

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

CLEARCORRECT OPERATING, LLC,
Petitioner,

v.

ALIGN TECHNOLOGY INC.,
Patent Owner.

IPR2025-00817
Patent 10,791,936 B2

Before KEVIN F. TURNER, NEIL T. POWELL, and
CYNTHIA M. HARDMAN, *Administrative Patent Judges*.

TURNER, *Administrative Patent Judge*.

DECISION
Granting Institution of *Inter Partes* Review
35 U.S.C. § 314

I. INTRODUCTION

Petitioner ClearCorrect Operating, LLC requests *inter partes* review of claims 1–20 of U.S. Patent No. 10,791,936 B2 (“the ’936 Patent,” Ex. 1001). Paper 1 (“Pet.”) 2. Patent Owner Align Technology, Inc. filed a Preliminary Response. Paper 10 (“Prelim. Resp.”). With our authorization (Ex. 3102), Petitioner filed an Opposition (“Pet. Opp.,” Paper 14) to the Preliminary Response, and Patent Owner filed a Sur-reply (“PO Sur-reply,” Paper 15) to that Opposition.

We note that Patent Owner filed a Brief in Support of Discretionary Denial (Paper 7) with the Director, to which Petitioner filed an Opposition (Paper 8), and Patent Owner responded with a Reply (Paper 11), but the Director referred the Petition to the Board (Paper 13), denying Patent Owner’s request for discretionary denial.

We have authority under 35 U.S.C. § 314(a), which provides that an *inter partes* review may not be instituted “unless . . . there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.” After considering the briefing and cited evidence of record, we institute an *inter partes* review because we find that Petitioner has established a reasonable likelihood that it will prevail with respect to at least one of the claims challenged in the petition.

A. Real Parties in Interest

Petitioner identifies itself (ClearCorrect Operating, LLC) and ClearCorrect Holdings, Inc., Straumann USA, LLC, and Institut Straumann AG as the real parties in interest. Pet. 84. Patent Owner identifies itself (Align Technology, Inc.) as the real party in interest. Paper 3, 1.

B. Related Matters

The parties identify as related the following litigation involving the '936 Patent: *Align Technology, Inc. v. ClearCorrect Operating, LLC*, Case No. 6:24-cv-00187-ADA-DTG (W.D. Tex.). Pet. 84; Paper 3, 2. The parties also identify the following *inter partes* reviews: IPR2025-00814 (U.S. Patent No. 10,456,217); IPR2025-00815 (U.S. Patent No. 10,524,879); IPR2025-00816 (U.S. Patent No. 11,369,456); IPR2025-00818 (U.S. Patent No. 10,973,613); IPR2025-00819 (U.S. Patent No. 11,154,384); IPR2025-00820 (U.S. Patent No. 11,648,090); and IPR2025-00821 (U.S. Patent No. 11,648,091). Pet. 84; Paper 3, 1–2.

The record also reflects a previous challenge to the '936 Patent, in *3Shape A/S and 3Shape Inc. v. Align Technology, Inc.*, IPR2021-01241. *See, e.g.*, Pet. 8, 84–85; Prelim. Resp. 5–8. The Board did not institute an *inter partes* review based on the petition in that proceeding. *See generally 3Shape A/S and 3Shape Inc. v. Align Technology, Inc.*, IPR2021-01241, Paper 16, 2, 14–15.

C. The '936 Patent (Ex. 1001)

The '936 Patent, titled “Methods and Systems for Creating and Interacting with Three Dimensional Virtual Models,” relates to “provid[ing] a computer[-]based method for modifying a virtual model of a physical structure,” wherein a portion of that model is identified and modified through replacement with additional data. Ex. 1001, code (54), 4:3–14. “For example, the physical structure can comprise any one of an intra-oral cavity of a patient and a physical dental model representative of said intra-oral cavity. Additionally or alternatively, said virtual model includes a first

three dimensional (3D) virtual model representative of a first physical part of the physical structure.” *Id.* at 4:15–20.

The '936 Patent details that the system includes hand-held intraoral scanner³¹ to acquire scan data of the physical structure, as illustrated in Figure 3. Ex. 1001, 18:32–47; Fig. 3. We reproduce Figure 3 below.

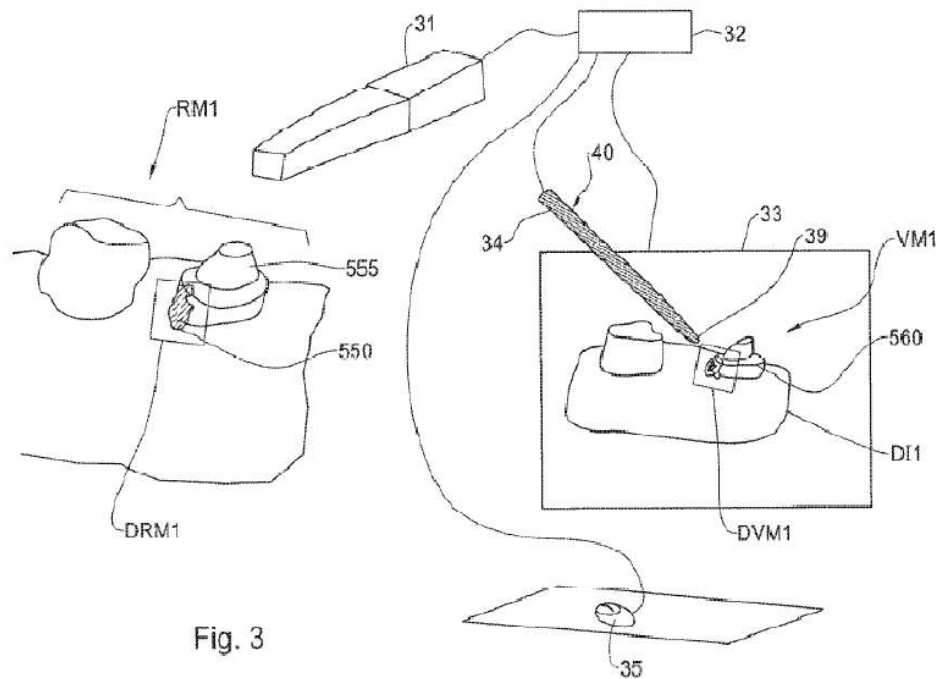


Figure 3 schematically illustrates providing a first virtual model to the computer system, and interacting with the display thereof. *Id.* at 17:25–27.

The '936 Patent details that:

The 3D data obtained by the scanner 31 may then be stored in a suitable storage medium, for example a memory in a computer workstation or system 32, which includes display 33, such as for example a computer screen, operatively connected thereto . . . [wherein the] computer system 32 is configured for enabling the user to interact with images displayed in the display 33 and comprises an input device 40 configured for enabling the user to point to displayed objects on the display, and/or to interact with the display 33 to at least enable deletion and/or replacement of images thereon.

Id. at 19:5–19.

The '936 Patent generally discloses modifying the model, such as by allowing a user to interface with the model to identify a portion to be modified and modifying that portion with new scan data obtained from the intraoral cavity. Ex. 1001, 4:6–14, 21:18–59, 27:17–22, Figs. 1–3. For example, the '936 Patent describes rescanning a portion of the intraoral cavity where the first scan was distorted or obscured, and then “stitch[ing]” the new rescan data into the original model. *See id.* at 14:43–15:36, 20:64–21:17, 22:16–23:15, 27:29–34.

D. The Challenged Claims

Petitioner challenges all claims (1–20) of the '936 Patent. Claims 1, 9 and 17 are independent. Claim 1, reproduced below with annotations,¹ is representative of the challenged claims:

1. [1(pre)] A system for scanning a patient's teeth for a dental procedure, the system comprising:
 - [1(a)] a hand-held intraoral scanner; and
 - [1(b)] a computer readable medium including instructions that when executed by a computer system, cause the computer system to:
 - [1(c)] receive first scan data of the patient's teeth from the hand-held intraoral scanner;
 - [1(d)] display, to a display, a model of the patient's teeth, wherein the model of the patient's teeth is based on the received first scan data of the patient's teeth;

¹ For ease of reference, we use the same bracketed notations Petitioner uses in the Petition. *See, e.g.*, Pet. xiii–xix (claims listing).

- [1(e)] receive user input defining a portion of the model to be removed;
- [1(f)] remove, from the displayed model, a removed surface portion of the model to be removed according to the user input;
- [1(g)] receive second scan data of the patient's teeth from the handheld intraoral scanner, the second scan data including surface data of a physically changed portion of the patient's intraoral cavity;
- [1(h)] replace at least a portion of the removed surface portion of the model using the received second scan data of the patient's teeth including surface data of a physically changed portion of the patient's intraoral cavity; and
- [1(i)] output, to the display, the model of the patient's teeth with the portion of the removed surface portion replaced using the received second scan data.

Ex. 1001, 30:24–50.

E. Asserted Grounds of Unpatentability

Petitioner asserts the following grounds of unpatentability:

Ground	Claim(s) Challenged	35 U.S.C. § ²	Reference(s)/Basis
1	1, 4–6, 8–12, 14–16	103(a)	Boerjes ³
2	1, 4–6, 8–12, 14–16	103(a)	Boerjes, Geng ⁴

² The Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011) (“AIA”) included revisions to 35 U.S.C. § 103 that became effective on March 16, 2013. We apply the pre-AIA version of § 103; however, our decision would be no different under the AIA version of the statute.

³ International Application Publication No. WO 2007/084727, published July 26, 2007 (Ex. 1004, “Boerjes”).

⁴ U.S. Patent No. 7,474,932 B2, filed October 25, 2004, issued January 6, 2009 (Ex. 1005, “Geng”).

Ground	Claim(s) Challenged	35 U.S.C. § ²	Reference(s)/Basis
3	2, 3, 7, 13, 17–20	103(a)	Boerjes, Babayoff ⁵
4	2, 3, 7, 13, 17–20	103(a)	Boerjes, Geng, Babayoff

Pet. 3. Petitioner supports its arguments with a declaration from Dr. Lina J. Karam (Ex. 1003), among other evidence.

II. ANALYSIS

A. Principles of Law

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”)). Petitioner ultimately bears the burden of persuasion to prove unpatentability of each challenged claim by a preponderance of the evidence. 35 U.S.C. § 316(e). This burden never shifts to Patent Owner. *See Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015).

Under pre-AIA 35 U.S.C. § 103(a), a claim is unpatentable as obvious if the differences between the claimed subject matter 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. 35 U.S.C. § 103(a); *see also KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is

⁵ U.S. Patent Application Publication No. 2005/0283065, published December 22, 2005 (Ex. 1006, “Babayoff”).

resolved based on 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 ordinary skill in the art; and (4) any objective indicia of nonobviousness.⁶ *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). An obviousness determination requires finding a reason to combine accompanied by a reasonable expectation of achieving what is claimed in the challenged patent. *See Intelligent Bio-Sys., Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1367 (Fed. Cir. 2016). “[A]ny need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed.” *KSR*, 550 U.S. at 419–20.

B. Level of Ordinary Skill in the Art

We consider the grounds of unpatentability in view of the understanding of a person of ordinary skill in the art at the time the invention was made. *See Graham*, 383 U.S. at 17–18. Petitioner proposes that a person of ordinary skill in the art:

would have been a person having at least a bachelor’s degree in electrical engineering, computer engineering, or a closely related field such as computer science, and two years of work experience in 3D imaging, including the generation of 3D models of physical structures and image processing. Additional education might substitute for less work experience, or vice versa.

⁶ At this stage, Patent Owner does not assert any objective indicia of nonobviousness. *See generally* Prelim. Resp.

Pet. 16 (citing Ex. 1003 ¶¶ 27–30). At this stage, Patent Owner does not dispute Petitioner’s proposal or offer an alternative proposal. *See generally* Prelim. Resp.

Because Petitioner’s proposed level of ordinary skill in the art appears to be consistent with the cited prior art and is undisputed on this record, we adopt it for purposes of this Decision. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001) (indicating that the prior art itself may reflect an appropriate skill level).

C. Claim Construction

The Board interprets a claim 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). Under this standard, we construe a claim “in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent.” *Id.* A patentee may act as its own lexicographer by clearly setting forth a definition of a claim term. *See, e.g., Thorner v. Sony Comput. Entm’t Am. LLC*, 669 F.3d 1362, 1365 (Fed. Cir. 2012).

The parties indicate that in the co-pending litigation in the District Court for the Western District of Texas (*see supra* Section I.B), the Court provided preliminary constructions of two specific claim limitations. Pet. 16–17; Prelim. Resp. 8. Patent Owner adds that “district court subsequently adopted these constructions in its final claim construction order.” Prelim. Resp. 8 (citing Ex. 2001). We determine that the constructed limitations do not impact the analysis below, but nonetheless, we adopt this those constructions for purposes of this Decision.

Neither party indicates that any other claim term requires express construction. Pet. 16–17; Prelim. Resp. 8–9. Only claim terms in controversy need be construed. *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.”). For purposes of this Decision, we determine that no other claim term requires construction.

D. Overview of the Prior Art

1. Boerjes (Ex. 1004)

Boerjes discloses scanning systems and methods for capturing detailed digital 3D dental models of a patient’s intraoral cavity for dental procedures, such as preparing a surface for a dental hardware item. Ex. 1004, code (57). Boerjes’s system includes a hand-held intraoral scanner for acquiring surface scan data of a patient’s tooth, and sending those data to computer 108, where the data are converted into a 3D model of a tooth or teeth, as illustrated in Figure 1, reproduced below.

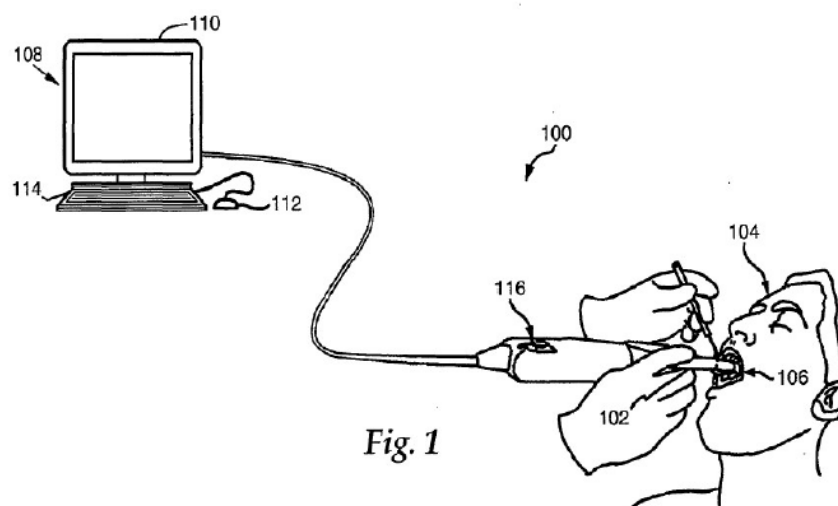


Fig. 1

Figure 1 of Boerjes illustrates a dental image capture system

Id. ¶¶ 132–135, 141–143. Boerjes also discloses a user interface that is used to mark, annotate and manipulate the 3D model. *Id.* ¶¶ 146–149, 182, 192. Boerjes also discloses processes whereby the 3D model can be checked and “supplemented or replaced with new scan data.” *Id.* ¶¶ 190–200; Fig. 4 (quoting *id.* ¶ 199).

2. Geng (Ex. 1005)

Geng discloses systems and methods for interactive 3D dental imaging for dental prostheses. Ex. 1005, code (57). Geng’s system includes camera 104 to acquire image data of a patient’s dentition and send it to computer 112, which processes the data to form a 3D image, as illustrated in Figure 1, reproduced below.

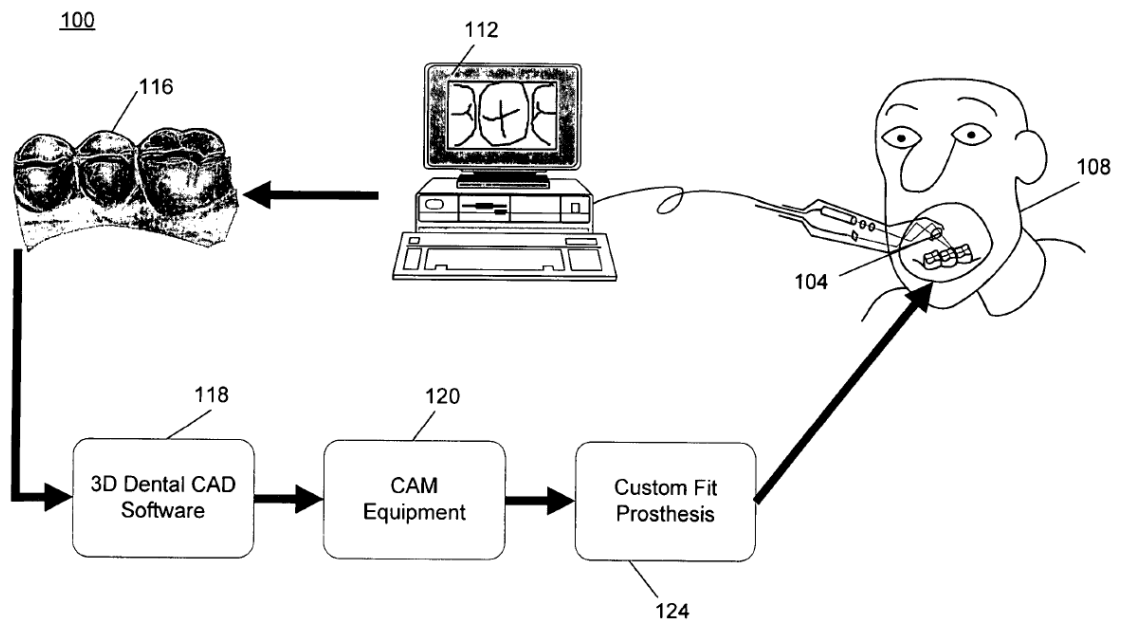


Fig. 1

Figure 1 of Geng illustrates a block diagram showing a dental computer-aided design system

Geng's computer also includes a graphical user interface for displaying and manipulating the 3D image. *Id.* at 7:12–37. An editor portion of the interface allows operators to modify 3D data files interactively, including to “modify and/or eliminate any undesirable area(s) on the original 3D image.” *Id.* at 7:38–51. The interface also includes merger tools that enable operators to integrate multiple uncalibrated images into a single 3D digital impression, through optimization of geometric registrations of the images. *Id.* at 7:57–8:3. Geng teaches that its system and methods allow for interactive design and fabrication of dental prostheses using 3D models, which advantageously allows dental restorations to be performed in a patient's single visit, improves accuracy and quality of care, and reduces dental costs and time. *Id.* at 1:22–32, 15:41–57.

3. Babayoff (*Ex. 1006*)

Babayoff discloses systems and methods for providing a 3D surface representation of the oral cavity for various procedures, such as dental restoration. *Ex. 1006*, code (57). Babayoff's system includes a hand-held 3D surface scanner for acquiring image data, wherein the scanner includes a probe with an illumination source, optical sensor, light-focusing optics defining focal planes, and a motor for changing the focal-plane location. *Id.* ¶¶ 104, 113–136, 156, Figs. 4A, 5A–8. Babayoff's system also includes a processor coupled to the scanner for providing a 3D-surface representation, which can be displayed and manipulated by a user, and the system allows for registering and stitching two or more 3D-surface representations together. *Id.* ¶¶ 70–72, 107, 121.

E. Alleged Obviousness over Boerjes

Claims 1, 4–6, 8–12, and 14–16

Petitioner asserts that claims 1, 4–6, 8–12, and 14–16 would have been unpatentable as obvious over Boerjes. Pet. 25–68. Patent Owner focuses its rebuttal on the “replac[ing] at least a portion of the removed surface portion of the model using the received second scan data of the patient’s teeth” claim limitation, which is found in each independent claim (limitations [1(h)] and [9(e)]) included in Ground 1. Prelim. Resp. 10–19; *see* Pet. xiii–xvi (claims listing). We likewise focus our analysis on this disputed limitations.

1. Petitioner’s Obviousness Argument

Petitioner argues, with respect to Ground 1, that Boerjes alone renders claims 1, 4–6, 8–12, and 14–16 obvious. Pet. 25–35, 40–47, 51. Petitioner identifies the elements of claim 1 which are met by Boerjes, as detailed below, where we take claim 1 to be representative of the claims asserted in this ground:

[1(pre)] A system for scanning a patient’s teeth for a dental procedure, the system comprising (Ex. 1004 ¶¶ 6, 7, 118, 132, Fig. 1; Ex. 1003 ¶¶ 77–78):

[1(a)] a hand-held intraoral scanner (Ex. 1004 ¶¶ 7, 12, 16, 135, Fig. 1; Ex. 1003 ¶¶ 79–80); and

[1(b)] a computer readable medium including instructions that when executed by a computer system, cause the computer system to (Ex. 1004 ¶¶ 10, 38, 61, 146–148, Fig. 1; Ex. 1003 ¶¶ 81–82):

[1(c)] receive first scan data of the patient’s teeth from the hand-held intraoral scanner (Ex. 1004 ¶¶ 130, 144, Fig. 4; Ex. 1003 ¶¶ 83–84);

[1(d)] display, to a display, a model of the patient's teeth, wherein the model of the patient's teeth is based on the received first scan data of the patient's teeth (Ex. 1004 ¶¶ 40, 61, 76, 129, 132, 139, 221–222, Figs. 1, 7A; Ex. 1003 ¶ 86);

[1(e)] receive user input defining a portion of the model to be removed; [1(f)] remove, from the displayed model, a removed surface portion of the model to be removed according to the user input (Ex. 1004 ¶¶ 43, 188–196, 199; Ex. 1003 ¶ 88);

[1(g)] receive second scan data of the patient's teeth from the handheld intraoral scanner, the second scan data including surface data of a physically changed portion of the patient's intraoral cavity (Ex. 1004 ¶¶ 41, 59–64, 127–128, 135, 189–196, 199, Fig. 4; Ex. 1003 ¶¶ 106–107);

[1(h)] replace at least a portion of the removed surface portion of the model using the received second scan data of the patient's teeth including surface data of a physically changed portion of the patient's intraoral cavity (Ex. 1004 ¶¶ 144, 163, 199, Fig. 4; Ex. 1003 ¶¶ 109–110); and

[1(i)] output, to the display, the model of the patient's teeth with the portion of the removed surface portion replaced using the received second scan data (Ex. 1004 ¶¶ 193–199, Fig. 4; Ex. 1003 ¶¶ 124–125).

Pet. 25–35, 40–47, 51.

In addition to the elements of Boerjes identified by Petitioner, cited above, Petitioner asserts that specific elements of claim 1 would have been obvious in view of Boerjes. Pet. 31–35, 43–47. Specifically, Petitioner argues that a person of ordinary skill in the art would have understood that the user would mark on the model “regions of a digital model requiring additional or supplemental scanning” via the user interface, such as by providing “graphical feedback ... highlighting questionable or erroneous areas of a preparation within a rendered display of scan data” to indicate

areas of the model to be “replaced.” *Id.* at 33 (citing Ex. 1004 ¶¶ 196–197, 199; Ex. 1003 ¶ 89). Additionally, Petitioner argues that “a POSITA [person of ordinary skill in the art] would have been motivated to remove the user-identified surface portion before replacing it with new scan data.” *Id.* at 34 (citing Ex. 1004 ¶¶ 196–199; Ex. 1003 ¶ 90). Also, Petitioner argues that “a POSITA implementing Boerjes would have found it preferable to remove the user-identified portion from the model *before* replacing it with new scan data. *Id.* at 34–35 (citing Ex. 1003 ¶¶ 92–94).

In addition, with respect to limitation 1(h), Petitioner argues that “[a] POSITA would have understood that in Boerjes, the second scan data would be used to replace at least a portion of the removed surface of the model, including the surface data of the physically changed portion.” Pet. 43 (citing Ex. 1004 ¶¶ 196–199; Ex. 1003 ¶¶ 109–111). Also, Petitioner argues that “a POSITA would have known and been motivated to use known methods, such as ‘register[ing]’ and ‘stitch[ing],’ as recognized by Boerjes, as part of Boerjes’s replacement of undesirable areas. *Id.* at 46 (citing Ex. 1004 ¶¶ 126, 144, 218; Ex. 1007 ¶¶ 58, 65–66, 74, 86, 97; Ex. 1008 ¶¶ 6, 36; Ex. 1003 ¶ 112).

2. Patent Owner’s Arguments

Patent Owner argues that Petitioner’s obviousness argument fails to adequately address limitation 1(h), which details the replacement of at least a portion of the removed surface portion of the model using the received second scan data of the patient’s teeth including surface data of a physically changed portion of the patient’s intraoral cavity. Prelim. Resp. 10–19. Patent Owner asserts that “the parts of Boerjes that the petition relies on never disclose building a composite model from a first scan modified to

include portions of a second scan following physical changes to the patient's intraoral cavity.” *Id.* at 11.

Patent Owner points out that paragraph 199 of Boerjes, relied upon by Petitioner to teach or suggest limitation 1(h) (Pet. 43), instead discloses that “the digital model may be supplemented or replaced with new scan data,” and Boerjes provides no discussion of replacing a portion of an earlier scan with a portion of a subsequent scan following physical modification of the patient's intraoral cavity. Prelim. Resp. 12 (quoting Ex. 1004 ¶ 199). Patent Owner continues that the operation of Boerjes never says it is replacing a region or amalgamating with a prior scan when it performs its replacement operation. *Id.* at 13. Patent Owner further argues that the Petition also cites to paragraph 196 of Boerjes, but that portion confirms that “Boerjes distinguishes between supplemental scanning of the same unmodified dental structure due to incomplete data and, distinctly, obtaining an entirely new scan following additional preparation work. *Id.* (citing Pet. 40–41, 45).

Patent Owner additionally argues that Boerjes includes no discussion of constructing a composite digital model from different scans with different surface preparations, and that other cited portions of Boerjes, describing manual quality control, performance during a single office visit, and models that include only some of the dentition, do not teach or suggest the same. Prelim. Resp. 14–15 (citing Pet. 40–41, 43, 45; Ex. 1004 ¶¶ 193, 189–199). Patent Owner also argues that Boerjes' disclosure of “combining historical three-dimensional data with a three-dimensional representation of the prepared surface” is directed to fabrication of a “restoration” based on multiple representations, and that Boerjes does not propose combining these data into a new composite model. *Id.* at 15 (citing Pet. 45; Ex. 1004 ¶ 163).

Patent Owner additionally argues that Boerjes describes generating a new digital model based on an entirely new scan when the patient's intraoral cavity is altered. *Id.* at 16–17. Lastly, Patent Owner argues that although the Petition's citations to additional references may support the general assertion that stitching data during image acquisition was generally known, those references do not address building a composite model by replacing a portion of an old scan with a later scan of dentition that was physically changed. *Id.* at 18.

3. The Parties' Arguments in the Opposition & Sur-reply

The Opposition to the Preliminary Response, and the Sur-reply to that Opposition, both focus on this Ground, largely reiterating the arguments discussed above. *See generally* Pet. Opp; PO Sur-reply.

Petitioner asserts that Boerjes discloses creating a composite image after physical modification because Boerjes states that the digital model may be *supplemented* or replaced with new scan data. Pet. Opp. 2 (citing Ex. 1004 ¶ 199). Petitioner asserts that Patent Owner is narrowly characterizing Boerjes, based on its disclosed examples, instead of its broader teaching. *Id.* Petitioner asserts that “Boerjes expressly discloses identifying a region of a scan and then *supplementing* the pre-existing scan data by taking a new scan of that region,” and that such identifications can occur between scans. *Id.* at 2–3 (citing Ex. 1004 ¶¶ 196, 199; Pet. 43–47). Petitioner also characterizes Patent Owner's arguments as being merely “attorney argument,” with no expert testimony to support Patent Owner's understanding of Boerjes. *Id.* at 4–5.

Patent Owner replies that the Opposition continues to misconstrue the disclosure of Boerjes, asserting that paragraph 199 discloses “new scanning

to replace only erroneous or inadequate scan data corresponds to *supplementing*, while obtaining a “new scan of the dental subject matter” corresponds to *replacing* the digital model of the dental subject matter.” PO Sur-reply 4. Patent Owner argues that the Opposition reverses the structure of the paragraph, and Boerjes is clear that an entirely new scan of the modeled dental subject matter is obtained after physical modifications of the dentition. *Id.* at 4–5. Patent Owner also emphasizes that the different models in Boerjes “are not combined to generate a composite scan.” *Id.* at 5.

4. Analysis

Upon review of the Petition, the evidence of record, and the additionally filed papers, we are persuaded by Patent Owner’s arguments, with respect to this ground. We are persuaded that Petitioner’s obviousness argument fails to adequately address limitation 1(h), which details the replacement of at least a portion of the removed surface portion of the model using the received second scan data of the patient’s teeth including surface data of a physically changed portion of the patient’s intraoral cavity. *See* Prelim. Resp. 10–19.

Although the Petition is persuasive that Boerjes allows a user to “identify areas that need replacing, such as ‘a margin line’ to be removed, ‘areas of poor margin preparation,’ and ‘holes or areas of incomplete scan[s],’” and that the user can identify regions of a prepared tooth surface requiring additional preparations and “supplemental scanning” (Pet. 32 (citing Ex. 1004 ¶¶ 189, 193, 196)), Boerjes is silent with respect to replacing at least a portion of the removed surface portion of the model using the received second scan data of the patient’s teeth, per claim 1. Boerjes certainly contemplates the re-scanning of the dentition, but does not

assert partial insertion of new data into an existing 3D model. Even under the “comprising” language of claim 1, for example, the complete replacement of a 3D model cannot teach or suggest “replacing at least a portion of the removed surface portion” without repudiating the language of the claim by making a portion be the entire model.

Even if, as Petitioner asserts, “removing portions of a virtual model has been a well-known and routine technique in 3D modeling,” and the “process of replacing a user-identified portion would have been well within the skills of a POSITA” (Pet. 35), the disclosure of Boerjes does not teach or suggest such processes. Although Boerjes allows for the *possibility* that portions of a model can be identified as needing replacement or supplementation, it does not disclose the partial replacement required by the instant, independent claims. Boerjes’s actual disclosure details that supplemental scanning is used to compensate for an inadequate scan, but not disclosed to be used to stitch together before-and-after models that have undergone an intervening physical change.

In view of the arguments and cited evidence, we find on this record that Petitioner has not demonstrated a reasonable likelihood of showing that a person of ordinary skill in the art would have been motivated to modify Boerjes, based on its disclosure alone, to teach or suggest all of the elements of claims 1, 4–6, 8–12, and 14–16. Thus, we determine that the information presented does not establish a reasonable likelihood that Petitioner would prevail in showing that at least one challenged claim of the ’936 Patent is unpatentable, based on Ground 1.

F. Alleged Obviousness over Boerjes and Geng

Claims 1, 4–6, 8–12, and 14–16

In Ground 2, Petitioner asserts that claims 1, 4–6, 8–12, and 14–16 would have been unpatentable as obvious over Boerjes and Geng. Pet. 25–31, 35–43, 47–51. Patent Owner again focuses its rebuttal on the “replac[ing] at least a portion of the removed surface portion of the model using the received second scan data of the patient’s teeth” claim limitation, which is found in each independent claim (limitations [1(h)] and [9(e)]) included in this ground. Prelim. Resp. 19–21; *see* Pet. xiii–xvi (claims listing). We likewise focus our analysis on this disputed limitation.

1. Petitioner’s Obviousness Argument

Petitioner’s analysis parallels its analysis asserted in Ground 1, with respect to the teachings of Boerjes and how they meet the limitations of representative claim 1. *See supra* Section II.E.1. In Ground 2, Petitioner also asserts that the disclosure of Geng supplements the disclosure of Boerjes, and that it would have been obvious to combine Boerjes and Geng to render claim 1 obvious, which we take to be representative of the claims asserted in this ground. Pet. 35–40, 47–51.

With respect to limitations 1(e) and 1(f), Petitioner asserts that Geng discloses receiving user input defining a surface portion of the model to be removed and removing the portion, and that persons of ordinary skill in the art would have been motivated to combine Geng’s teachings with Boerjes because the references are analogous art and because using “Geng’s editing function to remove the undesirable portions on the model [would] improve the efficiency and accuracy of Boerjes’s replacement process and improve patient comfort.” Pet. 35–37 (citing Ex. 1005, 2:21–3:34, 3:48–5:21, 6:15–

53, 7:10–51, 15:53–57; Ex. 1003 ¶¶ 97–105). Petitioner also asserts that removing undesired portions, per Geng, would conserve computer resources and provide faster processing because the computer has less data to sift through. *Id.* at 39 (citing Ex. 1003 ¶¶ 103). Petitioner also asserts that implementing Geng’s function in Boerjes’s system would have involved merely applying known techniques—Geng’s editing function—to improve Boerjes’s known and similar system in the same way. *Id.* at 40 (citing Ex. 1003 ¶¶ 105).

With respect to limitation 1(h), Petitioner asserts that Geng’s system is equipped with a merger tool that enables operators to integrate multiple uncalibrated 3D images into a single 3D digital impression. Pet. 47 (citing Ex. 1005, 7:57–8:3, Figs. 1, 3). Petitioner also asserts that persons of ordinary skill in the art would have been motivated to use Geng’s merger function to replace indicated portions of Boerjes’s 3D model with additional data because the references are analogous art and “Geng’s merger function would have been a suitable option because it allows for aligning and integrating the second scan data to the existing model in Boerjes.” *Id.* at 48–49 (citing Ex. 1003 ¶¶ 120–123). Petitioner also asserts that persons of ordinary skill in the art would have had a reasonable expectation of success in implementing Geng’s merging function in Boerjes’s system because the modification requires nothing more than ordinary computer-programming skill, and the modification would have been the application of known techniques to improve a known and similar system. *Id.* at 50–51 (citing Ex. 1003 ¶ 123).

2. Patent Owner's Arguments

Patent Owner argues that Petitioner's obviousness argument fails because Geng does not remedy the deficiencies of Boerjes. Prelim. Resp. 19–21. With respect to limitation 1(h), Patent Owner argues that “[e]ven if a POSITA would be ‘motivated to use Geng’s merger function,’ the relied upon prior art lacks disclosure of the two different scans and resulting composite model required by the challenged claims.” *Id.* at 20. Patent Owner argues that Boerjes fails to teach or suggest that the second scan data would be data of a physically-changed portion to be integrated into a pre-modification model, and that Petitioner relies on Boerjes for the selection of the new data and the model into which it is to be integrated. *Id.* at 20–21. Lastly, Patent Owner argues that “ground 2 relies on the same mischaracterization of Boerjes as ground 1, whereas the actual disclosure of Boerjes does not teach the merging pre- and post-modification data to form a new (‘composite’) model recited in the claims.” *Id.* at 21.

3. Analysis

We are persuaded that Petitioner has shown that Boerjes discloses the elements of independent claim 1, as identified in the Petition, with the exceptions of elements 1(e), 1(f), and 1(h). We are also persuaded, as an initial matter, that Geng teaches a system that allows for multiple scans of the dentition to occur and data from a subsequent scan is used to supplement the first scan, based on indications from a user of where such supplementation should occur. Geng discloses that an editor portion of its interface allows operators to modify 3D data files interactively, including to “modify and/or eliminate any undesirable area(s) on the original 3D image,” and that the interface also includes merger tools that enable operators to

integrate multiple uncalibrated images into a single 3D digital impression, through optimization of geometric registrations of the images. Ex. 1005, 7:38–51, 57–8:3.

We determine that Geng’s disclosure matches the language of limitations 1(e), 1(f) and 1(h), whereby at least a portion of the removed surface portion of the model is replaced by using the received second scan data of the patient’s teeth, based on a user’s selection of a portion to be removed and replaced. We then must consider the efficacy of the Petition’s assertion that it would have been obvious to combine the teachings of Boerjes and Geng.

On that basis, we agree with Petitioner that a person of ordinary skill in the art would recognize that Geng’s editing function would improve the efficiency and accuracy of Boerjes’s system, and the incorporation of that editing function would have involved merely applying known techniques to improve a known and similar system in the same way. *See* Pet. 35–37, 39–40, 48–49, 50–51. We also agree with Petitioner that the references are analogous, and are directed to address similar problems in 3D modeling of dentition. Patent Owner’s arguments are not directed to the proffered motivation to combine Boerjes and Geng (*see* Prelim. Resp. 19–21), but rather to the formulation of Ground 2, which we address below. As such, we are persuaded, for purposes of institution, that Petitioner has demonstrated a reasonable likelihood of combining Boerjes and Geng, per the Petition.

With respect to Patent Owner’s arguments regarding the formulation of Ground 2, i.e., that Petitioner relies on Boerjes for the selection of the new data and the model into which it is to be integrated, we find those arguments unavailing. *See* Prelim. Resp. 19–21. Boerjes discloses a user

interface that is used to mark, annotate and manipulate the 3D model, analogous to Geng's process of modifying and eliminating undesirable areas on the original 3D image, and Boerjes also discloses processes whereby the 3D model can be checked and supplemented or replaced with new scan data. *See* Ex. 1004 ¶¶ 146–149, 182, 190–200, Fig. 4; Ex. 1005, 7:38–51. With respect to Ground 1, we are persuaded that the new scan data would likely be an entirely new scan, per the disclosure of Boerjes alone, and Boerjes lacks specific disclosure of how portions of new data could be incorporated into an existing model. With the addition of Geng, specific areas, less than the whole model, can be eliminated and processes are detailed for integrating multiple images into a single 3D digital impression, i.e., filling in or stitching together to create a single 3D model. The section of the Petition addressing limitation 1(h) addresses the disclosures of both Boerjes and Geng. *See* Pet. 47–51. As such, we are not persuaded that the Petition fails to address all aspects of limitation 1(h), per Patent Owner's arguments.

On this record, we determine that Petitioner has developed this ground sufficiently to meet the reasonable likelihood standard for institution. Having determined that Petitioner has met its burden as to its Ground 2 arguments, and because the Board must institute on all grounds or none, *SAS Institute Inc. v. Iancu*, 584 U.S. 357, 364–65 (2018) and 37 C.F.R. § 42.108(a), we institute trial in on all grounds presented in this proceeding. Nevertheless, we address the additional grounds below.

G. Alleged Obviousness over Boerjes, Geng and Babayoff

Claims 2, 3, 7, 13, and 17–20

Petitioner asserts that claims 2, 3, 7, 13, and 17–20 would have been unpatentable as obvious over Boerjes and Geng, and over Boerjes, Geng and

Babayoff. Pet. 19–76. We note that Ground 3, applying just Boerjes and Babayoff, is based on Ground 1, applying Boerjes alone to the claims in that latter ground. As we have determined that the information presented in Ground 1 does not establish a reasonable likelihood that Petitioner would prevail in showing that at least one claim challenged in that ground to be unpatentable (*see supra* Section II.E), we similarly determine that Petitioner has not made such a showing with respect to Ground 3 either. Ground 3 does not address the deficiencies in Ground 1, nor assert that the disclosure of Babayoff addresses or mitigates those deficiencies. As such, we need not consider the arguments Patent Owner raises against Ground 3. *See* Prelim. Resp. 22–23.

With respect to Ground 4, however, which is based on Ground 2, where we determine Petitioner has shown a reasonable likelihood that it would prevail with respect to at least 1 of the claims challenged in that ground, we further evaluate the efficacy of Ground 4 below.

With respect to claim 2, Petitioner argues that Babayoff discloses a hand-held intraoral scanner that includes an endoscope, an illumination unit, main optics, color illumination, and a tri-color sequence generator used to illuminate and scan objects of the intraoral cavity. Pet. 69 (citing Ex. 1006 ¶¶ 107, 156, Figs. 1, 4A; Ex. 1003 ¶¶ 181–182). Petitioner also points to Babayoff’s system with a scanner with a sensing surface, a main illumination source, and light-focusing optics defining one or more focal planes that can be displaced through action of a motor. *Id.* at 70–74 (citing Ex. 1006 ¶¶ 107–108, 120, 123–124, 126, Figs. 1, 4A, 5A–5C; Ex. 1003 ¶¶ 183–187). Petitioner asserts that persons of ordinary skill in the art would have understood that Babayoff’s intraoral scanner would have improved the

dental restoration procedure of Boerjes and Geng by providing color data for presenting an accurate 3D color model, as well as allowed for more accurate matching and identification, motivating the combination. *Id.* at 75-76 (citing Ex. 1003 ¶¶ 188–194). With respect to claim 3, which depends from claim 2, Petitioner relies on the disclosure of Boerjes. *Id.* at 77.

With respect to claims 7, 13, and 17, Petitioner argues it would have been obvious to modify the Boerjes-Geng system to further discard the remainder of the second scan data after registering and stitching the second scan data to the model. Pet. 78–82. Petitioner cites to Babayoff for its disclosure of a system that accurately stitches data sets of overlapping areas scanned within the intra-oral cavity, and asserts that it was well-known to discard a remainder of the unused, received second scan data. *Id.* at 78 (citing Ex. 1006 ¶¶ 37–39, 176–177, 179; Ex. 1003 ¶ 199). Petitioner asserts that the combination of Babayoff with Boerjes-Geng would have been obvious to improve smoothness and reduce artifacts in the 3D model, as well as reducing data redundancy and required memory space, and processing power. *Id.* at 78–79 (citing Ex. 1003 ¶¶ 200–201). For independent claim 17 and dependent 13, Petitioner refers back to its analyses of claims 1 and 7. *Id.* at 80–82. In a similar fashion, Petitioner, in its analysis of claims 18–20, refers back to its analyses of claims 1–4. Pet. 83.

Patent Owner argues that Ground 4 fails “to remedy the deficiencies of grounds 1 and 2 with respect to any of dependent claims 2–3, 7, and 13, each of which depends directly or indirectly from independent claims 1 or 9.” Prelim. Resp. 22 (*see also id.* at 22–23, addressing independent claim 17, also asserted for this ground). As we do not determine Ground 2 to be deficient, we find this argument to be unavailing.

In view of the arguments and cited evidence, we find on this record that Petitioner has demonstrated a reasonable likelihood of showing that a person of ordinary skill in the art would have been motivated to combine the teachings of the Boerjes, Geng and Babayoff to meet the limitations of the claims challenged under this ground.

Petitioner persuasively maps the limitations of the challenged claims to the portions of the references relied upon. Pet. 69–83. Petitioner also, on this record, provides adequate statements of motivation to combine with a reasonable expectation of success. *Id.* at 75–83.

For the above reasons, we determine that the information presented in the Petition establishes a reasonable likelihood that Petitioner would prevail in showing that at least one challenged claim of the '936 Patent is unpatentable under this ground as well.

III. CONCLUSION

Petitioner has shown a reasonable likelihood that it would prevail with respect to at least 1 of the claims challenged in the Petition.

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. This is not a final decision as to the patentability of the

claims for which *inter partes* review is instituted. Our final decision will be based on the record as fully developed during trial.

IV. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that pursuant to 35 U.S.C. § 314(a), an *inter partes* review is instituted as to claims 1–20 of the '936 Patent on the grounds set forth in the Petition; and

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 will commence on the entry date of this decision.

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