologies, LLC*, Case No. 3:19- cv-00174-MOC-DSC (W.D.N.C.)). These same claims are challenged in the Petition. *See* Pet. 4.

¹⁴ The trial was originally set of May 18, 2020, but was postponed due to a court closure associated with Covid-19. *See* Ex. 2006, 2 (D.I. 18) (setting May 18, 2020 trial date); Ex. 2015 (resetting trial date for October 16, 2020).

Prelim. Reply,” Paper 8), and Patent Owner filed a Preliminary Sur-Reply to Petitioner’s Preliminary Reply (“PO Prelim. Sur-Reply,” Paper 9). For the reasons stated below we are not persuaded to exercise discretion to deny institution.

Institution of an *inter partes* review is discretionary. *See* 35 U.S.C. § 314(a) (authorizing institution of an *inter partes* review under particular circumstances, but not requiring institution under any circumstances); 37 C.F.R. § 42.108(a) (“[T]he Board may authorize the review to proceed”). *Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2140 (2016) (“[T]he agency’s decision to deny a petition is a matter committed to the Patent Office’s discretion.”); *SAS*, 138 S. Ct. at 1356 (“[Section] 314(a) invests the Director with discretion on the question whether to institute review” (emphasis omitted)); *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1367 (Fed. Cir. 2016) (“[T]he PTO is permitted, but never compelled, to institute an IPR proceeding.”).

In the *NHK* case, the Board denied institution relying, in part, on § 314(a), because the parallel district court proceeding was scheduled to finish before the Board reached a final decision. *NHK Spring Co. v. Intriplex Techs., Inc.*, IPR2018-00752, Paper 8 (PTAB Sept. 12, 2018) (precedential). “Thus, *NHK* applies to the situation where the district court has set a trial date to occur earlier than the Board’s deadline to issue a final written decision in an instituted proceeding.” *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11, 3 (PTAB March 20, 2020) (precedential) (Order). When determining whether to exercise discretion to deny institution under *NHK* due to an earlier trial date, we consider the following factors (“*Fintiv* factors”):

1. whether the court granted a stay or evidence exists that one may be granted if a proceeding is instituted;
2. proximity of the court's trial date to the Board's projected statutory deadline for a final written decision;
3. investment in the parallel proceeding by the court and the parties;
4. overlap between issues raised in the petition and in the parallel proceeding;
5. whether the petitioner and the defendant in the parallel proceeding are the same party; and
6. other circumstances that impact the Board's exercise of discretion, including the merits.

Id. at 6. “These factors relate to whether efficiency, fairness, and the merits support the exercise of authority to deny institution in view of an earlier trial date in the parallel proceeding.” *Id.* In evaluating these factors, we take “a holistic view of whether efficiency and integrity of the system are best served by denying or instituting review.” *Id.* (citing Patent Trial and Appeal Board Consolidated Trial Practice Guide 58 (November 2019), <https://www.uspto.gov/TrialPracticeGuideConsolidated>). We address the *Fintiv* factors *in seriatim* and discuss in detail our reasons for not exercising discretion to deny institution based on § 314(a).

1. Whether a Stay Exists or Is Likely to Be Granted if a Proceeding Is Instituted

The *Kavo* proceeding, in which Petitioner is a defendant, “is stayed pending the results of *Kavo*’s petitions based on a *joint request*.” Pet. Prelim. Reply 5 (citing Ex. 2013). This factor weighs against exercising discretion to deny institution. The stay of the *Kavo* proceeding allays concerns about inefficiency and duplication of efforts as it relates to this proceeding. *See Fintiv*, Paper 11 at 6.

As to the Planmeca proceeding, the *Fintiv* Order explains, “Even when a petitioner is unrelated to a defendant, however, if the issues are the same as, or substantially similar to, those already or about to be litigated, or other circumstances weigh against redoing the work of another tribunal, the Board may, nonetheless, exercise the authority to deny institution.” *Fintiv*, Paper 11 at 14.

Petitioner essentially argues that whether the Planmeca proceeding is stayed is irrelevant because it is not a party to the Planmeca proceeding. Pet. Prelim. Reply 4. Patent Owner argues the Planmeca proceeding is not stayed and given its advanced stage and proximity to trial, “the Delaware court is not likely to stay the case even if the petitions were instituted and Planmeca made such a motion.” PO Prelim. Sur-reply 4.

As noted above, the Planmeca proceeding may be a basis to deny institution if the issues are the same as, or substantially similar to, those already or about to be litigated, or other circumstances weigh against redoing the work of another tribunal. *See Fintiv*, Paper 11 at 14. Petitioner, however, is in no position to offer evidence about a stay in the Planmeca proceeding because Petitioner is not a party to that proceeding. In the event that there may be duplicative efforts, we continue our analysis and inquire further as to whether the district court would render a decision before this proceeding as examined below under *Fintiv* factor 2, and the degree of overlap of the proceedings under *Fintiv* factor 4. *Fintiv* at 6 (explaining that there is some overlap among the factors).

2. *Proximity of the Court’s Trial Date to the Board’s Projected Statutory Deadline*

As noted above, the Kavo proceeding is stayed pending this resolution of this proceeding, which weighs in against exercising our discretion to deny

institution. Pet. Prelim. Reply 5. Both Petitioner and Patent Owner agree that the Planmeca proceeding is scheduled for a trial in October 2020. Pet. Prelim. Reply 6; PO Prelim Sur-reply 1, 5–6; *see also* Ex. 2015 (Order Rescheduling Trial). Because the Planmeca trial is scheduled approximately eight months before a Final Written Decision would be due in this case, this factor weighs in favor of exercising our discretion to deny institution. *See Fintiv*, Paper 11 at 9 (“If the court’s trial date is earlier than the projected statutory deadline, the Board generally has weighed this fact in favor of exercising authority to deny institution under *NHK*.”).

3. *Investment in the Parallel Proceeding by the Court and Parties*

Petitioner acknowledges that “[t]he Delaware court has clearly invested time and effort in the Planmeca [proceeding].” Pet. Prelim Reply 6. Petitioner argues, however, that “apart from *Markman* proceedings—the results of which Kavo adopted in its petitions—none of that effort bears on the distinct invalidity challenges raised in Kavo’s petitions.” *Id.*

Petitioner also argues there was no delay in filing the Petition. Pet. Prelim. Reply 7. Specifically, Petitioner argues it filed the Petition approximately two months after Patent Owner filed its infringement contentions and Petitioner filed its invalidity contentions in the Kavo proceeding. *Id.*

Patent Owner argues that “[t]he court in the Planmeca [proceeding] has issued substantive rulings, including a claim construction order and orders denying motions to strike the expert reports relating to the same patents at issue in these petitions.” PO Prelim. Sur-reply 6; *see* Prelim. Resp. 7–8 (noting the status of the Planmeca proceeding). Patent Owner further argues that summary judgment and *Daubert* motions have been fully briefed and

argued. PO Prelim. Sur-reply 7. Patent Owner also argues that although the Kavo proceeding is not in an advanced stage, “Petitioner has benefited from [the Planmeca proceeding] as evidenced from Petitioner’s reliance on that court’s claim construction, [which] is significant and weighs heavily in favor of denial.” *Id.*

It is clear that the district court in the Planmeca proceeding has invested substantial resources into the case. With the exception of the *Markman* Order, however, Patent Owner has not shown sufficiently how the investment relates to the issue before us. That is, although summary judgment and *Daubert* motions have been briefed and argued, Patent Owner has not shown sufficiently that those issue are relevant here.

Accordingly, because the investment made by the court and the Patent Owner is in a proceeding in which Petitioner is not a party and Patent Owner has not demonstrated persuasively how this investment leads to an inefficient duplication of resources if this Petition is instituted, we find this factor weighs against exercising our discretion to deny.

4. *Overlap Between Issues Raised in the Petition and in the Parallel Proceeding*

Petitioner states it has limited knowledge of the arguments in the Planmeca proceeding, but contends that based on Planmeca’s Section 282 statement, none of the lead prior art references of this Petition—Arai and Pelc—are asserted in the Planmeca proceeding. Pet. Prelim. Reply 8 (citing Ex. 1039). Petitioner argues that Planmeca’s expert’s invalidity reports and motion for summary judgment (Ex. 2004) support its contention that the grounds, arguments, and/or evidence in the Petition are “materially different” “than those presented in the district court.” Pet. Prelim. Reply 8–9 (quoting *Fintiv*, Paper 11 at 12–13).

Patent Owner acknowledges that the Petition involves different primary references than the Planmeca proceeding, but argues that “the prior art that Petitioner presents requires consideration of issues . . . are cumulative to those presented in the Planmeca [proceeding].” PO Prelim. Sur-reply 7; *see also* PO Prelim. Resp. 9–10 (arguing that Petitioner’s arguments essentially duplicate those of the Planmeca proceeding).

Based on the record, we are not persuaded by Patent Owner’s argument that Arai and Pelc are cumulative to the references Planmeca is relying on in district court. Patent Owner simply offers a conclusory statement, without any support or analysis. Because the Petition “includes materially different grounds, arguments, and/or evidence than those presented in the district court,” this factor weighs against exercising discretion to deny institution. *Fintiv*, Paper 11 at 12–13 (citations omitted).

5. *Whether the Petitioner and the Defendant in the Parallel Proceeding Are the Same Party*

Petitioner argues it is not a party to the Planmeca proceeding. Pet. Prelim. Reply 9.

“Patent Owner acknowledges that Petitioner is not a party to the Planmeca [proceeding].” PO Prelim. Sur-reply 8. Patent Owner argues, however, that “this factor is not dispositive.” *Id.* Patent Owner further argues “the significant efficiencies of denial and consideration of other factors, viewed holistically, favor denial.” *Id.* at 8–9 (citing *Valve Corp. v. Elec. Scripting Prods., Inc.*, IPR2019-00062, Paper 11 at 2 (PTAB Apr. 2, 2019) (precedential)); *see also* Prelim. Resp. 8–9 (“In other contexts, such as a later-filed petition, the Board has found that identity of the parties is not dispositive and has exercised its discretion to deny institution.”).

“If a petitioner is unrelated to a defendant in an earlier court proceeding, the Board has weighed this fact against exercising discretion to deny institution under *NHK*.” *Fintiv*, Paper 11 at 13–14 (citations omitted). Because there is no dispute that Petitioner is unrelated to the defendant in the Planmeca proceeding and is not similarly situated as Planmeca, this factor weighs against us exercising discretion.

We do not find Patent Owner’s reliance on *Valve* persuasive. In *Valve*, Valve Corporation (“Valve”)—the petitioner—had a preexisting relationship with HTC Corporation and HTC America, Inc. (collectively, “HTC”), which had filed an earlier petition. *See Valve*, Paper 11 at 9–10. Specifically, both Valve and HTC were accused of patent infringement based on the same product, “namely HTC’s VIVE devices that incorporate technology licensed from Valve,” and of Valve employees providing HTC with technical assistance during the development of the accused devices. *Id.* (citations omitted). In contrast, in this case, Patent Owner has not alleged any relationship between Petitioner and Planmeca. Simply being accused of infringing the same patent is not a sufficient relationship. Accordingly, we find that this factor strongly weighs against us exercising discretion to deny institution.

6. *Other Circumstances that Impact the Board’s Exercise of Discretion, Including the Merits*

Petitioner argues Patent Owner’s arguments are not “frank and fair.” Pet. Prelim. Reply 10 (quoting *Keystone Driller Co. v. General Excavator Co.*, 290 U.S. 240, 244 (1933)). Petitioner further argues that the Petition contains “a wealth of prior art[, which] provides more than sufficient basis for this Board to institute *inter partes* review and hold the challenged claims

unpatentable” while Patent Owner does not present any arguments directed to the merits. *Id.*

Patent Owner disputes Petitioner’s contention that its arguments regarding preliminary matters should weigh against it because “[a]ll factors ‘are part of a balanced assessment of all the relevant circumstances in the case, including the merits.’” PO Prelim. Sur-reply 9. Patent Owner states that “[a]lthough a detailed discussion of the merits undermines the goal of conserving the Board’s resources by rejecting these petitions based on Section 314(a), the asserted grounds for institution fail to satisfy the Petitioner’s burden.” *Id.* Patent Owner argues, for example, that although Petitioner “repeats the [district] court’s construction [of densitometry/tomographic modeling and/or tomographic models] and adopts it as its own, Petitioner made no effort to explain how the prior art teaches this limitation.” *Id.* Patent Owner further argues Petitioner waited “until just six weeks before the statutory deadline and several week after the summary judgment arguments in the Planmeca [proceeding]” to file the Petition. *Id.* at 10.

We are not persuaded by either parties’ arguments on this point. Although Petitioner waited until towards the end of the statutory period, Patent Owner waited eighteen months between filing complaints in the Planmeca proceeding and Kavo proceeding. That period of delay in filing the Kavo proceeding accounts for a large portion of the prejudice Patent Owner alleges.

Nor do we agree with the parties’ remaining arguments. Petitioner has not shown sufficiently that Patent Owner has unclean hands. And Patent Owner relies on conclusory attorney argument—which is not persuasive—to

attack the sufficiency of the evidence in the Petition. Accordingly, we find this a neutral factor.

7. Balancing the Fintiv Factors

We have considered the circumstances and facts before us in view of the *Fintiv* factors. Because our analysis is fact driven, no single factor is determinative of whether we exercise our discretion to deny institution under § 314(a). Based on the facts of this case, the stay in the Kavo proceeding involving Petitioner allays concerns about inefficiency and duplication of efforts as it relates to issues raised by the parties in that parallel proceeding. Furthermore, the challenges raised in the Petition are not the same as, or substantially similar to, those about to be litigated in the Planmeca proceeding, which does not involve Petitioner as a party. Thus, the risk of duplicate work between the Planmeca proceeding and this *inter partes* review is *de minimis*. Even if the patents are found not to be invalid in the Planmeca proceeding, the patents will be subject to a second validity challenge by Petitioner. Patent Owner has not argued persuasively that it would be more efficient for that challenge to be held in the Kavo proceeding as opposed to before the Board.

Balancing all of the factors, on this record, we determine that the circumstances presented here weigh against exercising discretion under § 314(a) to deny institution of *inter partes* review.

B. Claim Construction

In an *inter partes* review for a petition filed on or after November 13, 2018, a claim “shall be construed using the same claim construction standard that would be used to construe the claim in a civil action under

35 U.S.C. 282(b).” 37 C.F.R. § 42.100(b) (2019); *see* Changes to the Claim Construction Standard for Interpreting Claims in Trial Proceedings Before the Patent Trial and Appeal Board, 83 Fed. Reg. 51,340 (Oct. 11, 2018) (amending 37 C.F.R. § 42.100(b) effective November 13, 2018). In applying this claim construction standard, we are guided by the principle that the words of a claim “are generally given their ordinary and customary meaning,” as understood by a person of ordinary skill in the art in question at the time of the invention. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–13 (Fed. Cir. 2005) (*en banc*) (citation omitted). “In determining the meaning of the disputed claim limitation, we look principally to the intrinsic evidence of record, examining the claim language itself, the written description, and the prosecution history, if in evidence.” *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 469 F.3d 1005, 1014 (Fed. Cir. 2006) (citing *Phillips*, 415 F.3d at 1312–17). There is a “heavy presumption,” however, that a claim term carries its ordinary and customary meaning. *CCS Fitness, Inc. v. Brunswick Corp.*, 288 F.3d 1359, 1366 (Fed. Cir. 2002) (citation omitted).

Petitioner requests—without providing any argument—that we adopt the district court’s claim construction of various terms from the Planmeca proceeding. *See* Pet. 15–18 (citing Ex. 1010). Patent Owner does not address Petitioner’s proposed constructions. *See generally* Prelim. Resp.

Because no express construction is needed to resolve any dispute in this proceeding, we do not construe any of the claim limitations. *See, e.g., Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017); *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999) (“[O]nly those terms need be construed that are in controversy, and only to the extent necessary to resolve the

controversy.”). A final determination as to claim construction will be made at the close of the proceeding, after any hearing, based on all the evidence of record. The parties are expected to assert all their claim construction arguments and evidence in the Petition, Patent Owner’s Response, Petitioner’s Reply, or otherwise during trial, as permitted by our rules.

C. Principles of Law

1. Anticipation

A claim is unpatentable under 35 U.S.C. § 102 if a prior art reference discloses every limitation of the claimed invention, either explicitly or inherently. *Glaxo Inc. v. Novopharm Ltd.*, 52 F.3d 1043, 1047 (Fed. Cir. 1995). If the prior art reference does not expressly set forth a particular element of the claim, that reference still may anticipate if that element is “inherent” in its disclosure. *In re Robertson*, 169 F.3d 743 (Fed. Cir. 1999). To establish inherency, extrinsic evidence, when relied upon, “must make clear that the missing descriptive matter is necessarily present,” or inherent, in the single anticipating reference. *Continental Can Co. v. Monsanto Co.*, 948 F.2d 1264, 1268 (Fed. Cir. 1991). “Inherency, however, may not be established by *probabilities* or *possibilities*. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.” *Id.* at 1269 (quoting *In re Oelrich*, 666 F.2d 578, 581 (CCPA 1981)) (emphasis added). Inherent anticipation, however, does not require recognition in the prior art. *Schering Corp. v. Geneva Pharmaceuticals*, 339 F.3d 1373, 1377 (Fed. Cir. 2003) (“*Continental Can* does not stand for the proposition that an inherent feature of a prior art reference must be perceived as such by a person of ordinary skill in the art before the critical date.”). Moreover, the reference must also “disclose[] within the four corners of the document not only all of

the limitations claimed but also all of the limitations arranged or combined in the same way as recited in the claim.” *Net MoneyIN, Inc. v. Verisign, Inc.*, 545 F.3d 1359, 1371 (Fed. Cir. 2008). Additionally, “the reference need not satisfy an *ipsissimis verbis* test.” *In re Gleave*, 560 F.3d 1331, 1334 (Fed. Cir. 2009).

2. *Obviousness*

A claim is unpatentable under 35 U.S.C. § 103(a) if “the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations, including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art; and (4) objective evidence of nonobviousness, i.e., secondary considerations. *See Graham v. John Deere Co. of Kansas City*, 383 U.S. 1, 17–18 (1966).

“While the sequence of these questions might be reordered in any particular case,” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 407 (2007), the U.S. Court of Appeals for Federal Circuit has “repeatedly emphasized that an obviousness inquiry requires examination of all four *Graham* factors and that an obviousness determination can be made only after consideration of each factor,” *Nike, Inc. v. Adidas AG*, 812 F.3d 1326, 1335 (Fed. Cir. 2016), *overruled on other grounds by Aqua Prods., Inc. v. Matal*, 872 F.3d 1290 (Fed. Cir. 2017) (en banc). We note that, with respect to the fourth *Graham* factor, the parties have not presented argument or evidence directed to

secondary considerations of nonobviousness. *See generally* Pet.; Prelim. Resp. The analysis below addresses the first three *Graham* factors.

D. Burden of Proof

“In an [*inter partes* review], the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable.” *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016) (citing 35 U.S.C. § 312(a)(3) (requiring *inter partes* review petitions to identify “with particularity . . . the evidence that supports the grounds for the challenge to each claim”)). This burden of persuasion never shifts to Patent Owner. *See Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015) (discussing the burden of proof in *inter partes* review). Furthermore, Petitioner cannot satisfy its burden of proving obviousness by employing “mere conclusory statements.” *In re Magnum Oil Tools Int’l, Ltd.*, 829 F.3d 1364, 1380 (Fed. Cir. 2016).

Thus, to prevail in an *inter partes* review, Petitioner must explain how the proposed prior art or combinations of prior art would have rendered the challenged claims unpatentable. At this preliminary stage, we determine whether the information presented in the Petition shows there is a reasonable likelihood that Petitioner would prevail in establishing that one of the challenged claims is unpatentable. Additionally, the Supreme Court held that a decision to institute under 35 U.S.C. § 314(b) may not institute review on less than all claims challenged in the petition. *SAS Inst., Inc. v. Iancu*, 138 S. Ct. 1348, 1355–56 (2018). Moreover, in accordance with USPTO Guidance, “if the PTAB institutes a trial, the PTAB will institute on all challenges raised in the petition.” *Guidance on the Impact of SAS on AIA Trial Proceedings* (April 26, 2018) (available at <https://www.uspto.gov/patents-application->

process/patent-trial-and-appeal-board/trials/guidance-impact-sas-aia-trial)
("USPTO Guidance").

E. Level of Ordinary Skill in the Art

In determining whether an invention would have been obvious at the time it was made, we consider the level of ordinary skill in the pertinent art at the time of the invention. *Graham*, 383 U.S. at 17. "The importance of resolving the level of ordinary skill in the art lies in the necessity of maintaining objectivity in the obviousness inquiry." *Ryko Mfg. Co. v. Nu-Star, Inc.*, 950 F.2d 714, 718 (Fed. Cir. 1991). Factors pertinent to a determination of the level of ordinary skill in the art include "(1) the educational level of the inventor; (2) type of problems encountered in the art; (3) prior art solutions to those problems; (4) rapidity with which innovations are made; (5) sophistication of the technology; and (6) educational level of active workers in the field." *Envtl. Designs, Ltd. v. Union Oil Co. of Cal.*, 713 F.2d 693, 696–697 (Fed. Cir. 1983) (citing *Orthopedic Equip. Co. v. All Orthopedic Appliances, Inc.*, 707 F.2d 1376, 1381–82 (Fed. Cir. 1983)). "Not all such factors may be present in every case, and one or more of these or other factors may predominate in a particular case." *Id.*

Petitioner argues that a person having ordinary skill in the art "would include a person with an advanced medical degree, such as an MD, DDS, or DMD, and/or an advanced degree in Medical Physics, Physics, or a related field, and at least three years of experience in using and/or designing medical imaging devices, including CT imaging systems and/or densitometric imaging systems." Pet. 18 (citing Ex. 1007 ¶¶ 52–55). Petitioner further argues that the person having ordinary skill in the art "would be generally

familiar with X-ray imaging, CT, X-ray tomosynthesis, densitometry, and medical and dental imaging, including the state of the art as of the priority date.” *Id.* (citing Ex. 1007 ¶¶ 52–55).

Patent Owner does not address the level of ordinary skill in the art in the Preliminary Response. *See generally* Prelim. Resp.

Based on our review of the ’374 patent, the types of problems and solutions described in the ’374 patent and cited prior art, and the testimony of Dr. Maidment, for purposes of this Decision, we adopt and apply Petitioner’s proposed level of ordinary skill in the art, except that we delete the qualifier “at least” to eliminate vagueness as to the amount of practical experience. The qualifier expands the range indefinitely without an upper bound, and thus, precludes a meaningful indication of the level of ordinary skill in the art.¹⁵ Specifically, we find that a person of ordinary skill in the art at the time of the claimed invention would have “include[d] a person with an advanced medical degree, such as an MD, DDS, or DMD, and/or an advanced degree in Medical Physics, Physics, or a related field, and three years of experience in using and/or designing medical imaging devices, including CT imaging systems and/or densitometric imaging systems.”

IV. ANALYSIS AND DISCUSSION

A. *Alleged Anticipation of Claims 1–12 of the ’374 Patent in View of Arai*

Petitioner contends claims 1–12 of the ’374 patent are unpatentable under 35 U.S.C. § 102 as anticipated by Arai. Pet. 31–53. Patent Owner

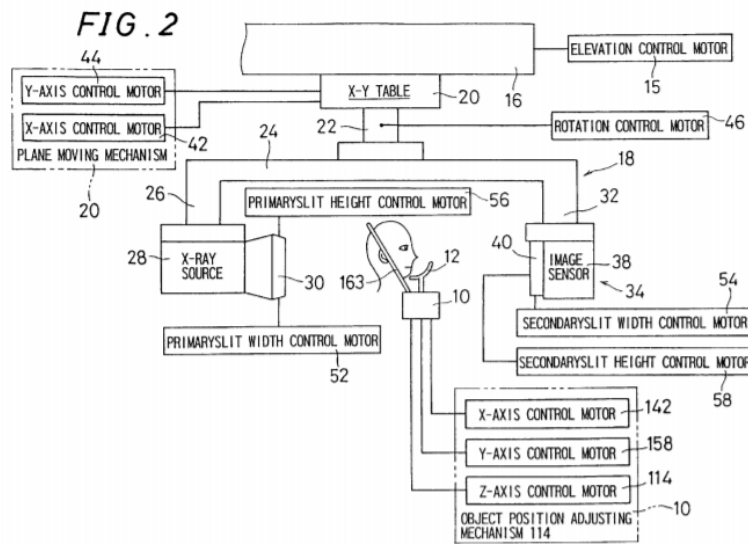
¹⁵ If Patent Owner proposes a different level of ordinary skill in the art in its Response, the parties are encouraged to address whether there are any material differences between the two proposals and what impact, if any, the different level has on the obviousness analysis.

does not dispute Petitioner’s contentions at this time. *See generally* Prelim. Resp. Nonetheless, the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378. For reasons that follow, we determine Petitioner has shown a reasonable likelihood of demonstrating that at least one of the challenged claims are anticipated by Arai under 35 U.S.C. § 102.

1. *Overview of Arai (Ex. 1013)*

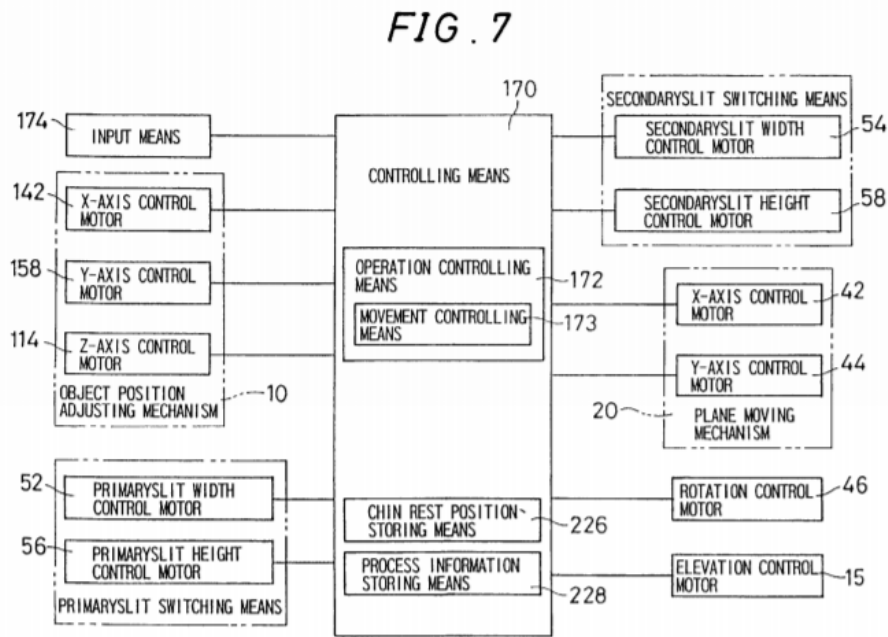
Arai is a U.S. Patent titled “X-ray Imaging Apparatus.” Ex. 1013, code (54). Arai is directed to “an X-ray imaging apparatus which takes an image of an object such as a head of a human body along a desired tomographic plane.” Ex. 1013, code (54), 1:5–7). “An object of the invention is to provide a dual-purpose X-ray imaging apparatus capable of partial CT imaging in addition to panoramic tomographic imaging. Another object of the invention is to provide a dedicated partial X-ray CT imaging apparatus.” *Id.* at code (57).

Aria’s Figure 2 is reproduced below.



Aria's Figure 2 "is a block diagram showing an outline of the X-ray imaging apparatus." Ex. 1013, 8:32–33. Figure 2 depicts, *inter alia*, the patient, the X-ray source, an image sensor, and an object position adjusting mechanism "for positioning the chin rest 12 at a predetermined position." *Id.* at Fig. 2, 12:42–45.

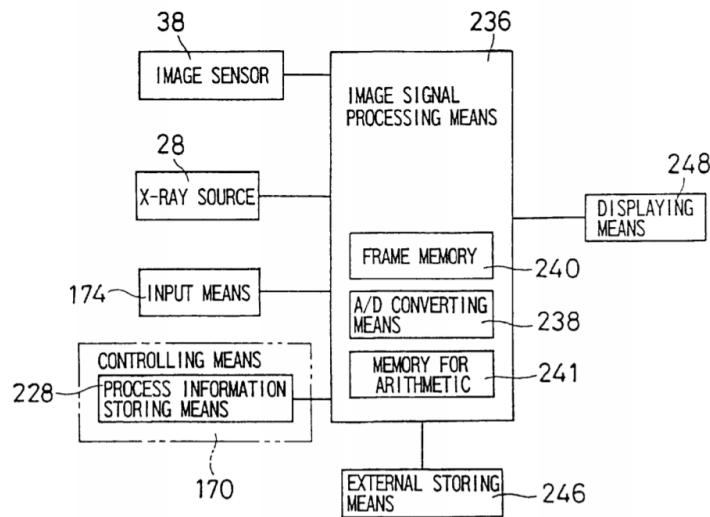
Aria's Figure 7 is reproduced below.



Aria's Figure 7 "is a block diagram showing a control system for various motors in the X-ray imaging apparatus." Ex. 1013, 8:43–44. Aria's Figure 7 depicts, *inter alia*, controlling means 170, which controls the operation of various motors, and process information storing means 228, which "stores CT process information for obtaining a partial CT image." *Id.* at Fig. 7, 15:62–16:3, 16:41–43.

Aria's Figure 9 is reproduced below.

FIG. 9



Arai's Figure 9 "is a block diagram showing an image signal processing system in the X-ray imaging apparatus." Ex. 1013, 8:48–49. According to Aria,

the image signal output from the image sensor 38 is supplied to image signal processing means 236. The image signal processing means 236 may be configured by, for example, a microprocessor for image processing. The image signal processing means 236 in the embodiment comprises A/D converting means 238 for converting an analog signal into a digital signal, a frame memory 240 which stores image information, and a memory for arithmetic 241. The image signal supplied from the image sensor 38 to the image signal processing means 236 is converted into a digital signal by the A/D converting means 238, and digital-converted image information is stored in the frame memory 240. 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.

Id. at 17:30–48.

2. *Analysis of Arai as Applied to Challenged Independent Claim 1.*

a. *preamble*

Claim 1 recites “[a] system for tomographically modeling a dental structure.” Ex. 10021, 5:34–35.

Petitioner argues that “[b]ecause the claim defines a structurally complete invention that has the capability to perform and report scan results,” the preamble recites “a non-limiting statement of purpose.” Pet. 32.

Petitioner further argues that even if the preamble is limiting, Arai meets it because Arai discloses a CT system that generates tomographic models, some of which can be of dental structures. *Id.* at 32–33 (citing Ex. 1013, 2:3–5, 17:42–48, 23:9–10, Fig. 18; Ex. 1007 ¶¶ 227–228).

Patent Owner does not dispute Petitioner’s contentions at this time. *See generally* Prelim. Resp. Nonetheless, the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378.

“Whether to treat a preamble term as a claim limitation is determined on the facts of each case in light of the claim as a whole and the invention described in the patent.” *Am. Med. Sys., Inc. v. Biolitec, Inc.*, 618 F.3d 1354, 1358 (Fed. Cir. 2010) (internal quotation marks and citation omitted).

“Absent clear reliance on the preamble in the prosecution history, or in situations where it is necessary to provide antecedent basis for the body of the claim, the preamble generally is not limiting.” *Symantec Corp. v. Computer Assoc. Int’l, Inc.*, 522 F.3d 1279, 1288 (Fed. Cir. 2008) (internal quotation marks and citation omitted). Additionally, preamble language that merely states the purpose or intended use of an invention generally is not treated as limiting the scope of a claim. *See Boehringer Ingelheim Vetmedica, Inc. v. Schering-Plough Corp.*, 320 F.3d 1339, 1345 (Fed. Cir.

2003); *Rowe v. Dror*, 112 F.3d 473, 478 (Fed. Cir. 1997). Yet, when the limitations in the body of the claim rely upon or derive essential structure from the preamble, then the preamble acts as a necessary component of the claimed invention and is limiting. See *Eaton Corp. v. Rockwell Int'l Corp.*, 323 F.3d 1332, 1339 (Fed. Cir. 2003).

Based on the current record, regardless of whether the preamble is limiting, we are persuaded Petitioner has shown adequately for purposes of institution that Arai discloses a “system for tomographically modeling a dental structure.”

b. *“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”*

Claim 1 recites “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.” Ex. 1001, 5:36–39.

Petitioner contends Arai anticipates this limitation because Arai discloses “a controller comprising ‘controlling means 170’ and/or ‘image signal processing means 236.’” Pet. 35 (citing Ex. 1013, 16:46–48; 17:30–32). According to Petitioner, “‘controlling means 170’ controls motors that move the imaging equipment during a scan, and ‘may be configured by . . . a microprocessor.’” *Id.* at 35 (citing Ex. 1013, 14:48–54, 15:62–16:6, Fig. 7). Additionally, Petitioner argues that a person of ordinary skill in the art would have “recognize[d] that a microprocessor having the functions described in Arai necessarily would have [had] memory associated with it.” *Id.* at 35–36 (citing Ex. 1013, Fig. 7; Ex. 1007 ¶¶ 232–33). Petitioner also argues that

Arai’s “image signal processing means 236” meets the limitation because it “controls the processing of the image signals detected by ‘image sensor 38.’” Pet. 36 (citing Ex. 1013, 17:29–38).

Petitioner further contends that Arai’s “image signal processing means” stores CT models of a dental structure in the “memory for arithmetic 241” component of the “image signal processing means 236,” and also separately describes “external storing means 246.” *Id.* at 37 (citing Ex. 1013, 17:42–44, 18:11–15; Ex. 1007 ¶ 235). Therefore, Petitioner concludes that Arai’s “image signal processing means” meets the challenged “adapted for” limitation.

Patent Owner does not address specifically this limitation of independent claim 1, but nonetheless the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378.

Based on the explicit disclosure of Arai, we find Petitioner’s argument regarding controlling means 170 and image signal processing means 236 to be adequate for institution. Additionally, we credit Dr. Maidment’s testimony regarding the knowledge of one of ordinary skill in the art and the association of a memory with a microprocessor. *See* Ex. 1007 ¶¶ 232–33. Accordingly, at this stage of the proceeding and based on the record before us, we are satisfied Petitioner has shown adequately that Arai discloses a “controller” that is “adapted for storing computed tomographic models of dental structure” as required by challenged claim 1.

c. “an input device connected to the microprocessor”

Claim 1 recites “an input device connected to the microprocessor.” Ex. 1001, 5:40. Petitioner contends this limitation is met by Arai because Arai discloses “input means 174” and “operation panel 176,” which can be

used by the operator to choose the imaging mode and input information relating to the object to be imaged. Pet. 38 (citing Ex. 1013, 14:51–56, Figs. 7–9; Ex. 1007 ¶ 236).

Patent Owner does not address specifically this limitation of independent claim 1, but nonetheless the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378. At this stage of the proceeding and based on the record before us, we are persuaded Petitioner has shown adequately for purposes of institution that Arai teaches “an input device connected to the microprocessor,” thereby satisfying the challenged claim limitation.

d. “a positioning motor connected to the microprocessor and responsive to commands from said microprocessor”

Claim 1 recites “a positioning motor connected to the microprocessor and responsive to commands from said microprocessor.” Ex. 1001, 5:41–42.

Petitioner contends this limitation is met by Arai because Arai teaches “X-axis control motor 42,” “Y axis control motor 44,” and “rotation control motor 46.” Pet. 38–39 (citing Ex. 1013, 11:23–26). According to Petitioner, “[t]hese positioning motors . . . are responsive to commands from the controlling means’ microprocessor . . . via ‘operation controlling means 172’ and ‘movement controlling means 173.’” *Id.* (citing Ex. 1013, 15:62–16:6, Fig. 7; Ex. 1007 ¶ 237).

Patent Owner does not address specifically this limitation of independent claim 1, but nonetheless the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378.

At this stage of the proceeding and based on the record before us, we are persuaded Petitioner has shown adequately for purposes of institution that

the Arai teaches “X-axis control motor 42,” “Y axis control motor 44,” and “rotation control motor 46” and such motors are reasonably likely “a positioning motor connected to the microprocessor and responsive to commands from said microprocessor” as required by the claim.

e. “X-ray equipment including an X-ray source, a detector array, and a restricted beam device”

Claim 1 recites “X-ray equipment including an X-ray source, a detector array, and a restricted beam device.” Ex. 1001, 5:43–44.

Petitioner contends this limitation is met by Arai because Arai discloses “X-ray source 28” and “image sensor 38.” Pet. 39 (citing Ex. 1013, 10:41–44, Fig. 2). Petitioner’s position is supported by Dr. Maidment, who testifies that a person of ordinary skill in the art would have understood an “‘image sensor 38’ is a detector array.” Ex. 1007 ¶ 238. Petitioner also argues that Arai “teaches that the X-ray equipment in its imaging system includes a restricted beam device.” Pet. 40. Petitioner cites to Arai’s disclosure that “primary slit means 30 restricts the width and height of X-rays emitted from the X-ray source 28, thereby preventing unnecessary X-rays from being emitted toward the object.” *Id.* (quoting Ex. 1013, 10:44–47). To further support its position, Petitioner then cites to the U.S. Food and Drug Administration (FDA) requirement (before the ’374 patent’s priority date) that all X-ray imaging devices use restricted beams. *Id.* (citing Ex. 1007 ¶ 239; Ex. 1025, 566).

Patent Owner does not address specifically this limitation of independent claim 1, but nonetheless the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378.

At this stage of the proceeding and based on the record before us, we are persuaded Petitioner has shown adequately for purposes of institution that Arai teaches “X-ray equipment including an X-ray source, a detector array, and a restricted beam device” as required by the claim.

f. “a convertor for converting a signal from said detector array, said converter being connected to said detector array and to said microprocessor”

Claim 1 recites “a convertor for converting a signal from said detector array, said converter being connected to said detector array and to said microprocessor.” Ex. 1001, 5:45–47.

Petitioner contends Arai discloses this limitation because Arai has “‘A/D converting means 238’ for converting an analog signal from ‘image sensor 38’ (detector array) into a digital signal.” Pet. 40 (citing Ex. 1013, 17:38–42, Fig. 9; Ex. 1007 ¶ 240).

Patent Owner does not address specifically this limitation of independent claim 1, but nonetheless the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378.

At this stage of the proceeding and based on the record before us, we are persuaded Petitioner has shown adequately for purposes of institution that the Arai teaches “a convertor for converting a signal from said detector array, said converter being connected to said detector array and to said microprocessor” as required by the claim.

g. “an output device connected to said microprocessor and adapted for receiving a tomographic model from said microprocessor”

Claim 1 recites “an output device connected to said microprocessor and adapted for receiving a tomographic model from said microprocessor.” Ex. 1001, 5:48–50.

Petitioner contends Arai discloses this limitation because Arai has “has two output devices that are capable of receiving a tomographic model from the microprocessor of the image signal processing means: ‘external storing means 246’ and ‘displaying means 248.’” Pet. 41 (citing Ex. 1013, 18:3–15; Ex. 1007 ¶ 241).

Patent Owner does not address specifically this limitation of independent claim 1, but nonetheless the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378.

At this stage of the proceeding and based on the record before us, we are persuaded Petitioner has shown adequately for purposes of institution that the Arai teaches “an output device connected to said microprocessor and adapted for receiving a tomographic model from said microprocessor” as required by the claim.

h. Conclusion Regarding Claim 1 Analysis under 35 U.S.C. § 102

Based on the foregoing, we conclude Petitioner has established a reasonable likelihood it would prevail in showing that challenged independent claim 1 is anticipated by Arai under 35 U.S.C. § 102.

3. Analysis of Arai under 35 U.S.C. § 102 as Applied to Dependent Claims 3, 7, and 9

Petitioner contends dependent claims 3, 7, and 9 of the ’374 patent are unpatentable under 35 U.S.C. § 102 as anticipated by Arai and provides specific arguments for each challenged claim. Pet. 42, 43–45 (citing Ex. 1013, 17:42–48, 17:42–48, 26:39–43, 38:54–57; Ex. 1007 ¶¶ 79–81, 243–44, 252–53). Patent Owner does not address specifically the limitations of these challenged dependent claims, but nonetheless the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378.

On this record and for purposes of this Decision, we determine Petitioner presents sufficient evidence to establish a reasonable likelihood it would prevail in showing that dependent claims 3, 7, and 9 are anticipated by Arai under 35 U.S.C. § 102.

B. Alleged Obviousness of Claims 1–24 of the '374 Patent in View of Arai Alone or with Other Cited Prior Art

Petitioner contends claims 1–24 of the '374 patent are unpatentable under 35 U.S.C. § 103 as obvious in view of (1) Arai alone for claims 1–12, (2) Arai in combination with Cann for claims 1–12, (3) Arai in combination with Cann and Pelc '080 for claims 4 and 10, (4) Arai in combination with Cann and Xu and/or Milestone for claims 5, 6, 11, and 12, (5) Arai in combination with Xu and/or Milestone for claim 13–24, (6) Arai in combination with Xu and/or Milestone and Cann for claim 13–24, and (7) Arai in combination with Xu and/or Milestone and Cann and Pelc '080 for claim 13–24. Pet. 4, 33–41.

Patent Owner does not disputes Petitioner's contentions at this time. *See generally* Prelim. Resp. Nonetheless, the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378. For reasons that follow, we determine Petitioner has demonstrated a reasonable likelihood of demonstrating that the challenged claims would have been obvious under 35 U.S.C. § 103 in view of Arai alone and in combination with Canns, Xu, Milestone, and/or Pelc '080.

1. Overview of Arai (Ex. 1013)

See supra, Section IV.A.1.

2. Overview of Cann (Ex. 1014)

Cann is an August 1980 publication titled “Precise Measurement of Vertebral Mineral Content Using Computed Tomography” published in the

Journal of Computer Assisted Tomography. Ex. 1014. Cann discloses that, as of the 1980s, “[q]uantitative bone mass measurements [were] widely used in the assessment of skeletal status in metabolic bone disease,” including “X-ray computed tomography (CT).” *Id.* at 493. Cann describes methods of improving the accuracy and precision of quantitative CT measurements for bone density. *Id.* at 493–94. To that end, Cann teaches using a dual-energy CT scan and calibrating the system with known references. *Id.* at 493. According to Cann, “[t]he diagnostic capability of vertebral CT in metabolic bone disease depends on the accuracy of measurement of the bone mineral contained within the vertebral body.” *Id.* Therefore, Cann conducted a series of experiments using a simulated human torso and a phantom for calibration, which enabled calculation of the mineral equivalent density of the bone in terms of mg K₂HPO₄/mL. *Id.* at 494–96; Table 1 (illustrating measurements in both CT number and mineral content). From these experiments, Cann concluded that the precision of bone mineral content determinations can be improved by using a calibration phantom and software to position patients. *Id.* at 499.

3. *Overview of Pelc '080 (Ex. 1018)*

Pelc '080 is a U.S. Patent titled “Reduced Field-of-View CT System for Imaging Compact Embedded Structures.” Ex. 1018, code (54). It was filed on May 8, 1995, and issued July 2, 1996. *Id.* at codes (22), (45). Pelc '080 is incorporated by reference in the '374 patent for its disclosure regarding the adaption of X-ray equipment for dental use. Ex. 1001, 4:24–30. Pelc '080 specifically discloses a C-arm X-ray system that rotates around an axis and translates along that axis. Ex. 1018, 9:15–28, 9:62–65, 10:47–51.

4. *Overview of Xu (Ex. 1019)*

Xu is a U.S. Patent titled “Method and System for the Automated Temporal Subtraction of Medical Images.” Ex. 1019, code (54). It was filed on Feb. 23, 1998, and issued March 26, 2002. *Id.* at codes (22), (45). Xu teaches a method and system that uses a computer to detect changes in three-dimensional medical scans by using temporal subtraction. Ex. 1019, 2:19–32; 16:43–18:52 (reciting various claims covering computer algorithms to perform comparisons). The method involves obtaining the first and second scans of interest, matching the images, non-linearly warping the first image, and subtracting the first warped image from the second image. *Id.* at 2:36–44.

5. *Overview of Milestone (Ex. 1020)*

Milestone is WO publication titled “Non-Invasive Radiographic Method for Analyzation of a Body Element.” It has a priority date of Feb. 25, 1997, and published on August 27, 1998. Milestone teaches the use of software to compare volumetric or three-dimensional rendering of internal structures. Ex. 1020, 5:15–26. Specifically, Milestone teaches that the comparison can be between two patient scans (current and previous) as well as a patient scan and scanned/stored data representing a “normal” baseline structure. *Id.* at 10:26–11:12; 13:17–22.

6. *Analysis of Arai and Other Cited Prior Art as Applied to the Challenged Claims*

Petitioner contends that Arai alone or in view of several cited prior art references would have rendered all challenged claim limitations obvious to a person of ordinary skill in the art at the time of the invention. Pet. 31, 33–41. Petitioner argues for many of the same reasons detailed above in its anticipation challenge that Arai alone would have rendered the claims

obvious. *Id.* Petitioner also argues that Cann provides additional support to demonstrate how certain limitations would have been obvious, specifically because “Cann teaches use of CT for measuring bone mineral content through the use of quantitative CT imaging.” *Id.* at 33 (citing Ex. 1014, 493–95; Ex. 1007 ¶¶ 181–185, 230). According to Petitioner, “[b]ecause both Arai and Cann involve CT imaging systems, it would have been obvious to a skilled artisan to use the quantitative CT system taught in Arai for the densitometry measurements disclosed in Cann.” Pet. 33 (citing Ex. 1007 ¶ 231). Petitioner provides further analysis regarding Arai and the cited prior art as applied to independent claims 1, 13, and 21, as well as the challenged dependent claims. Pet. 41–53.

Patent Owner does not yet address the proffered combined teachings of Arai and the other cited prior art, but nonetheless the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378.

At this stage of the proceeding and based on the record before us, we are persuaded Petitioner has shown adequately for purposes of institution that Arai’s CT system in combination with applicable teachings from Cann, Xu and/or Milestone, and Pelc ’080 satisfies the challenged claim limitations. We find the testimony of Dr. Maidment supports a finding of a reasonable likelihood that Petitioner would prevail in showing that challenged independent claims 1, 13, and 21 as well as dependent claims 2–12, 14–20, and 22–24 would have been obvious under 35 U.S.C. § 103 in view of Arai and the cited prior art references. *See Ex. 1007 ¶¶ 243–278*

7. *Rationale to Combine Arai with Cann and Other Cited Art*

Petitioner contends a person of ordinary skill in the art would have many motivations to combine the teachings of Cann with the system of Arai, because they would have wanted to (1) obtain a more accurate and precise density model, (2) understand the density of the relevant portion of the jawbone pre-implantation, and (3) make Arai's system more versatile, save money, and save space by adding in the quantitative densitometrical functions described in Cann. Pet. 33–34 (citing Ex. 1013, 1:34–36; Ex. 1007 ¶ 231). Petitioner argues that a person of ordinary skill in the art would have “had a reasonable expectation of success in using the phantom quantitative process taught by Cann in combination with Arai given the minimal modifications required as well as the established use of CT for densitometrical purposes by the priority date (almost 20 years after Cann's publication).” Pet. 34–35 (citing Ex. 1007 ¶ 231). Petitioner relies on the testimony of Dr. Maidment to support its position. Specifically, Dr. Maidment testifies that “the features of Arai are suited to performing quantitative densitometry” and “any modification of the CT system to use a phantom would be minimal, i.e., inclusion of a phantom in the scan to correlate the CT numbers to a known value.” Ex. 1007 ¶ 231. Dr. Maidment applies this same testimony to many of the challenges based on combinations of prior art with Arai. *See e.g., id.* ¶¶ 242, 246, 251, 260, 270, 273, 280, 283, 286, 289.

We have considered carefully all arguments and supporting evidence regarding the rationale for combining the teachings of Arai with Cann and the other cited art. At this stage of the proceeding, we find Petitioner provides an adequate reason that a person of skill in the art would have combined the

teachings from the cited prior art to arrive at the inventions recited in the challenged claims. A motivation to combine may be found “explicitly or implicitly in market forces; design incentives; the ‘interrelated teachings of multiple patents’; ‘any need or problem known in the field of endeavor at the time of invention and addressed by the patent’; and the background knowledge, creativity, and common sense of the person of ordinary skill.” *ZUP, LLC v. Nash Mfg., Inc.*, 896 F.3d 1365, 1371 (Fed. Cir. 2018) (quoting *Plantronics, Inc. v. Aliph, Inc.*, 724 F.3d 1343, 1354 (Fed. Cir. 2013)).

Based on the current record, Petitioner appears to bring in Cann to provide a more explicit teaching of quantitative bone mineral density for Arai’s CT system and use of a phantom for calibrating CT numbers. *See* Ex. 2007 ¶ 231. Given Arai’s express teaching regarding a quantitative CT system for dental applications, we agree with Petitioner that a person of ordinary skill would have been motivated to turn to Cann’s teachings for use with Arai’s system. Accordingly, on this record and for purposes of this Decision, we are persuaded Petitioner presents sufficient evidence to establish a reasonable likelihood it would prevail in showing that claims 1–24 would have been obvious under 35 U.S.C. § 103 in view of Arai alone, in combination with Cann, and/or in combination with Xu, Milestone, Pelc ’080, or the knowledge of one of ordinary skill in the art.

C. Alleged Anticipation of Claims 1–4 and 7–10 of the ’374 Patent in View of Pelc

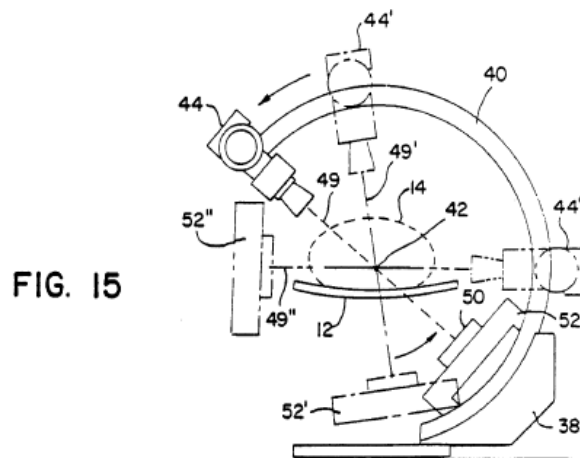
Petitioner contends claims 1–4 and 7–10 of the ’374 patent are unpatentable under 35 U.S.C. § 102 as anticipated by Arai. Pet. 5, 53–60. Patent Owner does not dispute Petitioner’s contentions at this time. *See generally* Prelim. Resp. Nonetheless, the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378. For

reasons that follow, we determine Petitioner has shown a reasonable likelihood of demonstrating that at least one of the challenged claims are anticipated by Pelc under 35 U.S.C. § 102.

1. *Overview of Pelc (Ex. 1015)*

Pelc is a WO application titled “Compact C-Arm Tomographic Bone Scanning System.” Ex. 1015, code (54). Pelc has a priority date of Nov. 16, 1992, and published on May 26, 1994. Ex. 1015, codes (30), (43). Pelc is directed to “[a]n x-ray imaging system [that] provides both scanning radiography and computed tomography by means of a modified C-arm geometry that provides improved angular rotation.” *Id.* at code (57).

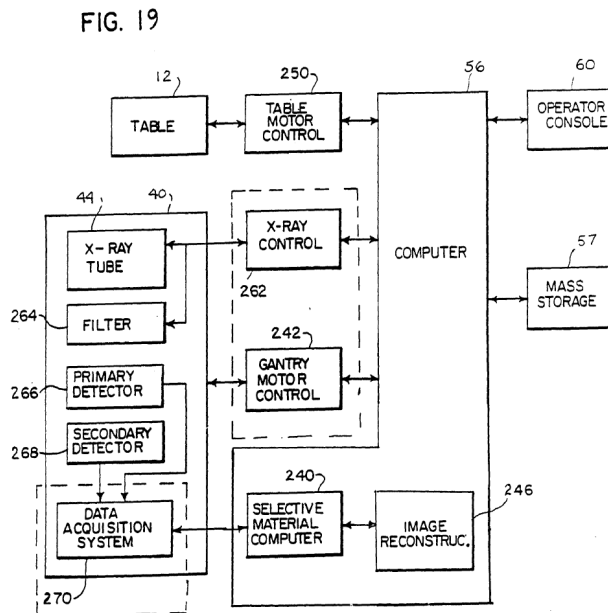
Pelc’s system is shown in Figure 15, reproduced below.



Pelc’s Figure 15 “is a schematic representation of motion of the C-arm showing the increased effective angular range obtained with the C-arm by motion of the radiation source and detector with respect to the C-arm itself.” Ex. 1015, 13:23–26. Figure 15 depicts, *inter alia*, Pelc’s X-ray imaging system, which includes an X-ray source, an X-ray detector, and a beam-restricting device. *Id.* at 5:22–6:7; 14:24–31; Ex. 1007 ¶¶ 187–90. Pelc has a “radiation source and a detector” that are “affixed to the ends of the C-arm to

provide energy attenuation measurements along an axis between those ends at the plurality of angles, such measurements being received by an electronic computer.” *Id.* at 5:27–31; *see also id.* at 16:23–36 (describing the detector). The X-ray equipment is housed on a rotating C-arm mounted on a gantry pallet. Ex. 1015, 30:3–17. A track system allows for movement of the pallet with respect to the patient, while the C-arm allows the X-ray equipment to rotate around the patient. *Id.* at 5:22–27. A computer “controls the C-arm, the radiation source and the Detector.” *Id.* at 5:31–33. The position of the pallet and C-arm is controlled by motors connected to a computer. *Id.* at 18:7–14. The computer provides step commands to motors associated with each component, and positioning motors generate the movement required to obtain data for generating the tomographic model. *Id.* at 7:9–12. Pelc teaches the X-ray equipment simultaneously rotates and moves longitudinally along that axis of rotation via rails. *Id.* at 13:34–14:2, 14:32–34, 21:18–35, Figs. 1, 6, 9, 15, 18, 19.

Pelc’s Figure 19 is reproduced below.



Pelc's Figure 19 "is a block diagram of the components of the present invention showing the components employed for computed tomography." Ex. 1015, 12:3–5. Figure 19 depicts, *inter alia*, Pelc's computer system for processing collected data to create a tomographic model. *Id.* at 25:34–26:1. Pelc teaches "image reconstructor 246 (implemented in computer 56), which receives corrected attenuation data from the selective material computation circuit 240 and performs high speed image reconstruction according to methods known in the art." Ex. 1015, 35:13–17. Pelc also teaches "mass storage device 57" connected to "computer 56," which "provides a means for storing operating programs for the CT imaging system, as well as image data for future reference by the user." *Id.* at 36:1–3. Pelc discloses "computer 56 having a display terminal 58 and a keyboard 60." *Id.* at 16:8–10. Pelc further discloses that "computer 56 receives commands and scanning parameters via operator console 58 which is generally a CRT display and keyboard which allows the user to enter parameters for the scan and to display reconstructed image and other information from the computer 56." *Id.* at 35:31–36, 4:17–20, Figs. 1, 19. Pelc teaches that one of the uses of the disclosed system is "evaluation of bone density and bone morphology." *Id.* at 1:16–17. Pelc further states that "[s]uch bone density measurements are useful in evaluating the health of the bone and in tracking bone mineral loss in diseases such as osteoporosis." *Id.* at 27:9–11.

2. *Analysis of Pelc as Applied to Challenged Independent Claim 1.*

a. *preamble*

Claim 1 recites "[a] system for tomographically modeling a dental structure, the structure comprising." Ex. 10021, 5:34–35.

Petitioner argues that the preamble is not limiting. Pet. 53. Petitioner further argues that even if the preamble is limiting, Pelc meets it because Pelc discloses “[a]n X-ray imaging system” that “provides both scanning radiography and *computed tomography*” *Id.* at 54 (citing Ex. 1015, Abstract, 1:13–17). Petitioner further notes that “Pelc teaches quantitative densitometric modeling” and “Pelc refers to ‘tomographic scanning of a patient for evaluation of *bone density and bone morphology*.’” *Id.* at 54 (quoting Ex. 1015, 1:13–17).

Patent Owner does not dispute Petitioner’s contentions at this time. *See generally* Prelim. Resp. Nonetheless, the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378.

Based on the current record, regardless of whether the preamble is limiting, we are persuaded Petitioner has shown adequately for purposes of institution that Pelc discloses a “system for tomographically modeling” a bone “structure.”

b. “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”

Claim 1 recites “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.” Ex. 1001, 5:36–39.

Petitioner contends Pelc anticipates this limitation because Pelc discloses an “electronic computer” that “controls the C-arm, the radiation source, and the detector.” Pet. 56 (quoting Ex. 1015, 5:31–32; citing Ex. 1005, 9:34–10:2, 18:10–12, 18:22–24, 35:17–21, Fig. 1). Petitioner argues

that a computer would necessarily include memory. *Id.* Petitioner further contends “[t]he controller taught by Pelc is capable of storing CT models.” *Id.* at 57. According to Petitioner, “Pelc refers to ‘[a] mass storage device’ connected to the computer that ‘provides a means for storing . . . image data for future reference by the user.’” *Id.* (quoting Ex. 1015, 36:1–3).

Patent Owner does not address specifically this limitation of independent claim 1, but nonetheless the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378.

Based on the explicit disclosure of Pelc, we find Petitioner’s argument regarding an electronic computer to be adequate for institution. Additionally, we credit Dr. Maidment’s testimony regarding the knowledge of one of ordinary skill in the art and the association of a memory with a computer and that “image data” includes digital tomographic models. *See Ex. 1007 ¶¶ 297–298.* Accordingly, at this stage of the proceeding and based on the record before us, we are satisfied Petitioner has shown adequately that Pelc discloses a “controller” that is “adapted for storing computed tomographic models of a dental structure” as required by challenged claim 1.

c. “an input device connected to the microprocessor”

Claim 1 recites “an input device connected to the microprocessor.” Ex. 1001, 5:40. Petitioner contends this limitation is met by Pelc because Pelc refers to “a computer 56 having a display terminal 58 and a keyboard 60 such as are well known in the art.” Pet. 57 (quoting Ex. 1015, 16:8–10). Petitioner notes Pelc further discloses that “[t]he computer 56 receives commands and scanning parameters via operator console 58 which is generally a CRT display and keyboard which allows the user to enter parameters for the scan and to display reconstructed image and other

information from the computer 56.” *Id.* (quoting Ex. 1015, 35:31–36; citing Ex. 1005, Figs. 1, 19).

Patent Owner does not address specifically this limitation of independent claim 1, but nonetheless the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378. At this stage of the proceeding and based on the record before us, we are persuaded Petitioner has shown adequately for purposes of institution that Pelc “an input device connected to the microprocessor,” thereby satisfying the challenged claim limitation.

d. “a positioning motor connected to the microprocessor and responsive to commands from said microprocessor”

Claim 1 recites “a positioning motor connected to the microprocessor and responsive to commands from said microprocessor.” Ex. 1001, 5:41–42.

Petitioner contends this limitation is met by Pelc because the Pelc system “includes a track for moving a pallet with respect to a patient along a first and second perpendicular axis. A collar is attached to the pallet and holds a C-arm which may slide through the collar so that its ends rotate to one of a plurality of angles about the patient.” Pet. 57 (quoting Ex. 1015, 5:24–27). According to Petitioner, “[t]he C-arm is positioned by “actuator 63,” which is “driven by a stepper motor . . . under the control of computer 56.” *Id.* (quoting Ex. 1015, 18:7–14; citing Ex. 1015, 35:9–13, 35:28–31; Ex. 1007 ¶ 301).

Patent Owner does not address specifically this limitation of independent claim 1, but nonetheless the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378.

At this stage of the proceeding and based on the record before us, we are persuaded Petitioner has shown adequately for purposes of institution that Pelc teaches an “actuator 63” and “stepper motor,” with such components reasonably likely constituting “a positioning motor connected to the microprocessor and responsive to commands from said microprocessor” as required by the claim.

e. “X-ray equipment including an X-ray source, a detector array, and a restricted beam device”

Claim 1 recites “X-ray equipment including an X-ray source, a detector array, and a restricted beam device.” Ex. 1001, 5:43–44.

Petitioner contends this limitation is met by Pelc because Pelc discloses “a radiation source and a detector” that are “affixed to the ends of the C-arm to provide energy attenuation measurements.” Pet. 58 (citing Ex. 1015, 5:27–31, 16:23–36). Petitioner further contends that because Pelc discloses a radiation source that “includes an x-ray tube together with filter and collimator” then the equipment would necessarily include “a restricted beam device.” *Id.* (citing Ex. 1015, 14:24–25, 22:10–11).

Petitioner’s position is supported by Dr. Maidment, who testifies that a person of ordinary skill in the art would have understood “the equipment includes a restricted beam device” both by the description of the equipment in Pelc but also because “as of the priority date [of the ’374 patent], CT devices were required to use restricted beam devices.” Ex. 1007 ¶¶ 303–306, 462; *see also* Ex. 1025, 566 (U.S. Food and Drug Administration (FDA) requirement that all X-ray imaging devices use restricted beams).

Patent Owner does not address specifically this limitation of independent claim 1, but nonetheless the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378.

At this stage of the proceeding and based on the record before us, we are persuaded Petitioner has shown adequately for purposes of institution that the Pelc teaches “X-ray equipment including an X-ray source, a detector array, and a restricted beam device” as required by the claim.

f. “a convertor for converting a signal from said detector array, said converter being connected to said detector array and to said microprocessor”

Claim 1 recites “a convertor for converting a signal from said detector array, said converter being connected to said detector array and to said microprocessor.” Ex. 1001, 5:45–47.

Petitioner contends Pelc discloses this limitation because “Pelc teaches that analog-to-digital convertors are necessary in digital imaging systems.” Pet. 59 (citing Ex. 1015, 2:1–10, 33:34–34:16, Fig. 19). Petitioner’s position is supported by Dr. Maidment, who testifies that a person of ordinary skill in the art would have understood that Pelc’s CT system, which uses a computer to process digital data for imaging purposes, necessarily includes an analog-to-digital converter that translates the signal information from the detector array into digital format. Ex. 1007 ¶ 308.

Patent Owner does not address specifically this limitation of independent claim 1, but nonetheless the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378.

At this stage of the proceeding and based on the record before us, we are persuaded Petitioner has shown adequately for purposes of institution that the Pelc teaches “a convertor for converting a signal from said detector array,

said converter being connected to said detector array and to said microprocessor” as required by the claim.

g. “an output device connected to said microprocessor and adapted for receiving a tomographic model from said microprocessor”

Claim 1 recites “an output device connected to said microprocessor and adapted for receiving a tomographic model from said microprocessor.” Ex. 1001, 5:48–50.

Petitioner contends Pelc discloses this limitation because Pelc’s system includes “a CRT display . . . to display the reconstructed image and other information.” Pet. 59 (citing Ex. 1015, 35:31–36). According to Petitioner, “Pelc states that the ‘reconstructed slice images’ generated by the computer ‘may be displayed on a conventional CRT tube or may be converted to a film record by means of a computer controlled camera.’” *Id.* at 59–60 (citing Ex. 1015, 4:17-20; Ex. 1007 ¶ 309).

Patent Owner does not address specifically this limitation of independent claim 1, but nonetheless the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378.

At this stage of the proceeding and based on the record before us, we are persuaded Petitioner has shown adequately for purposes of institution that the Pelc teaches “an output device connected to said microprocessor and adapted for receiving a tomographic model from said microprocessor” as required by the claim.

h. Conclusion Regarding Claim 1 Analysis under 35 U.S.C. § 102

Based on the foregoing, we conclude Petitioner has established a reasonable likelihood it would prevail in showing that challenged independent claim 1 is anticipated by Pelc under 35 U.S.C. § 102.

3. *Analysis of Arai under 35 U.S.C. § 102 as Applied to Dependent Claims 2–4 and 7–10*

Petitioner contends dependent claims 2–4 and 7–10 of the '374 patent are unpatentable under 35 U.S.C. § 102 as anticipated by Pelc and provides specific arguments for each challenged claim. Pet. 5, 60–64 (citing Ex. 1015, 2:14–17, 5:22–6:1, 6:25–29, 7:9–12, 13:34–14:2, 14:32–34, 21:18–35, 22:10–14, 25:34–26:1, 33:3–40:36, 45:1–5, Fig. 1, 6, 8, 9, 15, 18,19; Ex. 1012, 21:21–22:4; Ex. 1016, 7; Ex. 1021, 272-73; Ex. 1007 ¶¶ 313–329). Patent Owner does not address specifically the limitations of these challenged dependent claims, but nonetheless the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378.

On this record and for purposes of this Decision, we determine Petitioner presents sufficient evidence to establish a reasonable likelihood it would prevail in showing that dependent claims 2–4 and 7–10 are anticipated by Pelc under 35 U.S.C. § 102.

D. *Alleged Obviousness of Claims 1–24 of the '374 Patent in View of Pelc Alone or with Other Cited Prior Art*

Petitioner contends claims 1–24 of the '374 patent are unpatentable under 35 U.S.C. § 103 as obvious in view of (1) Pecl alone for claims 1–24, (2) Pecl in combination with Rothman for claims 1–24, (3) Pecl in combination with Rothman, Cann, and Xu and/or Milestone for claims 5, 6, 11, and 12, (4) Pecl in combination with Rothman, Cann, Xu and/or Milestone for claim 13–24. Pet. 5, 53–69.

Patent Owner does not disputes Petitioner's contentions at this time. *See generally* Prelim. Resp. Nonetheless, the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378. For reasons that follow, we determine Petitioner has demonstrated a reasonable

likelihood of demonstrating that the challenged claims would have been obvious under 35 U.S.C. § 103 in view of Pelc alone and in combination with Rothman, Cann, Xu and/or Milestone.

1. *Overview of Pecl (Ex. 1015)*

See Supra, section IV.C.1.

2. *Overview of Cann (Ex. 1014)*

See supra, Section IV.B.2.

3. *Overview of Rothman (Ex. 1016)*

Rothman is a textbook titled “Dental Applications of Computerized Tomography: Surgical Planning for Implant Placement,” published in 1998 and discusses CT in dental applications. Ex. 1016, 1–2. Rothman states that after “spinal CT became standard in the early 1980s,” “it was logical to adapt the same process to dental CT.” *Id.* at 13. Rothman further states that “[i]n the last decade, computerized tomography (CT) has become one of the most frequently used imaging modalities for the preoperative evaluation of the jaw for dental implants.” *Id.* at 1. Rothman also discusses non-surgical dental applications of CT. *Id.* at 153. According to Rothman, CTs “are superior to conventional tomograms as a guide for implant placement for several reasons,” including because “with CT it is possible to generate three-dimensional images from the same data set.” *Id.* at 7. Rothman discusses the “[q]uantitative assessment of mineral content” in the mandible, and uses that information to compare the preoperative and postoperative CT scan data (which had been stored on a computer). *Id.* at 57.

4. *Overview of Xu (Ex. 1019)*

See supra, Section IV.B.4.

5. *Overview of Milestone (Ex. 2020)*

See supra, Section IV.B.5.

6. *Analysis of Pelc and Other Cited Prior Art as Applied to the Challenged Claims*

Petitioner contends that Pelc alone or in view of several cited prior art references would have rendered all challenged claim limitations obvious to a person of ordinary skill in the art at the time of the invention. Pet. 5, 53–69. Petitioner argues for many of the same reasons detailed above in its anticipation challenge that Pelc alone would have rendered the claims obvious. *Id.* Petitioner also argues that Rothman provides additional support to demonstrate how certain limitations would have been obvious, specifically because “Rothman teaches a system for tomographic densitometry modeling of a dental structure” and Rothman demonstrates “the widespread use of CT imaging technology in dental application.” *Id.* at 54–55 (citing Ex. 1011, 1, 3; Ex. 1007 ¶¶ 292–296). According to Petitioner, a person of ordinary skill in the art “would have been motivated to combine Rothman and Pelc and would have had a reasonable expectation of doing so” because “Rothman explains how to use a CT imaging device similar to the one disclosed in Pelc.” Pet. 55 (citing Ex. 1016, 10, 13–15; Ex. 1007 ¶ 296). Petitioner provides further analysis regarding Pelc and the cited prior art as applied to independent claims 1, 13, and 21, as well as the challenged dependent claims. Pet. 53–69.

Patent Owner does not yet address the proffered combined teachings of Arai and the other cited prior art, but nonetheless the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378.

At this stage of the proceeding and based on the record before us, we are persuaded Petitioner has shown adequately for purposes of institution that Pelc’s CT system in combination with applicable teachings from Rothman,

Cann, Xu and/or Milestone, and in further view of the knowledge of one of ordinary skill in the art satisfies the challenged claim limitations.

Additionally, we have considered carefully all arguments and supporting evidence regarding the rationale for combining the teachings of Pelc with Rothman and the other cited art. Based on the current record, we find Petitioner provides an adequate reason that a person of skill in the art would have combined the teachings from the cited prior art to arrive at the inventions recited in the challenged claims, and we find the testimony of Dr. Maidment supports Petitioner's position.

Accordingly, on this record and for purposes of this Decision, we are persuaded Petitioner presents sufficient evidence to establish a reasonable likelihood it would prevail in showing that claims 1–24 would have been obvious under 35 U.S.C. § 103 in view of Pelc alone, in combination with Rothman, Cann, and/or in combination with Xu, Milestone, and in view of the knowledge of one of ordinary skill in the art.

V. CONCLUSION

For the foregoing reasons, we determine Petitioner has demonstrated there is a reasonable likelihood it would prevail in establishing the unpatentability of: (1) claims 1, 3, 4, 7, and 9 of the '374 patent are anticipated by Arai; (2) claims 1–24 would have been obvious over Arai alone or in combination with Cann and/or in combination with Xu, Milestone, Pecl '080, and in view of the knowledge of one of ordinary skill in the art; (3) claims 1–4 and 7–10 are anticipated by Pelc; and (4) claims 1–24 of the '374 patent would have been obvious in view of Pelc and Rothman, Cann, and/or in combination with Xu, Milestone, and in view of the knowledge of one of ordinary skill in the art. Additionally, we decline to

exercise our discretion under 35 U.S.C. § 314(a) to deny any of the proposed challenges to patentability.

Our factual findings, conclusions of law, and determinations at this stage of the proceeding are preliminary, and based on the evidentiary record developed thus far. At this stage of the proceeding, the Board has not made a final determination as to the patentability of any challenged claim. Our final decision will be based on the record as fully developed during trial.

VI. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that, pursuant to 35 U.S.C. § 314(a), an *inter partes* review is hereby instituted as to claims 1–24 of the '374 patent on all grounds presented in the Petition, namely:

- (1) Claims 1, 3, 4, 7, and 9 under 35 U.S.C. § 102(e) as unpatentable over Arai;
- (2) Claims 1–24 under 35 U.S.C. § 103 as unpatentable over Arai alone, in combination with Cann, and/or in combination with Xu, Milestone, Pelc '080, or knowledge of one of ordinary skill in the art ;
- (3) Claims 1–4 and 7–10 under 35 U.S.C. § 102(e) as unpatentable over Pelc; and
- (4) Claims 1–24 under 35 U.S.C. § 103 as unpatentable over Pelc alone, in combination with Rothman, Cann, and/or in combination with Xu, Milestone, and in view of the knowledge of one of ordinary skill in the art;

FURTHER ORDERED that pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4, notice is hereby given of the institution of a trial, the trial commencing on the entry date of this Decision.

IPR2020-00659
Patent 8,498,374 B2

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