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Paper: 8
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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

3SHAPE A/S and 3SHAPE INC.,
Petitioner,

v.

ALIGN TECHNOLOGY, INC.,
Patent Owner.

Case IPR2019-00132
Patent 7,112,065 B2

Before BRIAN J. MCNAMARA, NEIL T. POWELL, and ELIZABETH M. ROESEL, *Administrative Patent Judges*.

ROESEL, *Administrative Patent Judge*.

DECISION
Instituting *Inter Partes* Review
35 U.S.C. § 314

3Shape A/S and 3Shape Inc. ("Petitioner") filed a Petition (Paper 3, "Pet.") seeking *inter partes* review of claims 1–9 and 11 ("the challenged claims") of U.S. Patent No. 7,112,065 B2 (Ex. 1001, "the '065 patent"). Align Technology, Inc. ("Patent Owner") filed a Preliminary Response. Paper 8 ("Prelim. Resp.").

We have authority to determine whether to institute an *inter partes* review. 35 U.S.C. § 314; 37 C.F.R. § 42.4(a). 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." 35 U.S.C. § 314(a). Applying that standard and considering the arguments and evidence presented in the Petition and Preliminary Response, we institute an *inter partes* review.

The following findings of fact and conclusions of law are not final, but are made for the sole purpose of determining whether Petitioner meets the threshold for initiating review. Any final decision will be based on the full trial record, including any response timely filed by Patent Owner.

I. BACKGROUND

A. Related Matter

Pursuant to 37 C.F.R. § 42.8(b)(2), the parties identify the following civil action: *Align Technology, Inc. v. 3Shape A/S*, No. 1:17-cv-01646 (D. Del., filed Nov. 14, 2017). Pet. 2; Paper 4, 1 (Patent Owner's Mandatory Notices).

B. Asserted Ground of Unpatentability

Petitioner contends that the challenged claims are unpatentable as obvious under 35 U.S.C. § 103(a) over Kawai[1] in view of Baba,[2] both of which are asserted as prior art to the '065 patent under 35 U.S.C. § 102(b). Pet. 4–5.

Petitioner supports its challenge with a Declaration of Dr. Eli Saber. Ex. 1012 ("Saber Declaration").

C. The '065 Patent (Ex. 1001)

The '065 patent discloses a computer-based prosthodontic method for enabling a dental practitioner to define a finish line[3] of a dental prosthesis of at least one tooth to be fitted over a tooth preparation. Ex. 1001, (57), 2:18–21. The dental prosthesis is, for example, a crown. *Id.* at 1:15–16.

The '065 describes "current practice" for defining a finish line as follows:

> According to current practice, after diagnosing that a patient needs a crown, the dentist cuts the tooth to be reconstructed and prepares two impressions and a wax bite of the patient's jaws. Based on the impressions, wax bite and on written instructions of the dentist, a technician prepares in a lab the corresponding cast, and the relevant tooth within the preparation is temporary separated from the plaster so that the area with the anatomic information (the area defining the anatomic contour) and the finish line are exposed. At this point, the finish line is manually marked by the lab technician in ink on

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[1] US 5,417,572, issued May 23, 1995, Ex. 1003.

[2] US 6,049,743, issued April 11, 2000, Ex. 1004.

[3] Construction of the term "finish line" is discussed below. For purposes of this overview, its meaning can be understood from the portions of the '065 patent excerpted below, including Figure 4, which shows finish line 74.

> the preparation, and this finish line is an important parameter used in constructing the crown. Alternatively, a virtual three-dimensional (3D) image of the working cast is obtained . . . and the lab technician marks the finish line in the three dimensional environment.

Ex. 1001, 1:47–63.

The ’065 patent discloses a method that permits a dental practitioner (e.g. a dentist) to define a finish line on a tooth preparation. *Id.* at 3:50–52. According to the ’065 patent, the finish line is not drawn or marked by a lab technician on a working cast or in a virtual 3D environment. *Id.* at 4:1–3. Instead, “the finish line is generated in [a] service center . . . and is conveyed via [a] computer network . . . to the dentist . . . computer.” *Id.* at 4:3–5.

Figure 4 of the ’065 patent is reproduced below:

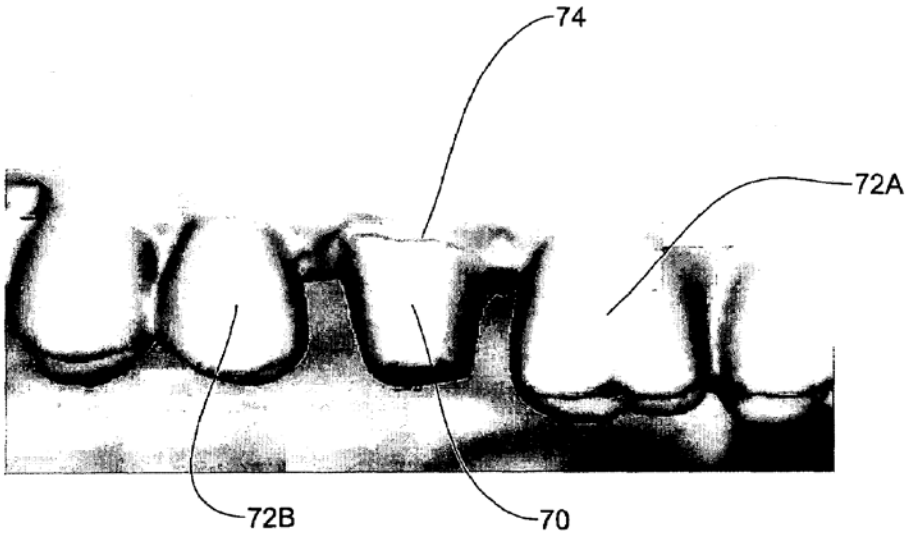


FIG. 4

Figure 4 shows a three-dimensional virtual image of a portion of a patient’s dentition, including tooth preparation 70 and neighboring teeth 72A and

72B, and finish line 74. *Id.* at 3:38–40, 4:49–51. Finish line 74 is "drawn as a continuous line on the apical[4] limit of tooth preparation." *Id.* at 4:51–52.

The '065 patent discloses steps for defining a finish line in a virtual three-dimensional teeth model. *Id.* at 4:39–48, 4:63–5:3, Figs. 3, 5. The steps include generating a first finish line on the tooth preparation in a manual, semi-automated, or fully automated manner and then superimposing the finish line on the dentition image. *Id.* at 4:44–48. According to the '065 patent, finish line data can be generated in a known manner, for example, by the method disclosed in Kawai. *Id.* at 5:23–46. After receiving input from the dentist, a second finish line is obtained and is used to update the first finish line. *Id.* at 4:63–5:3. The dentist can provide input, for example, by moving a cursor to draw the finish line, by moving a stylus on a touch-sensitive screen or pad, or by indicating a series of dots onto a 3D or 2D image. *Id.* at 5:62–67.

The finish line obtained according to the method of the '065 patent may be used to construct both a virtual and a physical crown, preferably in a CAD/CAM (Computer-aided-design/Computer-aided-Manufacture) environment utilizing a CNC (Computer Numerical Control) device. *Id.* at 4:9–16, 6:1–8, 6:16–40, Fig. 5.

Figure 6 of the '065 patent is reproduced below:

[4] According to Petitioner, the term "apical" pertains to a direction toward the root of a tooth. Pet. 6–7 (citing Ex. 1017, 1:22–25; Ex.1018, 2:30–31).

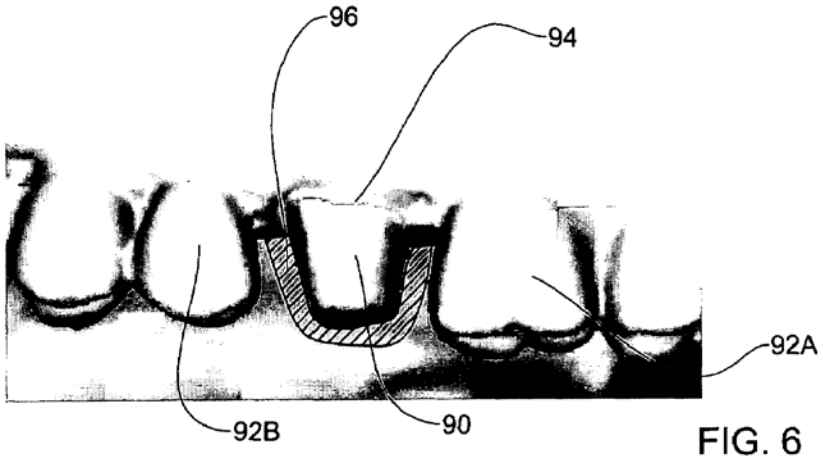


FIG. 6

Figure 6 shows a three-dimensional virtual image similar to Figure 4, with virtual crown 96 fitted on tooth preparation 90. Ex. 1001, 3:44–45, 6:40–44.

D. Illustrative Claim

The ’065 patent includes eleven claims. The Petition challenges claims 1–9 and 11, of which claims 1, 7, and 11 are independent. Claim 1 is illustrative of the challenged claims and is reproduced below, with bracketed identifiers added to correspond with Petitioner’s identification of claim elements:

> 1. [preamble] A computer-based prosthodontic method for enabling a dental practitioner to define a finish line of a dental prosthesis of at least one tooth to be fitted over a tooth preparation, comprising:
>
> [1.1] (One) providing a three-dimensional (3D) digital data relating to the patient's dentition, said 3D data includes data representative of the surface topology of said preparation and its surroundings;
>
> [1.2] (Two) generating first finish line data representative of at least a portion of said finish line and superimposing an image of said finish line on an image of said dentition;
>
> [1.3] (Three)obtaining second finish line data determined on the basis of input received from a dental practitioner; and

> [1.4] (Four) using said second finish line data to update said first finish line data and superimposing the updated data on the dentition image.

Ex. 1001, 6:60–7:9; *see* Pet. 28–43 (headings identify elements of claim 1).

II. DISCUSSION

A. Claim Construction

Because the Petition was filed before November 13, 2018, and the '065 patent has not yet expired, claim terms are to be given their broadest reasonable interpretation in light of the specification. 37 C.F.R. § 42.100(b) (2017).[5] Under that standard, we generally give claim terms their ordinary and customary meaning, as would be understood by a person of ordinary skill in the art, in the context of the entire patent disclosure. *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007).

Petitioner proposes constructions for three claim terms. Pet. 24–26. Patent Owner does not dispute any of Petitioner's proposed constructions. For the reasons discussed below, we adopt Petitioner's proposed constructions for purposes of this Decision. We determine that no other claim term requires express construction for purposes of this Decision. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) ("[W]e need only construe terms 'that are in controversy, and only to the extent necessary to resolve the controversy.'"

[5] A recent amendment to this rule does not apply here. *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).

(quoting *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999))).

Our claim constructions are not final. During trial, the parties may present arguments and evidence in support of or in opposition to our claim constructions or in support of or in opposition to any other proposed construction.

1. "finish line"

Petitioner asserts "the term 'finish line' should be construed as being synonymous with a 'chamfer line', a 'marginal line', or a 'margin line', and refers to the apical limit of the abutment tooth model (the 'preparation') and the margin of the reconstruction must end on it, i.e., it represents the point of transition between the biologic and artificial parts." Pet. 24. At this stage of the proceeding, Patent Owner does not dispute Petitioner's proposed construction. *See* Prelim. Resp. 16 (quoting and relying on part of Petitioner's proposed construction).

Petitioner's proposed construction is consistent with the preamble of the independent claims of the '065 patent, which recite a "finish line" as a feature "of a dental prosthesis" (Ex. 1001, 1:61–62, 8:4–5 (claims 1 and 10)) or a feature that may be employed in constructing a crown (*id.* at 7:24–28, 8:30–33 (claims 7 and 11)). Petitioner's construction is supported by the Specification of the '065 patent, which states that the term "finish line" is "also referred to at times by the term 'chamfer line' and 'marginal line.'" *Id.* at 1:35–37. Petitioner's construction is also supported by the '065 patent's express definition of "finish line" as "the apical limit of the abutment tooth model (the 'preparation') and the margin of the reconstruction must end on it, i.e. it represents the point of transition between the biologic and artificial

parts." *Id.* at 1:38–41. Petitioner's construction is further supported by the '065 patent, which equates the term "finish line," as used in the '065 patent, with the term, "margin line," as used in Kawai. For example, the '065 patent states that Kawai discloses a "computer-based method for extracting a finish line for designing an artificial crown" (*id.* at 1:64–65), which is similar to the title of Kawai, except the '065 patent uses the term "finish line" instead of the term "margin line." *See* Ex. 1003, (54) ("Method for extracting a margin line for designing an artificial crown").

For the foregoing reasons, we adopt Petitioner's proposed construction and construe the term "finish line" as synonymous with the terms, "chamfer line," "marginal line," and "margin line," and as referring to "the apical limit of the abutment tooth model (the 'preparation') and the margin of the reconstruction must end on it, i.e., it represents the point of transition between the biologic and artificial parts."

2. "dental practitioner"

Petitioner contends the term "dental practitioner" "encompasses, but is not limited to, a dentist." Pet. 25. Patent Owner does not dispute Petitioner's proposed construction. *See* Prelim. Resp. 4 ("Throughout the POPR, the use of dentist, dental practitioner, and technician is merely for convenience, but is not a limit on who performs or assists in dentistry or the techniques related to dentistry being discussed, as the parties have previously agreed.")

Petitioner's proposed construction is supported by the'065 patent, which discloses a dentist as an example of a dental practitioner. Ex.1001, 2:20, 3:51 ("dental practitioner (e.g. a dentist)").

Accordingly, we adopt Petitioner's proposed construction and construe "dental practitioner" as "encompasses, but is not limited to, a dentist."

3. "tooth preparation"

Petitioner asserts "the term 'tooth preparation' should be construed as being synonymous with 'abutment tooth', and refers to a physical tooth or portion thereof that receives a prosthesis such as a crown." Pet. 26. Patent Owner does not address the meaning of "tooth preparation" and does not dispute Petitioner's proposed construction.

Petitioner's proposed construction is consistent with the preamble of the independent claims of the '065 patent, which recite a tooth preparation in the context of a dental prosthesis that is "fitted over a tooth preparation" (Ex.1001, 6:61–63, 8:5–6 (claims 1 and 10)) or a crown that is "fitted on a tooth preparation" (*id.* 7:24–25, 8:30 (claims 7 and 11)). Petitioner's construction is supported by the specification of the'065 Patent, which indicates that a "tooth preparation" is synonymous with an "abutment tooth" and refers to a physical tooth or portion thereof that receives a prosthesis, such as a crown. *Id.* at 1:23–24 ("the abutment tooth (hereinafter referred to as the preparation)"); *id.* at 1:38–39 ("the abutment tooth model (the 'preparation')"); *id.* at 2:21–22 ("a dental prosthesis . . . to be fitted over a tooth preparation"); *id.* at 2:39–40 ("a crown to be fitted on a tooth preparation"). Petitioner's construction is further supported by Figures 4 and 6 of the'065 patent, which show a virtual image of tooth preparation 70 or 90 and a virtual crown 96 fitted on such an image. *Id.* at 4:49–52, 6:40–44.

For the foregoing reasons, we adopt Petitioner's proposed construction and construe the term "tooth preparation" as synonymous with "abutment tooth" and as referring to "a physical tooth or portion thereof that receives a prosthesis such as a crown."

B. Principles of Law

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, when introduced, (4) objective evidence of nonobviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

C. Level of Ordinary Skill in the Art

Relying on Dr. Saber's testimony, Petitioner asserts that a person of ordinary skill in the art ("POSITA") would have at least (1) a bachelor's degree in electrical and/or computer engineering, or computer science (or equivalent course work) with two to three years of work experience in computer modelling of physical structures, or (2) a master's degree in electrical and/or computer engineering, or computer science (or equivalent course work) with a focus in computer modelling of physical structures. Pet. 13 (citing Ex.1012 ¶ 25). Patent Owner does not dispute Petitioner's definition of a POSITA.

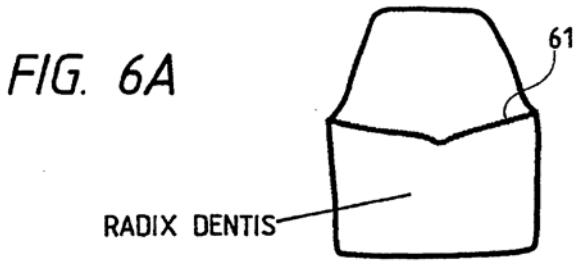
For purposes of determining whether to institute review, we accept Petitioner's definition of a POSITA.

D. Prior Art References

Below we provide an overview of the prior art references relied upon by Petitioner.

1. Kawai (Ex. 1003)

Kawai discloses a method for extracting the margin line for the designing of an artificial crown. Ex. 1003, 1:10–12. Kawai explains that an artificial crown is conventionally prepared by a manual process in which a dental technician draws a margin line on a plaster cast of an abutment tooth, as illustrated in Figure 6A, which is reproduced below. *Id.* at 1:15–25.

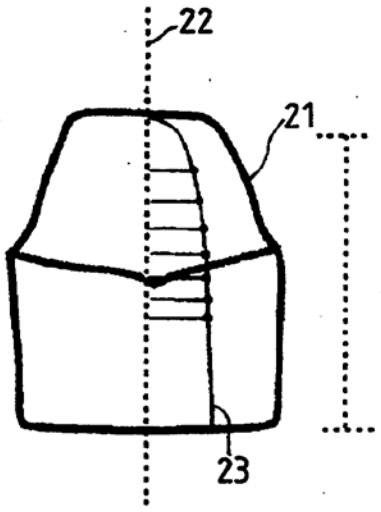


Kawai Figure 6A shows a plaster cast of an abutment tooth, including margin line 61 drawn by a dental technician. *Id.* at 1:17–22. Kawai explains how a hand-drawn margin line is used in a manual process for making an artificial crown and why an accurate margin line is important for ensuring a proper fit between the artificial crown and the abutment tooth. *Id.* at 1:24–44; Figs. 6B, 6C.

Kawai discloses that, in the future, artificial crown preparation will depend on CAD/CAM (computer aided design/computer aided manufacturing). Ex. 1003, 1:45–48. In anticipation of such CAD/CAM

preparation, Kawai discloses a method for extracting, i.e. calculating, a margin line from data representing the three-dimensional shape of an abutment tooth. *Id.* at 1:51–66. Kawai explains that shape data can be obtained by "known technology," such as CT (computerized tomography) scanning or a three-dimensional measuring instrument. *Id.* at 2:28–35. Kawai discloses that "[a] train of points in the margin area is extracted from [the] data representing the three-dimensional shape of the abutment tooth." *Id.* at 2:36–38. An example method for extracting, i.e., calculating, a train of points is illustrated in Figure 2A, which is reproduced below.

FIG. 2A

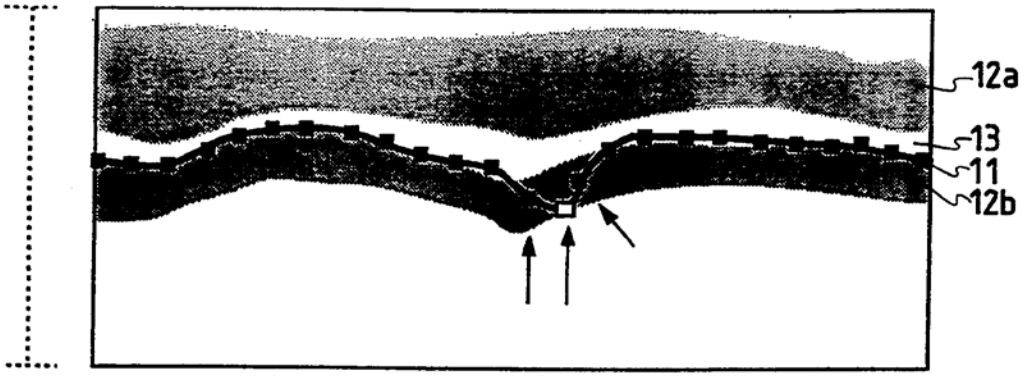


Kawai Figure 2A illustrates a calculation method for determining a train of points of the margin area. Ex. 1003, 2:6–8. Figure 2A shows three-dimensional shape 21 of the abutment tooth, central axis 22, and crossing line 23 defined by the intersection of a plane through the central axis and the curved surface 21 of the abutment tooth. *Id.* at 2:40–47. Kawai discloses mathematical equations for calculating the margin area, which is defined as

where the variation in inclination of crossing line 23 meets defined criteria. *Id.* at 2:47–3:12.

According to Kawai, the train of points representing the margin area is displayed on a display unit as illustrated in Figure 1A, which is reproduced below. *Id.* at 3:13–15, 3:24–28.

FIG. 1A



Kawai Figure 1A shows a display of a train of points superposed on a development view of the shape of an abutment tooth. Ex. 1003, 3:24–28. As shown in Figure 1A and disclosed in Kawai, the "points are connected by straight lines, and such connection can be made by hitting the points with a mouse." *Id.* at 3:28–30.

With reference to Figure 1A, Kawai discloses a "correction operation" for correcting points that deviate from the actual margin line, as follows:

> Subsequently there is executed a correction operation for the point train of the margin area extracted by calculation and the lines connecting the points. Said correction is conducted by hitting a displayed point and moving said point by giving an amount of variation by keys or a dial.
>
> Said correction operation will be explained in the following, with reference to FIG. 1A, in which shaded areas 12a, 12b slope gradually upward to an area 13. The area 13

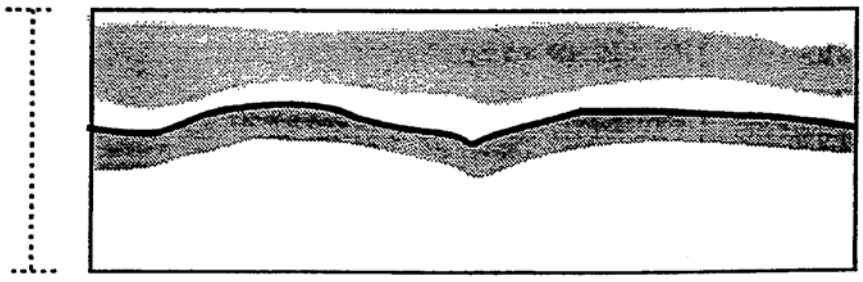
> constitutes a ridge line of a rise. The actual margin line is considered present in the vicinity of the peak of the rise in the developed view, namely in the area 13 in FIG. 1A. The point train 11 in FIG. 1A indicates the margin area determined by the aforementioned calculation. Most of the points of the train 11 are in the area 13, and can be considered close to the actual margin line. The points indicated by arrows are in the area 12b, namely on the sloped portion. These points, are considered deviated from the actual margin line, having been improperly obtained by the aforementioned calculation method, and have to be corrected in their positions. As explained above, the correction can be achieved by hitting a point to be corrected with a mouse and moving said point to a desired position by setting the amount of movement, for example by keys or a dial.

Ex. 1003, 3:35–60.

Kawai discloses that both a developed view, like Figure 1A, and a three-dimensional view, like Figure 6A, can be displayed simultaneously and that the point train and the connecting lines representing the margin area can be displayed in both views. *Id.* at 3:61–67, Fig. 5. According to Kawai, the correction operation may be conducted in either view and is displayed simultaneously in both views. *Id.* at 3:67–4:10.

Figure 3 of Kawai is reproduced below:

FIG. 3



Kawai Figure 3 shows a development view of the shape of an abutment tooth, with corrected points connected by straight lines. Ex. 1003, 4:11–14. Kawai discloses that the corrected point train is converted into three-dimensional data and formed as a curve that corresponds to the margin line. *Id.* at 4:20–23, Fig. 1B. Kawai explains that the margin line can be registered in the shape data of the abutment tooth and used to design the artificial crown. *Id.* at 4:23–30. According to Kawai, the disclosed method streamlines the extraction of a margin line and provides improved durability of the dental prosthesis due to improved accuracy of the margin line. *Id.* at 4:31–38.

2. Baba (Ex. 1004)

Baba discloses a method of designing a dental prosthesis model, such as a bridge or a crown, using a computer. Ex. 1004, (57), 1:7–10. Baba acknowledges that CAD/CAM techniques are known for making dental prostheses. *Id.* at 1:20–30. Baba discloses a method for designing dental prostheses easily and efficiently using a database that stores models of individual teeth, rather than models of each crown, pontic, and bridge. *Id.* at 1:31–47, 2:42–57, 4:9–28.

Baba discloses a method and a corresponding computer program for producing a crown model (Ex. 1004, 1:56–2:10, 2:58–3:28) and a method and a corresponding computer program for producing a bridge model, including both crown and pontic models (*id.* at 2:11–41, 3:29–4:8).[6]

[6] Baba explains that a "pontic model" refers to "a model of an artificial tooth to fill an intermediate position (i.e., position corresponding to a lost tooth without an abutment tooth) of a bridge." Ex. 1004, 5:6–9. Baba explains that a "crown model" refers to "a model of a dental prosthesis (artificial

Baba discloses a dental prosthesis model designing program for performing a series of steps, including: (i) displaying a dentition configuration diagram; (ii) reading out pontic model data from a database; (iii) making crown model data indicating a crown region; (iv) displaying a crown model and a pontic model superimposed on the dentition configuration diagram; (v) deforming each of the crown and pontic models so that each forms a desired gap with respect to pairing and adjacent teeth and a gum; and (vi) connecting the crown and pontic models to each other so as to make a bridge model. *Id.* at 6:59–7:22, Fig. 3. Baba discloses that the dentition configuration diagram is produced from dentition configuration data obtained by measuring a three-dimensional configuration of upper and lower jaw dentitions of a subject. *Id.* at 5:21–31, 6:61–67, 8:47–59. Baba explains that "configurations of teeth surrounding the teeth to which the bridge is attached . . . are measured and . . . represented on the display." *Id.* at 8:59–62.

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crown) to be mounted on a broken tooth (abutment tooth)" and a "bridge model" refers to "a model of an artificial bridge in which at least one pontic model and at least one crown model are connected to each other." *Id.* at 5:15–20.

Baba Figure 8A is reproduced below.

Fig.8A

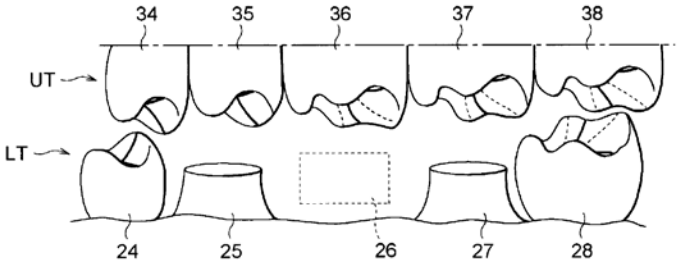
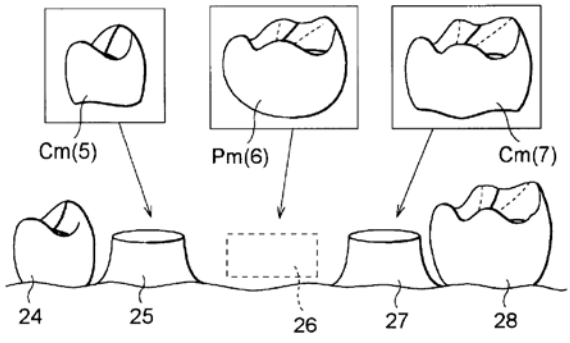


Figure 8A shows an example of a dentition configuration as displayed according to Baba's method. Ex. 1004, 6:5–8. Figure 8A shows upper jaw UT with teeth 34–38 and lower jaw LT with abutment teeth 25 and 27 adjacent to lost tooth 26 and teeth 24 and 28 adjacent to the abutment teeth. *Id.* at 8:59–67. A bridge can be attached to the abutment teeth. *Id.* at 8:65-67, Fig. 8B.

Figure 9 of Baba is reproduced below:

Fig.9

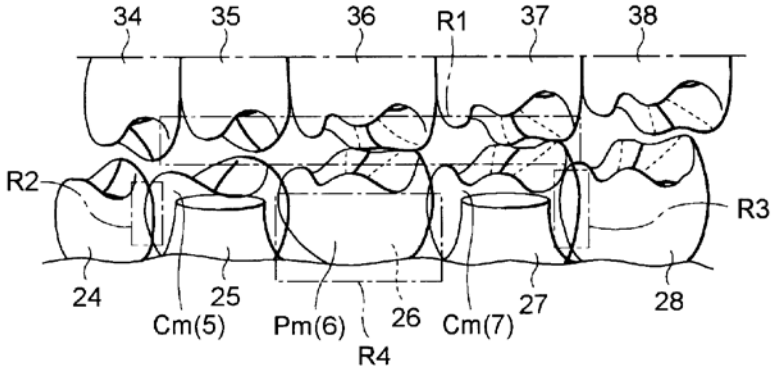


Baba Figure 9 shows an example of pontic and crown models and a dentition to which they are attached. Ex. 1004, 6:10–12. Baba explains that pontic model $P_{m(6)}$ is used to replace lost tooth 26 and crown models $C_{m(5)}$ and $C_{m(7)}$

are attached to the abutment teeth 25 and 27. *Id.* at 9:5–9. According to Baba, crown models $C_{m(5)}$ and $C_{m(7)}$ are generated by deforming pontic model data $P_{m(5)}$ and $P_{m(7)}$ corresponding to teeth 25 and 27. *Id.* at 9:9–19. Baba discloses that "[t]his deformation is effected by eliminating the base region $B_{(n)}$ below the margin line ML in each of the pontic models $P_{m(5)}$ and $P_{m(7)}$." *Id.* at 9:13–15; *see also id.*at Fig. 4A (showing pontic model P_m with base region $B_{(n)}$ and margin line ML).

Figure 10 of Baba is reproduced below:

Fig.10



Baba Figure 10 shows an example of upper and lower jaw dentitions to which pontic and crown models are attached according to the superimposition displaying step of Baba's method. Ex. 1004, 6:13–16. Baba Figure 10 shows crown models $C_{m(5)}$ and $C_{m(7)}$ superimposed on their respective abutment teeth 25 and 27 and pontic model $P_{m(6)}$ superimposed in place of lost tooth 26. *Id.* at 9:20–30. In this state, each model can be deformed to avoid interference with the pairing and adjacent teeth and to align the margin lines of the crown models with the margin lines of the corresponding abutment teeth. *Id.* at 9:30–62, Figs. 11, 12.

According to Baba, the disclosed method can be used to design a bridge model on a computer, and the model can be used to manufacture a bridge. *Id.* at 10:16–20.

E. Petitioner's Obviousness Ground

Petitioner contends that claims 1–9 and 11 of the '065 patent are unpatentable as obvious under 35 U.S.C. § 103(a) over Kawai in view of Baba. Pet. 27–74. Patent Owner opposes. Prelim. Resp. 9–40, 50–64. We address the parties' arguments below.

Petitioner presents its obviousness contentions in two parts. First, it provides an element-by-element analysis, identifying disclosures in Kawai and Baba that Petitioner contends correspond to each element of claims 1–9 and 11. Pet. 27–59. Second, Petitioner provides an explanation of why the claims would have been obvious, identifying four claim elements that Patent Owner may contend are missing from Kawai and asserting that these four elements are well known, taught by Baba, or both. *Id.* at 59–74. In this section, Petitioner provides its contentions regarding a reason or motivation to modify Kawai with well-known features and to combine the teachings of Kawai and Baba. *Id.* at 61, 66, 66–73.

Regarding claim 1, for example, Petitioner contends that Kawai discloses all but two claim features. Pet. 28–36, 38–41, 59, 60, 64. First, Petitioner asserts that Kawai does not expressly identify a "dental practitioner" as the person who provides input used to obtain second finish line data, as recited in claim element 1.3. *Id.* at 59, 60. Petitioner contends this feature is well known and a POSITA would have been motivated to have a dentist act as the user in Kawai's process. *Id.* at 60–64. Second, Petitioner states that Patent Owner may allege that the terms "its

surroundings" and "dentition," as recited in claim elements 1.1, 1.2, and 1.4, require more than the tooth preparation (abutment tooth) disclosed by Kawai and shown, e.g., in Kawai Figure 2A. *Id.* at 31–32, 59, 64. For this claim limitation, Petitioner relies on Baba's disclosure of providing 3D data of the tooth preparation together with its surroundings and superimposing prosthesis models (such as a crown model) on such displayed data. *Id.* at 33–34, 36–37, 41-43, 64–66 (relying on Baba Figs. 8A, 9, and 10).

Petitioner explains why it would have been obvious to modify Kawai to provide data of the abutment tooth together with surrounding teeth and to superimpose the prosthesis model (including the finish line) on such data of the abutment tooth and its surrounding teeth, addressing both motivation to combine and reasonable expectation of success. Pet. 66–70. For example, Petitioner contends a POSITA would have been motivated to combine the references "at least because Baba virtually models the crown $C_{m(n)}$ in relation to the adjacent virtual teeth and gum(s) to beneficially allow the user to easily view and adjust the interferences and desired gaps between the virtual crown model $C_{m(n)}$ and adjacent virtual teeth and gum." *Id.* at 67 (citing Ex. 1004, 2:8–10, 9:28–40, 8:60–63; Ex. 1012 ¶¶ 146, 147).

In the Preliminary Response, Patent Owner focuses on alleged deficiencies in Kawai pertaining to the "second finish line data" recited in elements 1.3 and 1.4 of claim 1. Prelim. Resp. 17–36. Patent Owner does not dispute Petitioner's contention that Kawai teaches the preamble and elements 1.1 and 1.2 of claim 1, including "generating first finish line data," but does not teach a "dental practitioner," "its surroundings," and "dentition" that includes more than an abutment tooth. Patent Owner also does not dispute Petitioner's contention that it would have been obvious for a dentist

to act as the user in Kawai's process. Nor does Patent Owner dispute Petitioner's contention that Baba teaches the "its surroundings" and "dentition" limitations. Although Patent Owner argues that the combination of Kawai and Baba is the product of hindsight bias (Prelim. Resp. 2, 17, 36, 39), that argument focuses on the difference between Baba's margin line and the margin line of Kawai and the '065 patent (*id.* at 36–39). Patent Owner does not contest the sufficiency of Petitioner's reasons or motivations for combining Baba's teaching of the "its surroundings" and "dentition" limitations with Kawai's teaching of a method for defining a finish line of a dental prosthesis.

According to Patent Owner, Kawai fails to teach elements 1.3 and 1.4 of claim 1 (and the corresponding limitations of claims 7 and 11) because Kawai teaches only "first finish line data" and fails to teach "second finish line data determined on the basis of input received from a dental practitioner." Prelim. Resp. 17–36. Patent Owner argues that "Kawai's correction operation is fundamentally different from lines drawn by a dentist or generated automatically by software based on indication of a series of dots by the dentist." *Id.* at 25. Patent Owner's argument rests on a distinction between "a dentist indicating a series of ***new dots*** onto 3D or 2D images," as in the '065 patent, and "Kawai's correction operation of moving existing points to ***new positions*** in a 2D developed view." *Id.* at 30 (emphasis added); *see also id.* at 33 ("any data in Kawai would, at best, only represent the new positions of existing points and not input from a dentist or software").

In addition, Patent Owner argues that the Petition suffers from "procedural errors," including: (a) insufficient explanation as to why or how

the cited portions of the applied references teach the claim features; (b) failure to indicate what claim features are missing from Kawai before moving on to Baba; (c) lack of clarity as to which reference is relied upon for each claim feature; and (d) failure to prove that the '065 patent admits that it is conventional and well-known for a dentist to provide input for determining the margin line. Prelim. Resp. 50–63. Patent Owner additionally argues that the Petition is merely unsupported attorney arguments because the Saber Declaration substantially parrots the Petition and should not be given any weight. *Id.* at 63–64.

After considering the Petition and the Preliminary Response, we are persuaded Petitioner has identified with sufficient particularity where and how it contends each claim limitation is taught by the prior art. We are also persuaded that Petitioner has identified with sufficient particularity which claim features are or may be missing from Kawai and which reference Petitioner relies upon to teach each claim element. Furthermore, we are persuaded that, for purposes of institution, Petitioner's evidence is sufficient on the issue of whether it was conventional and well-known in the prior art for a dentist or dental technician to provide input for determining the margin line, even absent any such admission in the '065 patent. Pet. 14–15, 60 (citing Ex.1003, 1:15–44).[7] We are persuaded that, for purposes of institution, Petitioner's obviousness arguments are adequately supported by

[7] At this stage of the proceeding, there is no contrary evidence from Patent Owner. If Patent Owner submits such evidence during trial, we will consider it along with Petitioner's evidence and determine whether Petitioner has established its factual contention by a preponderance of the evidence.

the evidence it relies upon, including Kawai, Baba, and the Saber Declaration. At this stage, it is premature to determine how much weight to give to the Saber Declaration.

At this stage and for purposes of institution, we are persuaded Petitioner has sufficiently supported its contention that Kawai teaches or suggests "second finish line data determined on the basis of input received from a dental practitioner." Pet. 38–39. At this stage and before considering any evidence from Patent Owner, we are persuaded that Petitioner has demonstrated sufficiently that this claim limitation is taught or suggested by Kawai's "correction operation" and that Petitioner's evidence sufficiently supports its contention that "[t]he new positions of the points after being moved in the 'correction operation' constitute new, 'second' finish line data." Pet. 39 (citing Ex. 1003, 3:35–40). Based on the record before us, it is not clear how the claim limitation can encompass a dentist indicating a series of dots onto a 2D image, which the software connects into a continuous finish line (Ex. 1001, 5:64–67) and at the same time exclude Kawai's "correction operation" in which a user moves existing points to new positions in a 2D developed view (Ex. 1003, 3:35–60). Because the '065 patent discloses the former as an example of "second finish line data determined on the basis of input received from a dental practitioner," Kawai's "correction operation" seemingly would likewise fall within the scope of the claim limitation, absent contrary evidence or persuasive explanation in the record. In both instances, user input is provided in the form of dots or points in a graphical user interface, and the user input is used to determine second finish line data. Patent Owner argues: "the end result of a dentist's input in the '065 Patent is not merely a series of dots, but

rather, a new, second finish line automatically generated before it is used to update the first finish line." On this record, Patent Owner's argument appears to read an extraneous requirement into the claim, which recites "second finish line data determined on the basis of input received from a dental practitioner," not a new, second finish line automatically generated.

Accordingly, after considering the Petition and the Preliminary Response, we determine that Petitioner's arguments and evidence are sufficient to show a reasonable likelihood of prevailing on its contention that claims 1–9 and 11 of the '065 patent are unpatentable as obvious over Kawai in view of Baba.

F. Section 325(d)

Patent Owner argues that we should deny institution pursuant to 35 U.S.C. § 325(d) because the Office already considered Kawai and Baba during prosecution. Prelim. Resp. 40–50. Petitioner disagrees. Pet. 75–78.

Under § 325(d), we have discretion to deny a petition that presents the same or substantially the same prior art or arguments as previously presented to the Office. 35 U.S.C. § 325(d). In evaluating whether the factual predicate under § 325(d) is met, the Board has considered a number of non-exclusive factors, including, for example:

> (a) the similarities and material differences between the asserted art and the prior art involved during examination;
>
> (b) the cumulative nature of the asserted art and the prior art evaluated during examination;
>
> (c) the extent to which the asserted art was evaluated during examination, including whether the prior art was the basis for rejection;

> (d) the extent of the overlap between the arguments made during examination and the manner in which Petitioner relies on the prior art or Patent Owner distinguished the prior art;
>
> (e) whether Petitioner has pointed out sufficiently how the Examiner erred in its consideration of the asserted prior art; and
>
> (f) the extent to which additional evidence and facts presented in the Petition warrant reconsideration of the asserted prior art or arguments.

Becton, Dickinson and Co. v. B. Braun Melsungen AG, IPR2017-01586, slip op. at 17–18 (PTAB Dec. 15, 2017) (Paper 8) (informative) ("the *Becton Dickinson* factors").

Becton Dickinson factors (a)–(d) relate to whether—and to what extent—the Examiner considered and relied upon the prior art and arguments asserted in the Petition. Here, the references relied upon by Petitioner—Kawai and Baba—were before the Examiner (*see* Ex. 1001, (56)), but neither reference was substantively discussed or applied by the Examiner in any office action, nor addressed by the Applicant in any office action response. The challenged claims were allowed in a first office action, and no reasons for allowance were provided. Ex. 1002, 78, 94. Although the Examiner rejected other claims, including over prior art (*id.* at 93–94), there is no argument that Kawai or Baba is cumulative of the prior art applied by the Examiner. Kawai is discussed in the Specification of the '065 patent. Ex. 1001, 1:64–2:5, 5:30–46. The Specification does not, however, mention Kawai's "correction operation" (*id.* at 3:35–60), which we find to be at the heart of the issue of whether the challenged claims are patentable over Kawai and Baba. *See, e.g.*, Prelim. Resp. 1 (arguing there is a "fundamental difference between Kawai's correction operation and the '065 patent's input of a new finish line").

Becton Dickinson factors (e) and (f) look to the Petition and whether Petitioner has made a case for reconsidering the asserted prior art. Here, there is no record that Kawai and Baba were substantively considered by the Examiner during prosecution. Even so, for the reasons discussed in the section II.E. above, we determine Petitioner has demonstrated a reasonable likelihood that the Examiner erred in failing to reject the claims over the combination of Kawai and Baba and that reconsideration of patentability over these references is warranted.

Accordingly, we decline to exercise our discretion to deny review under § 325(d).

III. CONCLUSION

For the reasons stated above, we institute an *inter partes* review as set forth in the Order. At this stage of the proceeding, the Board has not made a final determination with respect to the patentability of any challenged claim or any underlying factual or legal issues.

IV. ORDER

It is

ORDERED that, pursuant to 35 U.S.C. § 314(a), an *inter partes* review of claims 1–9 and 11 of the ’065 patent is instituted with respect to the ground of unpatentability asserted in the Petition; and

FURTHER ORDERED that pursuant to 35 U.S.C. § 314(a), *inter partes* review of the ’065 patent is hereby instituted commencing on the entry date of this Order, and pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4, notice is hereby given of the institution of trial.

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