

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*.

JUDGMENT
Final Written Decision
Determining No Challenged Claims Unpatentable
35 U.S.C. § 318(a)

I. INTRODUCTION

A. *Background and Summary*

ClearCorrect Operating, LLC (“Petitioner”) filed a Petition (Paper 1, “Pet.”) to institute an *inter partes* review of claims 1–20 (the “challenged claims”) of U.S. Patent No. 10,791,936 B2 (“the ’936 Patent,” Ex. 1001). Align Technology, Inc. (“Patent Owner”) timely filed a Preliminary Response (Paper 10, “Prelim. Resp.”) contending that the Petition should be denied as to all challenged claims. With our authorization (Ex. 3102), Petitioner filed an Opposition (Paper 14) to the Preliminary Response, and Patent Owner filed a Sur-reply (Paper 15) to that Opposition¹.

After considering the parties’ papers, on October 30, 2025, we instituted an *inter partes* review in this proceeding. Paper 16 (“Dec. to Inst.”). Patent Owner sought Director Review of that Decision (Paper 19), but that request was denied (Paper 28). Patent Owner subsequently filed a Patent Owner Response (Paper 26, “PO Resp.”), Petitioner filed a Petitioner Reply (Paper 31, “Pet. Reply”), Patent Owner filed a Patent Owner Sur-reply (Paper 36, “PO Sur-reply”), and a transcript of an oral hearing held on July 31, 2026 (Paper 43, “Hr’g Tr.”) was entered into the record.

We have jurisdiction under 35 U.S.C. § 6. This Final Written Decision is issued pursuant to 35 U.S.C. § 318(a). We base our decision on the preponderance of the evidence. 35 U.S.C. § 316(e) (2018); 37 C.F.R. § 42.1(d) (2024). Having reviewed the arguments of the parties and the supporting evidence, we conclude that Petitioner has not demonstrated by a

¹ The parties also filed Briefs (Papers 7, 8) directed to discretionary denial, where the acting-Director referred (Paper 13) the Petition to the panel for a decision on institution.

preponderance of the evidence that claims 1–20 of the challenged claims are unpatentable.

B. Related Proceedings

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. Real Party-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.

D. 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 scanner 31 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.

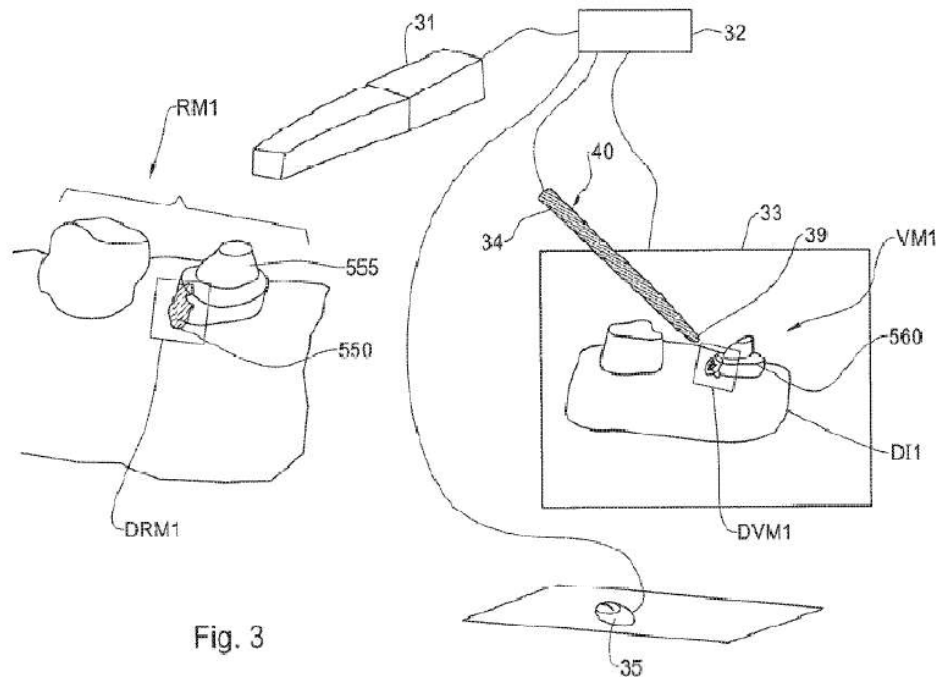


Figure 3 schematically illustrates providing a first virtual model to the computer system, and interacting with the display thereof. *Id.* at 17:25–27. The '936 Patent details that:

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.

E. Illustrative Claim

As noted above, Petitioner challenges all claims (1–20) of the '936 Patent. Claims 1, 9 and 17 are independent. Claim 1, reproduced below with annotations,² 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:

² For ease of reference, we use the same bracketed notations Petitioner uses in the Petition. *See, e.g.*, Pet. xiii–xix (claims listing).

- [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(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.

F. Grounds of Institution

Trial was instituted on the following grounds:

References	35 U.S.C. § ³	Claims Challenged
Boerjes ⁴	103(a)	1, 4–6, 8–12, 14–16

³ The Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011), amended 35 U.S.C. § 103 effective March 16, 2013. Because the '343 Patent has an effective filing date prior to the effective date of the applicable AIA amendment, we refer to the pre-AIA version of § 103.

⁴ International Application Publication No. WO 2007/084727 A1, published July 26, 2007 (Ex. 1004, "Boerjes").

References	35 U.S.C. § ³	Claims Challenged
Boerjes, Geng ⁵	103(a)	1, 4–6, 8–12, 14–16
Boerjes, Babayoff ⁶	103(a)	2, 3, 7, 13, 17–20
Boerjes, Geng, Babayoff	103(a)	2, 3, 7, 13, 17–20

Dec. to Inst. 28. Petitioner relies on the declaration of Dr. Lina J. Karam (Ex. 1003), and Patent Owner relies on the declaration of Dr. Hassan Foroosh (Ex. 2011), with depositions of Dr. Karam (Ex. 2013) and a deposition of Dr. Foroosh (Ex. 1056) entered into the record.

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

⁵ U.S. Patent No. 7,474,932 B2, filed October 25, 2004, issued January 6, 2009 (Ex. 1005, “Geng”).

⁶ U.S. Patent Publication No. 2005/0283065 A1, published December 22, 2005 (Ex. 1006, “Babayoff”).

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 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.⁷ *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

⁷ Patent Owner does not assert any objective indicia of nonobviousness. *See generally* PO Resp.; PO Sur-reply.

education might substitute for less work experience, or vice versa.

Pet. 16 (citing Ex. 1003 ¶¶ 27–30). Patent Owner does not dispute Petitioner’s proposal and adopts the proposed level of ordinary skill, noting that Dr. Foroosh meets and exceeds this level of ordinary skill. *See* PO Resp. 11–12 (citing Ex. 2011, ¶¶ 1–11, 40–41). As such, we adopt Petitioner’s unopposed position as to the level of ordinary skill in the art for purposes of this Decision.

C. *Claim Construction*

In an *inter partes* review, we construe a patent 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). In applying such standard, claim terms are generally given their ordinary and customary meaning, as would be understood by a person of ordinary skill in the art, at the time of the effective filing date of the patent application and in the context of the entire patent disclosure. *Phillips*, 415 F.3d at 1312–13. “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).

As noted in the Institution Decision (Dec. to Inst. 9–10), 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 continue to determine that the construed limitations do not impact the analysis below, but nonetheless, we continue to adopt those constructions for purposes of this Decision.

Neither party indicates that any other claim term requires express construction. *See* PO Resp. 12; *see generally* Pet. Reply, PO Sur-reply. Only claim terms in controversy need to 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.

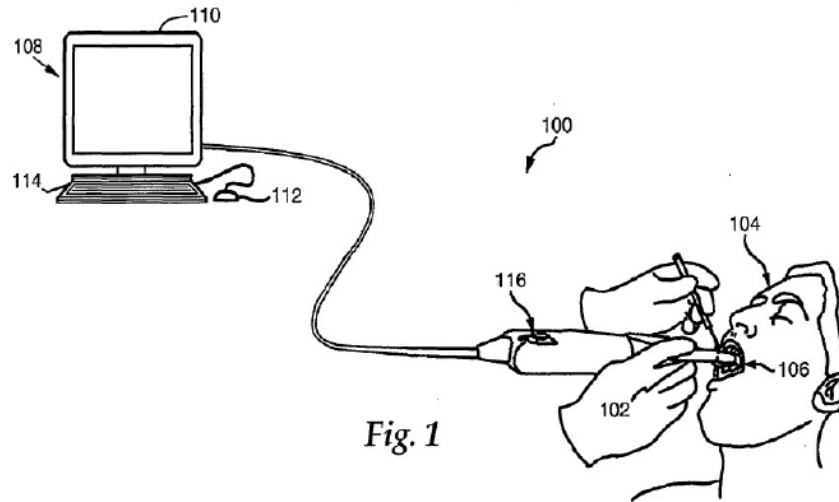


Figure 1 of Boerjes illustrates a dental image capture system *Id.* ¶¶ 132–135, 141–143. Boerjes also discloses a user interface that is used to mark, annotate and manipulate the 3D model. *Id.* ¶¶ 146–149, 182, 192. Boerjes also discloses processes whereby the 3D model can be checked and “supplemented 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.

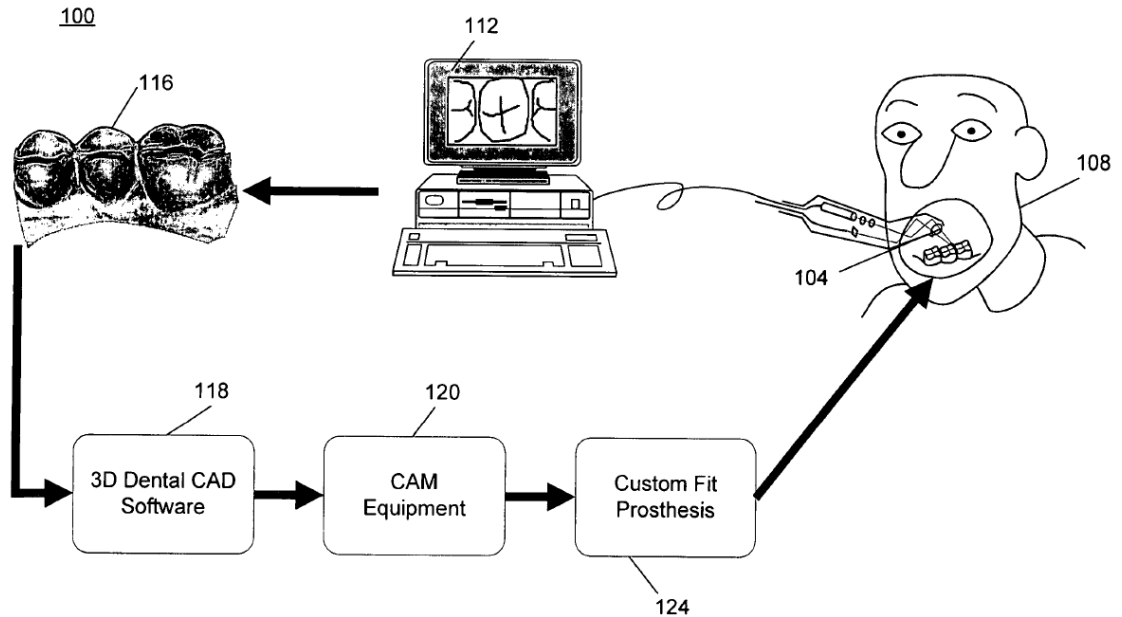


Fig. 1

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. 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. *See* Pet. 25–68. We considered both parties' arguments in the Institution Decision and we preliminarily determined that Petitioner's obviousness argument failed 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. Dec. to Inst. 18–19. We stated therein:

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 [and, although] Boerjes certainly contemplates the re-scanning of the dentition,

[it] does not assert partial insertion of new data into an existing 3D model.

Id. Thus, we determined that the information presented did 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 obviousness over Boerjes alone. *Id.* at 19. Although we consider additional arguments from the parties below, we do not reach a different conclusion with respect to this ground of unpatentability.

Patent Owner asserts that “the petition’s deficiencies as recognized by the Board at institution remain,” and the same should be found in this decision. PO Resp. 21 (citing Ex. 2011 ¶ 64). Patent Owner presents arguments supporting the position that Boerjes alone does not teach or suggest limitation 1(h). *See id.* at 23–35.

In Reply, Petitioner asserts that Boerjes teaches incrementally registering 3D data to an aggregate 3D model and stitching new 3D data to existing 3D data, relying on Dr. Karam’s testimony that it was well-known to take additional scans to update, supplement, or replace defective areas in a virtual 3D model. Pet. Reply 9 (citing Ex. 1003 ¶¶ 44–47). Petitioner also asserts that:

[O]nce Boerjes’s quality control identifies a portion requiring additional surface preparation and obtains new scan data for that portion, a skilled person would have found it obvious to use conventional image-registration and stitching techniques—already taught in Boerjes—to replace the user-identified portion with the new scan data.

Id. at 9–10 (citing Pet. 43–47; Ex. 1003 ¶¶ 109–117; Ex. 2013, 110:23–112:24, 116:1–22).

Patent Owner responds that it “never conceded that Boerjes discloses partial replacement in a 3D model of erroneous or inadequate scan data,” nor

that it argued the Boerjes requires a rescan of the entire mouth. PO Sur-reply 3. Patent Owner counters that the correct impression of Boerjes was provided by Dr. Foroosh in his cross-examination testimony, where he explained that Boerjes “doesn’t say insert or update or produce [a] composite model,” but rather “[i]t says, obtain digital models.” *Id.* at 4–5 (quoting Ex. 1004 ¶ 199; citing Ex. 1056, 172:12–174:16). Additionally, Patent Owner asserts that “[n]othing in Boerjes suggests targeting specific portions of the original 3D model for replacement to create a composite model.” *Id.* at 6.

Considering the parties’ renewed arguments, we are not persuaded that Boerjes alone teaches or suggests limitation 1(h) by a preponderance of the evidence. 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.

We acknowledge that Petitioner has argued (Pet. 43–44) that Boerjes’ Figure 4 and paragraph 144 of Boerjes teach partial replacement, but we are persuaded that those disclosures suggest total replacement and not partial replacement. The reference to “supplemented or replaced with new scan data” (Ex. 1004 ¶ 199) does not necessarily teach or suggest *partial* scanning, as Petitioner has argued. Additionally, Petitioner has argued (Pet.

44–45) that language used by Boerjes, such as “some or all,” “stitched,” and “combining historical three-dimensional data” (quoting Ex. 1004 ¶¶ 139, 144, 163), would have suggested to ordinarily skilled artisans that “Boerjes would be used to replace at least a portion of the model with the new scan data. *Id.* at 45 (citing Ex. 1003 ¶ 112). These disclosures are, however, applicable to scans that create complete replacement as well as partial replacement. We remain persuaded that Boerjes does not teach partial scans used to obtain partial replacement. 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 such supplemental scanning is not disclosed to be used to stitch together before-and-after models that have undergone an intervening physical change.

On the complete record, we determine, that Petitioner has not sufficiently established that the teachings of Boerjes meet limitation 1[h] of independent claim 1, such that Petitioner has not shown by a preponderance

of the evidence that claims 1, 4–6, 8–12, and 14–16 would have been unpatentable as obvious over Boerjes.

*F. Obviousness over Boerjes and Geng
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 and Geng. Pet. 25–31, 35–43, 47–51. Patent Owner raises arguments in the Patent Owner Response and Sur-Reply, with Petitioner responding with arguments in its Reply, which we address below. Although Patent Owner raises arguments specifically addressing limitations 1[e] and 1[h], Patent Owner has acknowledged that “the center of the dispute is on element 1[H]” (Hr’g Tr. 27), and we focus our discussion on limitation 1[h] below.

With respect to that limitation, 1[h], in the ground relying *only on Boerjes*, the Petition relies on specific portions thereof and on portions of Dr. Karam’s declaration. Pet. 43–45 (citing Ex. 1004 ¶¶ 144, 163, 199, Fig. 4; Ex. 1003 ¶¶ 109–110). In addition, 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. 45 (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) (citing to additional references).

With respect to the second ground, relying on Boerjes and Geng, the Petition makes limited assertions, with respect to limitation 1[h], beyond

those asserted in the first ground, asserting Boerjes alone. Pet. 47–51. The Petition asserts that persons of ordinary skill in the art would have been motivated to use Geng’s merger function to replace the first scan’s undesired portion with the second scan data in Boerjes. *Id.* at 48. The Petition also asserts that persons of ordinary skill in the art would have known to use conventional image-registration methods to replace Boerjes’s undesired portion of the model with second scan data. *Id.* at 49. The Petition also asserts that the combination would have had a reasonable expectation of success. *Id.* at 50–51.

Patent Owner argues that:

Petitioner simply brings in Geng’s merger tool as a means to perform a functionality that Petitioner (wrongly) asserts is present in Boerjes. Petitioner does not, and indeed cannot, assert that Geng teaches selectively updating a portion of a model using new scan data of a physically changed portion of the patient’s mouth, making an express limitation of the challenged claim wholly missing from Petitioner’s applied art.

PO Resp. 22 (citing Ex. 2011 ¶ 65). Patent Owner argues that a) Boerjes teaches rescanning, not replacing portions of the first scan to build a composite model after additional surface preparation, and that b) Geng does not teach or suggest replacing a portion of a model using scan data of a physically changed portion of the patient’s intraoral cavity. *Id.* at 23–40. With respect to a) (*id.* at 23–36), we agree and we refer to the analysis of the first ground above. With respect to b) (*id.* at 36–40), we further discuss Patent Owner’s arguments with respect to Boerjes and Geng below.

Patent Owner argues that while Geng provides general description of a merger tool as part of its system, Geng provides no disclosure of using the tool to 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, as required by limitation 1[h]. PO Resp. 36–37 (citing Ex. 2011 ¶¶ 90–91). Patent Owner continues that the Petition does not rely on Geng as teaching or suggesting replacing a removed portion of the model with scan data of the physically changed portion, where the Petition relies solely on Boerjes to meet that aspect of the claim. *Id.* at 37. Patent Owner also argues that Petitioner “makes no claims that Geng itself teaches or suggests *replac[ing]* a portion of a model using scan data that *includ[es] surface data of a physically changed portion of the patient's intraoral cavity.*” *Id.* at 38 (citing Ex. 2011 ¶ 92).

Patent Owner also argues that Dr. Karam confirmed that Geng lacked specific disclosure with respect to limitation 1[h], stating that in her declaration, she is “relying on Boerjes for the Boerjes replacement part which occurs ... after an update is done to the physical structure in the intraoral cavity and after that is done, basically there is a replacement.” PO Resp. 38 (quoting Ex. 2013, 194:13–18). Dr. Karam acknowledges that “[t]his doesn't mean Geng does not [teach that]” (Ex. 2013, 194:24), but this makes clear what the Petition is relying upon to teach limitation 1[h].

Petitioner replies that Patent Owner's arguments fail to address the combination of Boerjes and Geng. Pet. Reply 11 (citing *In re Merck & Co.*, 800 F.2d 1091, 1097 (Fed. Cir. 1986); *In re Mouttet*, 686 F.3d 1322, 1333 (Fed. Cir. 2012)). Petitioner argues that Patent Owner argues that “‘Geng itself’ does not teach replacing a portion of a model after a physical change as in limitation 1[h],” “[b]ut Ground 2 does not rely on Geng alone.” *Id.* at 12. Petitioner also argues that “Geng supplies the implementation details for Boerjes's supplementing/replacing the digital model through removal of the unsatisfactory data in the model and integration of the new scan data to the

remaining portion of the model.” *Id.* (citing Pet. 35–40, 47–51; Ex. 1003 ¶¶ 97–105, 118–123). Petitioner also argues that Patent Owner’s arguments minimize the disclosure of Geng and do nothing to rebut the proffered motivation to combine the references. *Id.* at 13–15.

Patent Owner replies that Petitioner does not dispute that the Petition did not purport to rely on Geng as teaching replacing a user-identified portion of a model with second scan data of a physically changed portion. PO Sur-reply 8–9. Patent Owner argues that “[l]ike Boerjes, Geng merely teaches the conventional approach of performing a new scan after a change to a physical structure in the mouth, rather than replacing a targeted portion of the original model.” *Id.* at 9.

On the complete record, we determine that Petitioner has not sufficiently established that the teachings of Boerjes and Geng meet limitation 1[h] of independent claim 1. As discussed in the prior section, we are unpersuaded that Boerjes alone renders the subject limitation obvious. Again, we determine that Boerjes certainly contemplates the re-scanning of the dentition, but does not assert partial insertion of new data into an existing 3D model. Looking to the actual ground of Boerjes and Geng asserted in the Petition, Geng is not relied upon to teach or suggest limitation 1[h] (*see* Pet. 47–51); rather, Geng is iterative of Boerjes, contemplating the re-scanning of the dentition, but not disclosing the partial insertion of new data into an existing 3D model. *See* Ex. 1005 7:57–8:3, Fig. 3. The Petition in an *inter partes* review must specify where each element of the claims is found in the prior art patents or printed publications relied upon (37 C.F.R. §42.104(b)(4)), and in this instance, the Petition does not provide support that limitation 1[h] is fully disclosed or rendered obvious by the relied upon references.

The Petition relies on the teachings of Boerjes alone to supply a teaching or suggestion of limitation 1[h], as discussed above. The cross-examination testimony of Dr. Karam, as discussed above, makes clear that the intent and thrust of the Petition was for Boerjes alone to specify the subject matter of limitation 1[h]. As we have discussed, we do not find Boerjes alone to be sufficient. Adding Geng to Boerjes makes it doubly clear that it would have been obvious to re-scan the dentition after review and detection of an anomaly, but neither Geng nor Boerjes discloses or suggests a partial re-scanning necessarily, and neither asserts the partial insertion of new data into an existing 3D model.

In the Institution Decision (Dec. to Inst. 24), we relied upon an additional portion of Geng (Ex. 1005, 7:38–51), disclosing the elimination of any undesirable areas on the 3D image, in asserting that the 3D model can be checked and supplemented or replaced with new scan data, but that citation of Geng is absent from the Petition, where an alternative portion of Geng (Ex. 1005, 7:57–8:3) is cited, disclosing the merger of images. Nonetheless, neither citation supplies the *partial* insertion of new data into an existing 3D model replacing the removed surface portion, as discussed above. Additionally, as determined above, the Petition relies solely on Boerjes for limitation 1[h], making the discussion of the disclosure of Geng irrelevant to the actual ground of unpatentability proffered in the Petition.

As such, on the complete record, we determine, that Petitioner has not sufficiently established that the teachings of Boerjes and Geng meet limitation 1[h] of independent claim 1, and where independent claim 9, and claims dependent thereon, recite a similar limitation, 9[e], such that Petitioner has not shown by a preponderance of the evidence that claims 1,

4–6, 8–12, and 14–16 would have been unpatentable as obvious over Boerjes and Geng.

*G. Obviousness over Boerjes, Geng and Babayoff
Claims 2, 3, 7, 13, and 17–20*

With respect to claims 2, 3, 7, 13, and 17–20, claims 2, 3, and 7 ultimately depend from independent claim 1, claim 13 ultimately depends from independent claim 9, and claims 18–20 ultimately depend from independent claim 17. The latter grounds of unpatentability rely on the prior grounds (Pet. 69–83), with the analysis of independent claim 17, for example, relying on elements of previously discussed independent claim 1 (*id.* at 80). As noted in the Institution Decision, the latter grounds do not seek to address any deficiencies in the prior grounds (Dec. to Inst. 25), such that any deficiency in the prior grounds inures to the latter grounds. As discussed above, we determine that the Petition does not establish, by a preponderance of the evidence, the unpatentability of the subject claims over Boerjes and Geng, such that we also determine that the Petition does not establish, by a preponderance of the evidence, the unpatentability of claims 2, 3, 7, 13, and 17–20 over Boerjes, Geng, and Babayoff.

III. CONCLUSION⁸

Having reviewed all the evidence and arguments of record, we determine that Petitioner has not demonstrated by a preponderance of the evidence that claims 1–20 of the '936 Patent are unpatentable. In summary:

⁸ Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this Decision, we draw Patent Owner's attention to the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding*. See 84 Fed. Reg.

Claims	35 U.S.C. §	Basis	Claims Shown Unpatentable	Claims Not Shown Unpatentable
1, 4–6, 8–12, 14–16	103(a)	Boerjes		1, 4–6, 8–12, 14–16
1, 4–6, 8–12, 14–16	103(a)	Boerjes, Geng		1, 4–6, 8–12, 14–16
2, 3, 7, 13, 17–20	103(a)	Boerjes, Babayoff		2, 3, 7, 13, 17–20
2, 3, 7, 13, 17–20	103(a)	Boerjes, Geng, Babayoff		2, 3, 7, 13, 17–20
Overall Outcome				1–20

IV. ORDER

In consideration of the above it is:

ORDERED that Petitioner has not demonstrated by a preponderance of the evidence that claims 1–20 of the '936 Patent are unpatentable; and

FURTHER ORDERED that, because this is a Final Written Decision, parties to the proceeding seeking judicial review of the decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. *See* 37 C.F.R. § 42.8(a)(3), (b)(2).

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