IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF GEORGIA

3SHAPE A/S, Plaintiff, v. CARESTREAM DENTAL, LLC, DENTAL IMAGING TECHNOLOGIES CORP., and DENTAL IMAGING TECHNOLOGIES CORP. d/b/a DEXIS Defendants.	§ § § § § § § § § § § § § § §	Civil Action No. 1:22-cv-01829-WMR

DITC'S OPENING CLAIM CONSTRUCTION BRIEF
<u>REGARDING THE DITC ASSERTED PATENTS</u>

3SHAPE EXHIBIT 1015
3Shape v. DITC
IPR2024-00549

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Exhibit No.	Description
Ex. 1	Declaration of Robert Stevenson, Ph.D.
Ex. 2	Declaration of Maryann Lehmann, D.D.S.
Ex. 3	Excerpt of Stedman's Medical Dictionary for the Dental Professions (1st ed. 2007)
Ex. 4	Excerpt of Handbook of Computer Vision and Applications, Volume 1 (1999)
Ex. 5	Excerpt of Modern Dictionary of Electronics (7th ed. 1999)
Ex. 6	Excerpt of File History for U.S. Pat. No. 10,076,391

I. INTRODUCTION

DITC submits this opening brief concerning claim construction of DITC's counterclaim patents, U.S. Pat. Nos. 10,076,391 (the "'391 patent") and 11,234,798 (the "'798 patent"), which relate to intraoral scanning technology.

The vast majority of disputed terms have well-understood meanings and are accessible to a jury without further construction. For several terms, DITC proposes constructions consistent with a POSA's understanding in light of the intrinsic and extrinsic evidence.

Where 3Shape actually proposes a construction, it generally seeks to re-write the claims or import limitations from the specification in contravention to black letter law. And for ***sixteen*** terms, 3Shape attempts to obtain early summary judgment with "see-what-sticks" indefiniteness arguments.

DITC respectfully requests that the Court reject 3Shape's indefiniteness arguments and litigation-driven constructions, and instead adopt DITC's plain-meaning proposals.

II. THE '798 PATENT

A. Technology Overview

The '798 patent relates to systems, methods, and computer readable media for generating an intra-oral scan of teeth in a patient's mouth. '798 patent at 1:50-52. It involves, *inter alia*, generating a contiguous scan of an occlusal surface of at least a part of one arch of the dentition, removing soft tissue, and stitching the at

least one additional surface (e.g., labial or lingual surfaces) to the contiguous scan of the occlusal surface. *Id.* at 1:52-55.

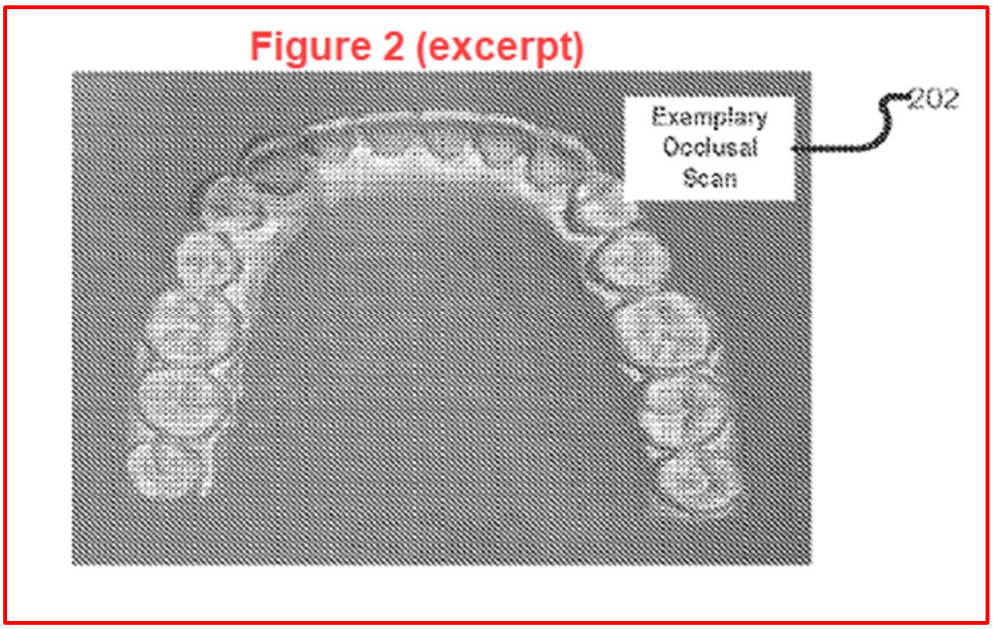
B. Disputed Terms

1. "occlusal surface" (claims 1-4, 6, 8-12, 14-15, 18, and 20)

DITC's Proposed Construction	3Shape's Proposed Construction
Plain and ordinary meaning.	"the biting surface of a patient's teeth"

The term "occlusal surface" requires no construction. It is a common term that a person of ordinary skill in the art ("POSA")[1] would have understood as the most precise descriptor of itself. Generally, a POSA would have understood the term as referring to the tooth surface which "occludes" or contacts with an opposing tooth surface in the opposing jaw in a clenched position. Ex. 1 at ¶¶29-35 [Stevenson Decl.]; Ex. 2 at ¶¶13-15 [Lehmann Decl.]. The '798 patent uses "occlusal surface" consistent with its ordinary meaning. Figures 2 and 3 depict occlusal scans 202 and 302, respectively, as scans of surface which would occlude with opposing teeth surfaces on the opposing jaw. '798 patent at 5:42-54, 5:55-65.

[1] A person of ordinary skill in the art ("POSA") as of the effective filing date of the '391 and '798 patents would have had a bachelor's degree in Computer Engineering, Computer Science, Electrical Engineering, Physics, or an equivalent field, as well as at least two years of work experience, or alternatively, at least five years of comparable industry experience in the field of imaging and/or image scanning including 3D imaging systems and 3D modeling techniques. Additional education reduces the threshold for years of experience in the field, and vice versa. Ex. 1 at ¶¶ 25-26, 64-65.



Likewise, Figure 9 shows an example of an occlusal scan of the same surface. *Id.* at 9:13-23. The intrinsic evidence is consistent with the plain and ordinary meaning throughout the '798 patent. *See also* '798 patent at 2:1-45, 2:55-56, 6:20-7:13, 8:5-32, 9:46-67, 10:16-51, 11:24-55, 12:1-46. The extrinsic evidence confirms "occlusal surface" is a common dentistry term and refers to the tooth surface that occludes with or contacts an opposing tooth surface in the opposing jaw. Ex. 3 ("occlusal surface of tooth" means "tooth surface that occludes with or contacts an opposing tooth surface in opposing jaw").

3Shape's proposal that "occlusal surface" be construed as "the biting surface of a patient's teeth" is unsupported and incorrect. "Biting surface" is not used in the '798 patent or the prosecution history. And 3Shape did not identify any extrinsic evidence suggesting that the "occlusal surface" is the "biting surface."

Thus, 3Shape's proposed construction is likely to confuse terminology and the jury and should therefore be rejected.

2. "contiguous scan of an occlusal surface" / "the contiguous scan" / "the contiguous scan of the occlusal surface" (claims 1-3, 6, 8-11, 14-15, 18-20)

DITC's Proposed Construction	3Shape's Proposed Construction
Plain and ordinary meaning.	"a scan of an/the occlusal surface made in a single, uninterrupted motion of the scanning wand"

These terms should be given their plain and ordinary meaning.[2] Here, the parties' dispute focuses on the meaning of "contiguous scan." DITC contends that it should have its plain and ordinary meaning. 3Shape argues the term should have a special definition, focused not on what it is but ***how*** the scan is performed.

A POSA would have understood "contiguous scan" to refer to a scan in which the component image frames are next to one another in sequence (with or without overlap between the neighboring frames). Ex. 1 at ¶¶37-38. Scans are comprised of frames, *id.* at ¶40, and "contiguous" is a plain English word (*e.g.*, the 48 "contiguous" United States of America) that indicates things are next to one another. *Cf. Honeywell Inc. v. Victor Co. of Japan, Ltd.*, 298 F.3d 1317, 1324 (Fed. Cir. 2002) ("the most common meaning of 'contiguous' connotes actual contact"). Contiguous scans are not unique to this context. Ex. 1 at ¶39. For example, in the

[2] As discussed above, "occlusal surface" is a well-known term that does not require construction.

context of other image scanning (*e.g.*, computer tomography scanning), "contiguous scan" indicates that the scan covers physically adjacent areas of the surface without gaps. *Id.* The specification uses the term consistently, and further makes plain that the neighboring frames may (but are not required to) overlap. *E.g.*, '798 patent at 6:34-38; *see also* '798 patent at 1:50-64, 2:40-45, 3:50-53, 6:20-36, 12:01-15, 12:26-40.

3Shape's proposal is incorrect for several reasons. First, nothing in the '798 patent or relevant technology warrants a special definition. The technological context counsels against 3Shape's proposal. Ex. 1 at ¶¶41-42. A POSA would have understood that the ordinary usage of intraoral scanners (in 2013 and still today) typically involves some degree of interruption and re-tracing of a scan. Ex. 2 at ¶¶16-21; Ex. 1 at ¶43. Given this technological limitation, a POSA would have additional reason to understand that "contiguous" refers to the frames of the scan and would not read an "uninterrupted motion" requirement into the claims.

Relatedly, 3Shape's proposal is incorrect because it improperly limits the claim to a single embodiment in the specification. *Liebel-Flarsheim Co. v. Medrad, Inc.*, 358 F.3d 898, 906 (Fed. Cir. 2004) ("Even when the specification describes only a single embodiment, the claims of the patent will not be read restrictively unless the patentee has demonstrated a clear intention to limit the claim scope using 'word or expressions of manifest exclusion or restriction.'"). In doing so,

3Shape imports the aspirational requirement for "a single, uninterrupted motion." 3Shape draws that language from discussion of a particular embodiment described with reference to Figure 4. '798 patent at 6:9-25. 3Shape's proposal should be rejected because "courts must take care not to import limitations into the claims from the specification." *E.g.*, *Abbott Labs v. Sandoz, Inc.*, 566 F.3d 1282, 1288 (Fed. Cir. 2009). No exception applies here: there is no plain indication that the applicant intended for the terms to have a narrower construction than their ordinary meaning. *Id.*

3. "image data" (claims 1, 9, 10, 18, 19, 20)

DITC's Proposed Construction	3Shape's Proposed Construction
Plain and ordinary meaning.	Indefinite.

The term "image data" is definite and should be given its plain and ordinary meaning. A POSA would have understood that "image data" refers to data that can be used to generate an image. Ex. 1 at ¶44. It is evident from the claims themselves that "image data" is used in its ordinary manner. For example, Claim 1 recites "image data of soft tissue from the contiguous scan of the occlusal surface." This refers to the data that can be used to generate an image of soft tissue from the contiguous scan of the occlusal surface. A POSA would have readily understood this basic term without any further elaboration. *Id.* at ¶¶44-46. Likewise, courts have adopted DITC's position that this basic term requires no construction. *See, e.g.*, *Graphics Properties Holdings, Inc. v. ASUS Computer Int'l, Inc.*, 2014 WL

4929340, at *21 (D. Del. Sept. 29, 2014) ("image data" given its plain and ordinary meaning).

3Shape has not yet provided any detail on why it believes "image data" is indefinite. But DITC's position is confirmed by 3Shape's own extrinsic evidence and 3Shape's own asserted patent. The '146 patent, which 3Shape asserted against DITC in this case, uses the term "image data" without definition. *E.g.*, U.S. Pat. No. 11,076,146 at 4:29-35, 11:66-12:1. Furthermore, 3Shape produced a copy of Handbook of Computer Vision and Applications, Volume 1 (Sensors and Imaging), which uses the term "image data" consistent with its plain and ordinary meaning. *See, e.g.*, Ex. 4 at 212 (referring to strategy for acquiring and processing "minimum amount of image data" for an image); *id.* at 338 (referring to a "3-D representation of a spark as reconstructed from the linescan image data"); *id.* at 348 (stating that scanning electron microscopy involves the loss of 3-D object information which "has to be restored by analysis and interpretation of the image data").

4. "image frames" (claims 1, 3, 10, 14)

DITC's Proposed Construction	3Shape's Proposed Construction
Plain and ordinary meaning.	Indefinite.

The term "image frames" is definite and should be given its plain and ordinary meaning. While arguing that this term is indefinite, 3Shape affirmatively

uses the term "image frames" in its proposed definition of "occlusal backbone."[3] A POSA would have understood that "image frame" refers to an image in a sequence of images. Ex. 1 at ¶¶47-49. The '798 patent uses the terms "image frame" and "frame" according to their ordinary meaning. The specification explains that in a scan of the occlusal surface, "hundreds or thousands of image frames may be acquired" and that "[s]uccessive frames may have overlapping regions of the occlusal surface." '798 patent at 6:34-38.

Figure 6, for example, "illustrates an exemplary sequence of occlusal frames." *Id.* at 8:5-6. In this embodiment, the occlusal frames (numbered F1-F11) are taken "while traversing the occlusal surface of the dental arch, and each occlusal frame encompasses part of a tooth, a single tooth, or a plurality of teeth." *Id.* at 8:6-13. "There is overlap of the occlusal surface between two successive frames. For example, both frame F1 and frame F2 may image a section of the same tooth." *Id.* at 8:13-15. In addition to these representative examples, the '798 patent uses the term "image frame" uniformly to refer to one image in a series of images from a scan. *See, e.g.*, '798 patent at 2:01-45, 4:03-47, 4:50-8:04, 8:05-9:12, 9:14-

[3] Here, 3Shape argues "image frames" is indefinite. Yet, 3Shape argues "occlusal backbone" should be defined as "a three dimensional surface representation of the occlusal surface generated by merging overlapping ***image frames*** of the occlusal scan." This plainly indicates that in the context of the '798 patent, even 3Shape cannot credibly argue that "image frames" is indefinite.

12:54, 12:55-62.

Again, 3Shape's extrinsic evidence and own patent confirms that "image frames" is a well-known, definite term. 3Shape's '146 patent uses "frame" without definition ('146 patent at 8:4-8, 17:53-55, 17:58-60, cl. 16) and 3Shape's extrinsic evidence states that a "frame" is "a complete image in a video sequence." Ex. 4 at 194. Other technical dictionaries further confirm DITC's understanding. *E.g.*, Ex. 5 at 145 ("frame" means "7. A single image of the connected multiple images on motion-picture film."). Unsurprisingly, other courts considering this term have held it requires no construction. *E.g.*, *VDPP LLC v. Vizio, Inc.*, 2021 WL 3621887, at *5 (C.D. Cal. Apr. 5, 2021) ("image frame" received plain and ordinary meaning and did not require construction).

5. "a scan of at least one additional surface" / "the at least one additional surface" (claims 1, 3, 10, 14)

DITC's Proposed Construction	3Shape's Proposed Construction
Plain and ordinary meaning.	"a subsequent additional scan of a surface (e.g. labial, lingual surface) to the contiguous scan of the occlusal surface"

This limitation can be readily understood, and 3Shape's attempt to re-write it should be rejected. "A scan of at least one additional surface" means exactly what it says: it refers to a scan of at least one surface other than the occlusal surface (the scan also may include images of the occlusal surface as required by claim 1). That is how a POSA would have understood it. *See* Ex. 1 at ¶¶50-56.

The specification is entirely consistent with this plain and ordinary meaning. Ex. 1 at ¶51. It explains that "the at least one additional surface" may include labial and/or lingual surfaces and that parts of the occlusal surface may be included in the labial and/or lingual scans to associate those other surfaces with the occlusal surface. '798 patent 1:56-64. Likewise, in connection with Figures 18 and 19, the '798 patent describes how the inventions associate and stitch at least one additional surface (e.g., labial or lingual surface) to the occlusal surface. *Id.* at 12:16-67.

3Shape's proposal attempts to import a temporal requirement for the scans by requiring a "***subsequent*** additional scan." In fact, the claims do not require that the scan of the occlusal surface occur before or after a scan of an additional surface. The claims should not be so limited. *Abbott*, 566 F.3d at 1288 ("[C]ourts must take care not to import limitations into the claims from the specification."). Moreover, claims 4 and 12 show that the claim drafters knew how to incorporate a temporal requirement when desired (*i.e.*, the limitation: "wherein the occlusal surface is imaged ***prior to*** the plurality of labial and lingual surfaces"). The fact that no such requirement was included in claims 1 and 10 confirms that 3Shape's construction is incorrect and claims 1 and 10 are not so limited. Ex. 1 at ¶¶54-55.

6. "analyzing the scan data to identify a portion of the scan of the at least one additional surface that overlaps with a portion of the contiguous scan of the occlusal surface" (claims 1, 10)

DITC's Proposed Construction	3Shape's Proposed Construction
Plain and ordinary meaning.	Indefinite.

This limitation requires no construction. The phrases "contiguous scan of the occlusal surface" and "a scan of at least one additional surface" are addressed in sections above (*supra* pp. 4-6, 9-10). The remainder of this limitation is everyday English for which the jury does not need clarification. Ex. 1 at ¶57. 3Shape has not explained the basis for its indefiniteness position. However, because 3Shape has proposed definitions for the remainder of the limitation, DITC understands 3Shape to be contending "analyzing the scan data" is somehow indefinite.

A POSA would have understood that this limitation refers to analyzing data from the contiguous scan of the occlusal surface and a scan of at least one additional surface to identify portions of the scans that overlap. Ex. 1 at ¶¶59-60. This is informed by the claims themselves. Claims 1, for example, requires that "the scan of the at least one additional surface includes a plurality of image frames including a plurality of image frames of the occlusal surface interspersed with a plurality of image frames of the at least one additional surface [e.g., labial or lingual surface]." '798 patent at cl. 1, 10. A POSA would have understood the recited "analyzing" is to locate overlap between the images of the occlusal surface included in "the scan of the at least one additional surface" and the images of the occlusal surface from the "contiguous scan of the occlusal surface." Ex. 1 at ¶¶59-60.

The specification teaches exactly this. For example, Figure 11 shows an "embodiment, in which by moving the wand 108 in a hook shaped pattern or in accordance with other predetermined patterns, a plurality of segments of the labial and lingual surfaces are obtained, where each segment also includes portions of the occlusal surface that may be used to map the lingual and labial segments to the occlusal backbone." '798 patent at 10:6-15. Figures 12-14 further show how the segments of labial and lingual surface are stitched to the occlusal backbone. *Id.* at 10:16-51. Figure 15 provides a flowchart that shows "how an accurate backbone is generated by selecting frames that overlap by a determined amount (e.g., 50% overlap) and by removing areas that represent the tongue, cheek, and lips, and how labial and lingual scans are attached to the occlusal backbone to display a three-dimensional reconstruction of the dental arch, in accordance with certain embodiments." *Id.* at 10:52-65. Other embodiments also describe that the overlap is used to combine additional surfaces to the contiguous scan of the occlusal surface. *E.g.*, '798 patent at 11:24-32; 11:33-55; 11:56-67; 12:1-15; 12:16-30.

7. "occlusal backbone" (claims 6, 15, 17-18)

DITC's Proposed Construction	3Shape's Proposed Construction
"Three dimensional representation of the occlusal surface"[4]	"a three dimensional surface representation of the occlusal surface

[4] In the interest of narrowing the issues for dispute, DITC modified its proposed construction of "occlusal backbone" to include "three dimensional" and

	generated by merging overlapping image frames of the occlusal scan"

A POSA would have understood "occlusal backbone," in the context of the claim language and other intrinsic evidence, to refer to a "three dimensional representation of the occlusal surface." Ex. 1 at ¶61.

The parties agree that an "occlusal backbone" is a three dimensional representation of the occlusal surface. 3Shape's proposal adds a gratuitous "surface" before the term "representation" and imports a requirement that the backbone is "generated by merging overlapping image frames of the occlusal scan." Both of 3Shape's additions are inconsistent with the specification.

First, the inclusion of the adjective "surface" limits the claims to the exclusion of embodiments in the specification. For example, with reference to Figure 8, the patent describes the construction of an "occlusal backbone" using point clouds. '798 patent at 8:53-9:3. The result would be a 3D representation of a surface; however, it would not be a 3D ***surface*** representation of a surface. Ex. 1 at ¶62. Therefore, 3Shape's proposal is too narrow.

3Shape's additional requirement as to how the "occlusal backbone" is generated improperly imports a limitation from the specification and conflicts with

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to remove the phrase ". . . to which other surfaces (e.g., labial or lingual) are mapped and fitted."

other claim language. 3Shape appears to have derived this from discussion of a specific embodiment, which states: "In certain embodiments, the frames of the occlusal scan are merged into an occlusal backbone . . . ." '798 patent at 4:20-24. That however is not the only way the '798 patent describes generating an "occlusal backbone." It also describes how frames may be "stitched" to form an occlusal backbone. *See, e.g.*, '798 patent at 4:25-43, 8:40-52. The words "stitch" and "merge" are not coextensive. Ex. 1 at ¶63. Thus, 3Shape improperly limits the claim to a single embodiment in the specification, to the exclusion of others.

Equally important, 3Shape's proposal is inconsistent with the claims, which already specify how the "occlusal backbone" is generated. Claim 6 requires the processor be configured "to generate an occlusal backbone by matching selected frames of the contiguous scan of the occlusal surface that have an overlap based on an analysis of data." '798 patent at cl. 6. Claim 15 has a similar requirement, *id.* at cl. 15, and claims 16-17 depend from claim 15. Thus, 3Shape's proposed requirement that the occlusal backbone is "generated by merging overlapping image frames of the occlusal scan" should be rejected.

III. THE '391 PATENT

A. Technology Overview

The '391 patent relates to the field of three-dimensional dental imaging and, more particularly, to methods and computerized systems for bite registration using

at least two bite surfaces. ’391 patent at 1:15-18. Bite registration is the process of registering the upper jaw with the lower jaw to establish a 3D spatial positioning relationship between an upper jaw and its corresponding lower jaw in a clenched. *Id.* at 1:31-34. The methods and systems of the ’391 patent improve the accuracy of bite registration. *Id.* at 2:3-5.

B. Disputed Terms

1. “successful bite registration” (claims 1, 13, 18, 20-21) and related terms

DITC’s Proposed Construction	3Shape’s Proposed Construction
Plain and ordinary meaning.	Indefinite.

(a) Related Terms

DITC understands 3Shape to be contending that the five other terms below are indefinite for the same reasons 3Shape contends “successful bite registration” is indefinite. Based on the understanding that 3Shape would be grouping like terms together, DITC does not include separate sections herein for the following disputed terms, but reserves the right to respond to any additional arguments 3Shape might raise with respect to any of these terms:

- “displaying the bite surface together with the 3D teeth models of the upper jaw and the lower jaw aligned with the bite surface is the alignment is successful” (claims 1, 13, 18, 20-21)
- “means for displaying the bite surface together with the 3D teeth models of the upper jaw and the lower jaw aligned with the bite surface if alignment is successful” (claim 13)

- "means for obtaining at least two successful bite registrations corresponding to different displayed bite surface by repeating…" (claim 13)
- "selecting said two or more of the displayed successful bite registrations" (claims 1, 13, 21)
- "means for . . . selecting said two or more of the displayed successful bite registrations" (claim 13)

(b) "successful bite registration"

The term "successful bite registration(s)" is a definite, straightforward term, which should be given its plain and ordinary meaning. As the claims, specification, and prosecution history indicate, a bite registration (or alignment) is successful if the upper and lower jaw models are stitched with the bite surface. By contrast, if the models are not stitched with the bite surface, then the registration (or alignment) is unsuccessful.

The '391 patent explains that "[b]ite registration is the process of registering the upper jaw with the lower jaw . . . ." '391 patent at 1:31-34. It is a concept that existed before the '391 patent, *id.* at 1:35-42, and was understood by POSAs. Ex. 1 at ¶70. Bite registration is "complete[d]" by capturing a bite surface of the clenched teeth, and then stitching 3D teeth models of the upper jaw and lower jaw onto the bite surface. '391 patent at 1:35-42.

The specification provides representative examples showing the difference between successful and unsuccessful bite registrations. Ex. 1 at ¶¶72-74. Figure 7 shows a successful alignment. The upper and lower jaws are "stitched onto the bite

surface [106], which represents one successful bite registration." '391 patent at 5:63-6:1. Figure 7 is reproduced below, with annotation, showing that that the "3D teeth model of the upper jaw [104]" and the "3D teeth model of the lower jaw [105]" were successfully aligned to the bite surface [106]. The large arrows "represent a moving direction of the 3D teeth models of the upper/lower jaws in the process of alignment." *Id.* at 6:6-8.

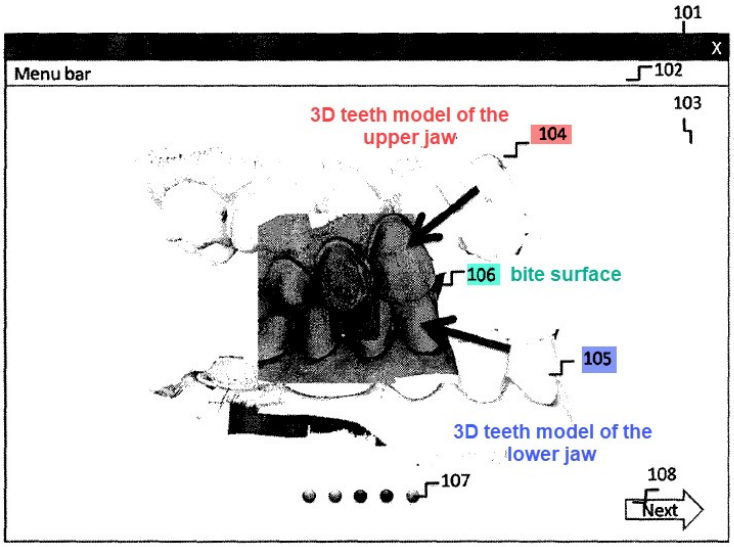

Fig.7

By contrast, Figure 8 depicts an unsuccessful alignment. '391 patent at 6:13-24. In this example, the 3D models of the upper and lower jaws have not been stitched onto the bite surface, which is not shown. Based on these examples, a POSA would have understood a "successful bite registration" refers to when the teeth models are stitched to the bite surface." Ex. 1 at ¶74.

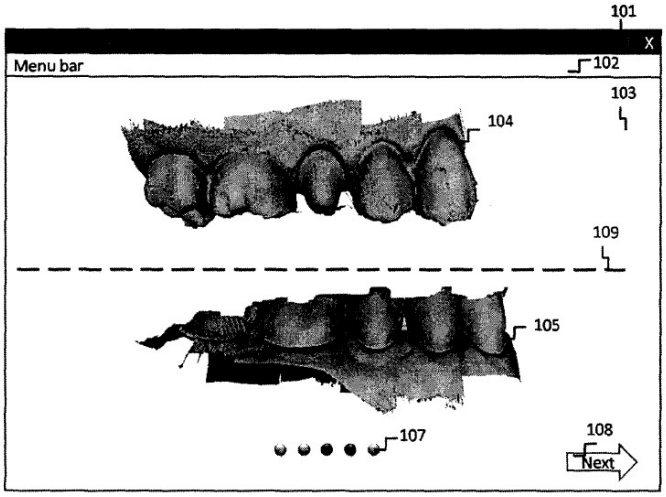

Fig.8

The prosecution history confirms DITC's understanding that a "successful bite registration" is one in which the upper and lower jaws are aligned with the bite surface. For example, in an Office Action, the Examiner stated that a prior art reference disclosed "displaying the bite surface together with the 3D teeth models of the upper and lower jaw aligned with the bite surface if alignment is successful" because "[the] [s]econd figure [of the prior art] shows the upper and lower jaws aligned." Ex. 6, June 15, 2017 Office Action at 6. Based on this Office Action, it is evident the Examiner understood the term and did not find it indefinite.

The structure of the claims also confirms DITC's understanding. Claim 1 requires two or more "successful bite registrations" from which the final bite registration is computed. Ex. 1 at ¶75. This is consistent with the discussion of how the '391 patent improved upon the prior art. *Id.*; '391 patent at 1:15-54.

3Shape has not yet explained why it believes this term is indefinite. DITC

will address 3Shape's arguments when they are presented. Regardless, 3Shape's invalidity claim charts belie any credible indefiniteness argument, as 3Shape purported to identify references that allegedly disclose a "successful bite registration" without any apparent difficulty understanding what the term means.

2. "selecting two or more bite registrations by evaluating at least two successful bite registrations" (claims 1, 13, 18, 20-21) and related terms

DITC's Proposed Construction	3Shape's Proposed Construction
Plain and ordinary meaning.	Indefinite.

(a) Related Terms

DITC understands 3Shape to be contending that "evaluating" is indefinite. In addition to contending that this term – "selecting two or more bite registrations by evaluating at least two successful bite registrations" – is indefinite, DITC understands that 3Shape contends that two other terms below are indefinite for the same reasons. Based on the understanding that 3Shape will be grouping these terms together, DITC does not include separate sections for the following terms, but reserves the right to respond to any additional arguments 3Shape might raise with respect to any of these terms:

- "selecting one or more successful bite registrations by evaluating at least two successful bite registrations" (claim 20)
- "means for . . . evaluating at least two successful bite registrations" (claim 13)

(b) "selecting two or more bite registrations by evaluating at least two successful bite registrations"

This phrase is definite and should be given its plain and ordinary meaning. DITC set forth its understanding of "successful bite registrations" above. *Supra* pp. 16-19. The rest of this phrase is plain English that does not require construction.

The '391 patent uses "evaluating" consistent with its ordinary meaning. It states that, "the respective location of 3D teeth models of the upper jaw and the lower jaw can be evaluated by the user so as to judge whether the bite surface is suitable or not." '391 patent at 6:46-49. "If the mismatch corresponding to the distant end of the bite surface exceeds desired value, the bite surface and its corresponding bite registration are not suitable to be used in the next steps of computation of the final bite registration." *Id.* at 6:49-53. By evaluating the successful bite registrations, the "user can select the bite registrations with optimized transformation in an intuitive way, which can further greatly improve the accuracy of the global 3D teeth model ultimately formed." *Id.* at 6:60-63.

A POSA would have understood this use of "evaluating" to be consistent with the term's plain and ordinary meaning. Ex. 1 at ¶¶77-78. In column 6, the patent describes evaluating or judging the location of the 3D teeth models and the degree of the mismatch in the selection of successful bite registrations for the following computing step. *Id.* at ¶79; '391 patent at 6:39-63.

To the extent that 3Shape argues the claims are indefinite because the bite registrations to be evaluated are already deemed "successful," it is incorrect. A bite

registration is successful if the teeth model is stitched to the bite surface. *Supra* p. 16-19. As the '391 patent teaches, when the successful bite registration is evaluated, it still may be determined that the "the bite surface and its corresponding bite registration are not suitable to be used in the next steps of computation of the final bite registration." '391 patent at 6:49-53.

3. "computing a final bite registration between the teeth models of the upper jaw and the lower jaw using the selected two or more displayed successful bite registrations, and wherein in step e, when repeating to perform step b, the location of the acquired bite surface is changed" (claim 13)

DITC's Proposed Construction	3Shape's Proposed Construction
The last limitation of claim 13 is an obvious patent drafting error and should be omitted from claim 13.	Indefinite.

This limitation (the "disputed limitation") should be omitted from claim 13 because its addition was an obvious clerical error. A POSA would have understood that the claims and prosecution history unambiguously indicate the phrase was inadvertently added through a copy-and-paste error, Ex. 1 at ¶¶80-86, which can and should be judicially corrected by this Court. DITC understands 3Shape to be contending this term is indefinite because it makes claim 13 a mixed method-apparatus claim. Because the limitation should be omitted, however, 3Shape's argument fails.

"A district court may correct obvious minor typographical and clerical errors in patents . . . . if (1) the correction is not subject to reasonable debate based on

consideration of the claim language and the specification and (2) the prosecution history does not suggest a different interpretation of the claims." *Pavo Solutions LLC v. Kingston Technology Company, Inc.,* 35 F.4th 1367, 1373 (Fed. Cir. 2022). Both requirements are met here.

First, nothing in the claims or specification permits reasonable debate of the error. Evaluation of claim 13 indicates the disputed limitation is extraneous. Ex. 1 at ¶81. Side-by-side comparison shows it is duplicative of the preceding limitation, except formatting differences which confirm the limitation is out of place:

Disputed Limitation	Preceding Limitation
computing a final bite registration between the teeth models of the upper jaw and lower jaw using the selected two or more displayed successful bite registrations, and wherein in step e, when repeating to perform step b, the location of the acquired bite surface is changed.	Means for computing a final bite registration between the teeth models of the upper jaw and the lower jaw using the selected two or more displayed successful bite registrations, and wherein in the means for obtaining, the location of the acquired bite surface is changed,

Unlike all other limitations of claim 13, the disputed limitation does not begin with "means for." Additionally, instead of referring to the "means for obtaining," it refers to "step e" and "step b." *Id.* at ¶82. That reference makes no sense within the context of claim 13, which does not contain enumerated steps. It only makes sense in the context of claim 1, from which the disputed limitation was inadvertently copied, as claim 1 does have enumerated steps.

Second, far from "suggest[ing] a different interpretation of the claim," *Pavo*,

35 F.4th at 1373, the prosecution history confirms that the disputed limitation was a copy-and-paste error. In the underlying application, the applicant included then-numbered claim 16 (which eventually issued claim 13 of the '391 Patent). Ex. 6, 8/5/2015 Preliminary Amendment at 5. It did ***not*** include the disputed limitation:

> 16. A system for bite registration, characterized by including:
>
> means for generating 3D teeth models of the upper jaw and the lower jaw;
>
> means for acquiring a bite surface containing a portion of upper and lower jaws simultaneously;
>
> means for attempting to align the 3D teeth models of the upper jaw and the lower jaw with the bite surface;
>
> means for displaying the bite surface together with the 3D teeth models of the upper jaw and the lower jaw aligned with the bite surface if alignment is successful;
>
> means for obtaining at least two successful bite registrations corresponding to different displayed bite surface by repeating;
>
> means for selecting one or more successful bite registrations by evaluating at least two successful bite registrations; and
>
> means for computing a final bite registration using selected one or more successful bite registrations.

The disputed limitation was added in a response to a Non-Final Office Action dated June 15, 2017, when DITC amended then-numbered "claims 1, 12, 16, and 21." Ex. 6, 10/16/2017 Amendment and Remarks. Specifically, Applicant amended another independent claim 1(g), adding the underlined language to read "computing a final bite registration <u>between the teeth models of the upper jaw and the lower jaw</u> using <u>the</u> selected ~~one~~ <u>two</u> or more <u>displayed</u> successful bite registrations, <u>and where in step e, when repeating to perform step b, the location of the acquired bite surface is changed</u>." *Id.* at 2. The quoted language (including the

underlined language) is identical to the disputed limitation.

In addition to claim 1, the applicant made two amendments to then-numbered claim 16. *Id.* at 5. The first was to amend the limitation beginning with "means for computing a final bite registration" to include similar language to the underlined language added to claim 1. This change is logical because it made similar changes to then-numbered claim 16 as it did to claim 1.

The second change, however, was an obvious clerical error. The entire last limitation of claim 1 was copied-and-pasted to then-numbered claim 16 (issued claim 13), including the same underlining and strikethrough from claim 1 (despite the entire limitation being new). Ex. 1 at ¶¶84-86.

16. (Currently Amended) A system for bite registration, ~~characterized by including~~~~comprising~~:

means for generating 3D teeth models of the upper jaw and the lower jaw;

means for acquiring a bite surface containing a portion of at least one tooth of the upper jaw and a portion of at least one tooth of the lower jaw~~s~~ simultaneously;

means for attempting to align the 3D teeth models of the upper jaw and the lower jaw with the bite surface;

means for displaying the bite surface together with the 3D teeth models of the upper jaw and the lower jaw aligned with the bite surface if alignment is successful;

means for obtaining at least two successful bite registrations corresponding to different displayed bite surface by repeating;

means for selecting ~~one~~two or more successful bite registrations by evaluating at least two successful bite registrations and selecting said two or more of the displayed successful bite registrations; and

means for computing a final bite registration between the teeth models of the upper jaw and the lower jaw using the selected ~~one~~two or more displayed successful bite registrations, and wherein in the means for obtaining, the location of the acquired bite surface is changed.

computing a final bite registration between the teeth models of the upper jaw and the lower jaw using the selected ~~one~~two or more displayed successful bite registrations, and wherein in step e, when repeating to perform step b, the location of the acquired bite surface is changed.

This clear record of a typographical error in the '391 patent's prosecution history is precisely the type of correction "not subject to reasonable debate" for which the Federal Circuit has held judicial correction is appropriate. *See, e.g., Hoffer v. Microsoft Corp.*, 405 F.3d 1326 (Fed. Cir. 2005) (reversing district court's ruling that dependent claim 22 was invalid for being indefinite when the prosecution error showed a printing error). Thus, claim 13 of the '391 patent is not indefinite, but should be judicially corrected to remove the disputed limitation.

4. Claim 18

DITC's Proposed Construction	3Shape's Proposed Construction
Plain and ordinary meaning	Indefinite.

DITC understands 3Shape to be contending claim 18 is indefinite because it allegedly mixes apparatus and method limitations. 3Shape is mistaken. Apparatus claims that recite a capability of structure to perform a certain function are not indefinite. *MasterMine Software, Inc. v. Microsoft Corp.*, 874 F.3d 1307, 1316 (Fed. Cir. 2017); *UltimatePointer, LLC v. Nintendo Co., Ltd.*, 816 F.3d 816, 826 (Fed. Cir. 2016).

In *UltimatePointer*, the claim at issue recited a handheld device including an image sensor, "said image sensor ***generating*** data . . . .; and a processor coupled to said handheld device to receive said generated data . . . and programmed to use [the data] . . . to control the feature on the image." 816 F.3d at 819 (emphasis added). The district court found the claim indefinite, reasoning that although the

claim was directed to an apparatus (the handheld device), it also recited a method step ("generating data"). *Id.* at 821-22. The Federal Circuit reversed, explaining that the so-called method step merely reflected the capability of the device, rather than the activities of the user. *Id.* at 826-27. *See also Mastermine*, 874 F.3d at 1312-16 (claim was not indefinite despite reciting a "reporting module" and wherein the module "receives from the user a selection" and "generates a database query" because a POSA would interpret as referring to capability of the apparatus).

Here, it is even clearer than in *UltimatePointer* and *Mastermine* that the limitations in the form of verbs refer to the apparatus's capabilities, not actions of a user. Claim 18 recites a "system for bite registration" including two physical components: (1) "a scanner" and (2) "a computerized workstation." A "computerized workstation" refers to structure including a computer with a processor. '391 patent at 3:60-4:9. The claim requires that the "computerized workstation" be "***configured***" followed by various limitations that begin with the present participle of verbs (e.g., "displaying," "computing"). This indicates that the computerized workstation has the capability to perform those functions, in part because "configured" indicates that a computer is arranged so as to work for a specific application. Thus, the claims are definite, and 3Shape cannot meet its burden of showing by clear and convincing evidence that they are indefinite.

5. "means for computing a final bite registration between the teeth models of the upper jaw and the lower jaw using the selected two or more displayed successful bite registrations" (claim 13)

DITC's Proposed Construction	3Shape's Proposed Construction
Subject to § 112, ¶6 Function: compute a final bite registration between the teeth models of the upper jaw and the lower jaw using the selected two or more displayed successful bite registrations Structure: '391 Patent at 7:12-9:16 and accompanying figures thereto, and equivalents thereof.	Subject to 35 U.S.C. § 112(6) Function: computing a final bite registration between the teeth models of the upper jaw and lower jaw using the selected two or more displayed successful bite registrations Structure: The specification fails to provide adequate disclosure of corresponding structure for performing the claimed function, therefore rendering the term indefinite.

The parties agree this term is subject to 35 U.S.C. § 112, ¶6 and generally agree on the function. The parties disagree about structure, however, as 3Shape contends the term is indefinite. 3Shape is incorrect.

The '391 patent discloses adequate structure "for computing a final bite registration between the teeth models of the upper jaw and the lower jaw using the selected two or more displayed successful bite registrations." Ex. 1 at ¶¶87-89. Specifically, the '391 patent discloses a computerized workstation and associated software. It further provides a description of "step of S180, computing the final bite registration" over the course of three columns, and provides multiple algorithms corresponding to the claimed "computing" function. *Id.* at 3:45-4:9,

7:12-9:16. First, the '391 patent describes an embodiment in which "the computation of the final bite registration employs multiple matrix interpolation of the selected bite registrations." *Id.* at 7:15-38. Figure 9, and its accompanying discussion, discloses an exemplary algorithm for this function.

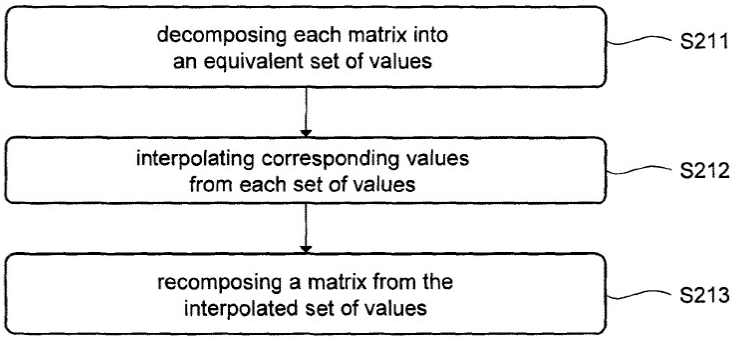

Fig.9

The description of this embodiment also incorporates additional detail on how to perform the matrix interpolation through the link: http://dev.w3.org/csswg/ css3-transforms/#matrix-interpolation. Based on the '391 patent's description, a POSA would have understood how the "computing" step may be carried out and would understand the '391 patent to disclose sufficient structure to satisfy that function. Ex. 1 at ¶88.

The '391 patent also describes an embodiment and supporting algorithms in which the "computation employs the optimization of a cost function . . ., i.e. employs global matching of 3D views to simultaneously optimize relative placement of all views which have some overlay." *Id.* at 7:42-50. It expands on

that and related embodiments in the next column. *See id.* at 7:50-8:63. The specific cost functions are provided in column 8 at lines 10, 20, and 50. Based on this disclosure and their background knowledge, a POSA would have understood the ’391 patent to disclose sufficient structure for the claimed function. Ex. 1 at ¶89.

6. “best metric” (claim 8)

DITC’s Proposed Construction	3Shape’s Proposed Construction
Plain and ordinary meaning.	Indefinite.

The term “best metric” is definite and should be given its plain and ordinary meaning. Metric is a common mathematical term. In the context of surface imaging and image processing, it indicates a way of measuring the distance between surfaces. Ex. 1 at ¶91. Claim 8 and the algorithm in Figure 6 describe generating multiple candidate 3D rigid transformations, and evaluating a “metric” (i.e., a distance between two surfaces) of the transformations.

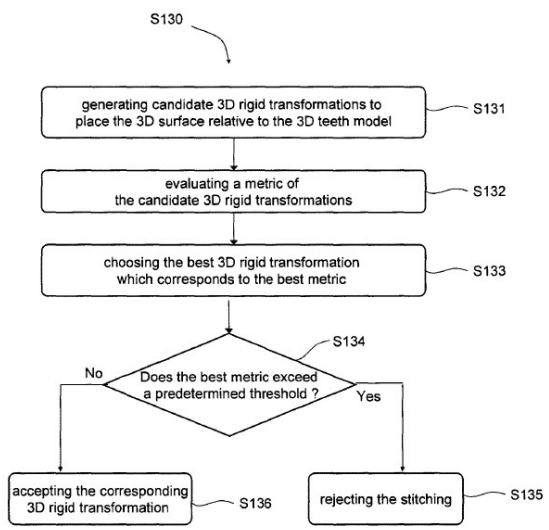

Fig.6

Each of the multiple candidates will have a "metric," *i.e.*, a distance between two surfaces, associated with that candidate. A POSA would have understood that it is better to have the distance be as small as possible in this context. Ex. 1 at ¶92. In other words, a smaller distance indicates a higher quality candidate. Thus, the "best metric" is simply the smallest value in that group of candidates. *Id.* To put this in full context of claim 8, once that "best metric" is selected, that value is compared to a threshold. '391 patent at 5:37-44, Fig. 6. If the metric (value) is less than the threshold, the corresponding transformation is accepted. If the metric exceeds the threshold, however, then the stitch is rejected. *Id.*

IV. CONCLUSION

For the foregoing reasons, DITC respectfully requests that the Court adopt DITC's proposed constructions.

Dated: October 27, 2023

Respectfully submitted,

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CERTIFICATE OF COMPLIANCE

Pursuant to LR 7.1(D), I hereby certify that the foregoing has been prepared in Times New Roman 14 point, as approved by the Court in LR 5.1(C).

Dated: October 27, 2023 *<u>/s/ Yunzhi Lin</u>*
Yunzhi Lin

CERTIFICATE OF SERVICE

I hereby certify that all counsel of record who are deemed to have consented to electronic service are being served with a copy of this document on October 27, 2023.

Dated: October 27, 2023 *<u>/s/ Yunzhi Lin</u>*
Yunzhi Lin