

**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.

§ 87(2)(b)

Civil Action No.  
1:22-cv-01829-WMR

## DEFENDANTS' OPENING CLAIM CONSTRUCTION BRIEF

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## I. INTRODUCTION

Pursuant to L.P.R. 6.5 and the Scheduling Order (Dkt. 135), Defendants submit their opening brief concerning claim construction of U.S. Patent Nos. 11,076,146 (the “’146 patent”); 11,368,667 (the “’667 patent”); RE48,221 (the “’221 patent”); and 10,695,151 (the “’151 patent”) (collectively, the “Asserted Patents”).

## II. THE ‘146 AND ‘667 PATENTS

### A. Technology Overview

The ’146 and ’667 patents relate to a scanner for intraoral scanning of objects. ‘146 patent at Abstract, 1:24-30.<sup>1</sup> The scanner includes a pattern generator to create a pattern of light on the object being scanned. The scanner obtains images with a time-varying pattern on the object at different focal plane positions. The scanner uses images from the focal plane positions to determine the in-focus plane for each pixel and determine the 3D surface information. *Id.* at 3:59-4:8.

### B. Disputed Terms

1. **“a pattern generator configured to generate, using a light source, a probe light with a plurality of configurations in the form of a time-varying illumination pattern” (claim 1 of the ‘146 patent; claims 1, 14, and 26 of the ‘667 patent)**

The term “pattern generator” is a means-plus-function term—it does not

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<sup>1</sup> The ‘667 patent issued as a continuation of and therefore shares the same specification as the ‘146 patent. The specification of both patents are referred to as the “common specification” hereinafter. Unless noted otherwise, all cites to the common specification are based on the line and column numbers as it appears in the ‘146 patent.

connote structure to a POSITA and is defined purely by the function it performs. And the only structures disclosed in the specification linked to the parties' agreed-to function are a "transparent wheel with an opaque mask in the form of spokes pointing radially from the wheel center and rotated with a motor" and "a segmented LED with control electronics." The additional structures proposed by 3Shape should be rejected because they fail to perform the agreed-to function.

**(a) The claimed "pattern generator" is a means-plus-function limitation.**

Federal Circuit authority establishes that "pattern generator" is a means-plus-function term under 35 U.S.C. § 112, ¶ 6. The Federal Circuit has already found a similar term, a "symbol generator," to invoke § 112 ¶ 6 in the absence of the word "means." *Advanced Ground Info. Sys., Inc. v. Life360, Inc.*, 830 F.3d 1341, 1347 (Fed. Cir. 2016). In *Advanced Ground Information*, the claims at issue recited:

- "symbol generator in [a CPU] that can generate symbols that represent each of the participants' cell phones in the communication network on the display screen;"
- "cellular phone for use in a communication network for a plurality of participants comprising ... a **symbol generator** connected to [a] CPU and [a] database for generating symbols on [a] touch screen display screen."

*Id.* at 1345. Finding that "symbol generator" invokes § 112 ¶ 6, the Federal Circuit agreed that "[a] plain reading of the term in context of the relevant claim language suggests the term 'symbol generator' is analogous to a 'means for generating

symbols’ because the term is simply a description of the function performed.” *Id.*

The term “pattern generator” is analogous. As an initial matter, the term “pattern generator” does not have a commonly understood meaning in the art. Ex. 1, ¶30. Nor does the claim language impart any specific structure to that term. Claim 1 of the ‘146 patent and all independent claims of the ‘667 patent simply define the term “pattern generator” by the function it performs, *i.e.*, “generate, using a light source, a probe light with a plurality of configurations in the form of a time-varying illumination pattern.” The claims do not describe any structural details that may be used to generate a “probe light” using a “light source” in the claimed manner. *Id.* The only thing a POSITA could glean from the claim language is that a probe light is given a “plurality of configurations,” which refers to the state of the light pattern and does not connote a structure. *Id.* Much like a “symbol generator” that substituted “means for generating symbols” in *Advanced Ground Information*, the term “pattern generator” here is used analogously to a “means for generating patterns” or “pattern generation means.”

Indeed, the common specification never once uses the term “pattern generator” and instead repeatedly uses “pattern generation *means*” to describe generation of patterns, further confirming that the term “pattern generator” is used as a non-structural placeholder for “means for generating a pattern.” See, *e.g.*, ‘146 patent at 8:25-26 (“[P]referably the scanner comprises at least one light source and *pattern*

*generation means* to produce the pattern”), 8:38-42, 14:56-59, 21:6-10, 27:24.

Accordingly, the use of the purely functional term “pattern generator,” together with repeated references to “pattern generation means” in the specification, demonstrates a lack of structural connotation for the term—and a plain invocation of means-plus-function claiming.

**(b) 3Shape Proposes Structures That Do Not Perform The Recited Function.**

Because the term “pattern generator” is subject to §112, ¶6, the next step is to identify the function recited in the claim and the corresponding structure linked in the specification to this recited function (in its entirety). *Noah Sys., Inc. v. Intuit Inc.*, 675 F.3d 1302, 1311 (Fed. Cir. 2012). Structure disclosed in the specification qualifies as “corresponding structure” only if the intrinsic evidence clearly links or associates that structure to the function recited in the claim. *B. Braun Med., Inc. v. Abbot Labs.*, 124 F.3d 1419, 1424 (Fed. Cir. 1997).

The parties agree on function: to “generate, using a light source, a probe light with a plurality of configurations in the form of a time-varying illumination pattern.” The parties also agree the structures that perform the function include “a transparent wheel with an opaque mask in the form of spokes pointing radially from the wheel center and rotated with a motor” and “a segmented LED with control electronics.”

None of the other structures identified by 3Shape, however, are clearly linked to the recited function. *First*, “at least one translucent and/or transparent pattern

element with a motor” is incomplete because it omits an opaque mask, a key component uniformly described in the specification, including in the passage 3Shape relies on for this structure. *See, e.g.*, ‘146 patent at 8:38-45 (“For example the pattern generation means comprises at least one translucent and/or transparent pattern element. For generating a time varying pattern **a wheel, with an opaque mask** can be used.”), 13:14-16, 13:57-59, 13:66-14:3, 21:10-12; Ex. 1, ¶36.

*Second*, “a glass plate with an opaque mask with a motor” is not linked to the claimed function because the specification makes clear that it is “[f]or generating a **static** pattern,” which is contrasted from the structure “[f]or generating a **time** varying pattern,” namely a “wheel[] with an opaque mask.” Ex. 1, ¶37.

*Third*, both “a Ronchi ruling with a motor” and an “LCD or DLP based project” are mentioned only in passing in the specification. Specifically, the specification summarily provides a Ronchi ruling as one of many examples of what may generate a “periodically varying illumination pattern.” *See* ‘146 patent at 13:29-31 (“A periodically varying illumination pattern may [be] generated by a Ronchi ruling moving orthogonal to the lines and the position is measured by an encoder.”). The single-sentence reference to an LCD or DLP based projector is even more conclusory: “A varying illumination pattern may [be] generated by a LCD or

DLP based projector.” *Id.* at 13:37-38.<sup>2</sup> Moreover, these disclosures vaguely refer to a “varying illumination pattern,” which does not necessarily relate to a **time-varying** pattern as required by the agreed-to function of a “pattern generator.” In fact, the specification contemplates different types of varying illumination patterns, distinguishing a static pattern that “varies in space” from a time-varying pattern that “varies in time.” See ‘146 patent at 8:34-37 (“In one embodiment of the invention the time varying pattern is periodically **varying in time**. In another embodiment of the invention the static pattern is periodically **varying in space**.”); 3:11-14 (“The variation/oscillation in the pattern **may be spatial**, e.g. a static checkerboard pattern, and/or it **may be time varying**, for example by moving a pattern across the object being scanned.”); 3:59-4:28; Ex. 1, ¶38. The passing disclosures about a Ronchi ruling or a LCD/DLP based projector thus do not qualify as corresponding structure because they fail to “clearly associate” the structure with performance of the claimed function. See *JVW Enterprises, Inc. v. Interact Accessories, Inc.*, 424 F.3d 1324, 1332 (Fed. Cir. 2005).

2. **“time-varying illumination pattern” (claims 1, 13, 15, 21, 27, 29 of the ‘146 patent; claims 1, 14, and 26 of the ‘667 patent)**

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<sup>2</sup> Claim 3 repeats largely the same phrase, reciting that the pattern generator is based on a LCD projector or a DLP projector. The use of these terms in the claim does not redeem the specification’s failure to clearly associate these structures with a pattern generator. Indeed, the specification does not even contain an enabling or adequate disclosure for claim 3 under § 112.

Defendants’ proposed construction tracks the definition provided in the Definitions section of the common specification verbatim, namely “a pattern that varies in time, i.e. the embedded spatial structure varies in time.” ‘146 patent at 4:63-65. “The specification acts as a dictionary when it expressly defines terms used in the claims or when it defines terms by implication.” *Jack Guttman, Inc. v. Kopykake Enterprises, Inc.*, 302 F.3d 1352, 1360 (Fed. Cir. 2002). “Where [] the patentee has clearly defined a claim term, that definition ‘[u]sually ... is dispositive; it is the single best guide to the meaning of a disputed term.’” *Id.* (quoting *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996)). The express definition is consistent with how a POSITA would have understood the term’s ordinary meaning in view of the claims and the specification. Ex. 1, ¶39.

3Shape initially proposed “plain and ordinary meaning,” but that provides no guidance to the jury. *See Mobile Telecommunications Techs., LLC v. United Parcel Serv., Inc.*, No. 1:12-CV-3222-AT, 2014 WL 1274003, at \*7 (N.D. Ga. Mar. 17, 2014). Subsequently, 3Shape proposed “a pattern that varies in time, i.e., an embedded spatial structure of the probe light varies in time.” But that proposal unnecessarily deviates from the express definition in the specification by simply adding the phrase “of the probe light.” ‘146 patent at 4:63-65. 3Shape’s proposal creates confusion as to whether what must be varied in time is “an embedded spatial structure” or “the probe light.” Accordingly, Defendant’s proposed construction—

“a pattern that varies in time, i.e., the embedded spatial structure varies in time”—should be adopted.

**3. “wherein the intraoral scanner is wireless” (claim 1 of the ‘146 patent; claims 1, 14, and 29 of the ‘667 patent)**

Claim 1 of the ‘146 patent and claims 1, 14, and 29 of the ‘667 patent require that the intraoral scanner be “wireless.” The claims are indefinite because they fail to inform a POSITA with reasonable certainty what aspect of the intraoral scanner must be wireless, creating a “zone of uncertainty” regarding the claim scope. *Nautilus, Inc. v. Biosig Instruments, Inc.*, 572 U.S. 898, 909 (2014).

The specification uses the term “wireless” only in the passage below:

In a further embodiment of the invention the scanner and/or the scanner head may be **wireless**, thereby simplifying handling and operation of the scanner and increasing accessibility under difficult scanning situations, e.g. intra-oral or in the ear scanning. However, **wireless** operation may further increase the need for local data processing to avoid **wireless** transmission of raw 3D data.

‘146 patent at 9:17-24.

As shown above, the specification contemplates at least two distinct aspects of an intraoral scanner that may be wireless: one where “the scanner and/or the scanner head” is structurally wireless (*i.e.*, cordless) and another where “raw 3D data” is transmitted wirelessly. As a POSITA would have understood, a cordless device does not necessarily transmit data wirelessly because, although it may be used in a cordless setting to collect data, it may require a wired connection to a workstation

for data transmission. Ex. 1, ¶41. But because the claims simply recite that “the intraoral scanner” is “wireless,” a POSITA would not be able to ascertain with reasonable certainty whether the disputed phrase can be met by a cordless intraoral scanner regardless of its capability to transmit data wirelessly. *Id.* The surrounding claims leave this ambiguity unresolved. Claim 9, for example, depends from claim 1 and further requires processing raw 3D data into data for the 3D geometry and “wirelessly transmitt[ing]” the data for the 3D geometry by the intraoral scanner, but this requirement does not illuminate whether the intraoral scanner of claim 1 should also have any wireless transmission capability.

**4. “optical path” (claims 1 and 21 of the ‘146 patent; claims 1, 14, and 26 of the ‘667 patent)**

Defendants’ proposed construction of the term “optical path” is consistent with the express definition in the specification. The patentee defined the term “optical path” by stating that “[t]he optical path is the path of the light from the light source 110 to the object 220<sup>3</sup> and back to the camera 180.” ‘146 patent at 27:51-53, Fig. 1. This definition is consistent with the term’s use in the claims. For instance, claim 1 of the ‘146 patent requires that, in an optical system, the probe light—generated using a “light source” (see ‘146 patent at 37:29-31)—is transmitted

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<sup>3</sup> The reference to the object 220 appears to be a typographic error and should be understood as referring to the object 200. There is no element numbered 220 in Fig. 1 or any other figures, and the specification repeatedly refers to object 200. See ‘146 patent at 27:20-35; 29:47-50.

towards the object “along an optical path” and a part of the light returned from the object is transmitted to a camera. Although the claims do not specify the path for the second transmission (*i.e.*, from the object to the camera), a POSITA would have understood that the express definition in the specification confirms that it is the same “optical path” as the first transmission (*i.e.*, from the light source to the object). Ex. 1, ¶44. Indeed, the specification provides no embodiment in which a single optical system has different optical paths for the two transmissions.

Elsewhere in the common specification, an optical path is defined as “[t]he path defined by the propagation of the light from the light source to the camera.” *Id.* at 5:32-33. This definition also confirms that there is a single optical path in an optical system, namely “the path” “from the light source to the camera.” While this definition informs the beginning (light source) and the end (camera) of the path, it is silent on where in the path an object is and also does not explain that an object is necessarily in the path in order for the light from the light source to end up in the camera as would be understood by a POSITA. The definition at 27:51-53 discussed above, on the other hand, eliminates such ambiguity by clarifying that the optical path is “the path of the light from the light source [] **to the object** [] and back to the camera.” Ex. 1, ¶45.

3Shape again proposes “plain and ordinary meaning,” but that is of no help to the jury, especially where, as here, the common specification provides an express

definition consistent with what a POSITA would understand to be the plain and ordinary meaning. *See Mobile Telecommunications*, 2014 WL 1274003 at \*7. Accordingly, Defendant’s proposed construction—“the path of the light from the light source to the object and back to the camera”—should be adopted.

**5. “high-speed camera” (claims 1, 16, and 22 of the ‘146 patent)**

A “high-speed camera” is a term of degree, and Defendants’ proposed construction supplies objective boundaries based on the sole guidance set forth in the specification. “[C]laims having terms of degree will fail for indefiniteness unless they ‘provide objective boundaries for those of skill in the art’ when read in light of the specification and the prosecution history.” *Liberty Ammunition, Inc. v. United States*, 835 F.3d 1388, 1396 (Fed. Cir. 2016) (quoting *Interval Licensing LLC v. AOL, Inc.*, 766 F.3d 1364, 1370–71 (Fed. Cir. 2014)). In *Liberty Ammunition*, the Federal Circuit found that the term “reduced area of contact” is one of degree, “as it necessarily calls for a comparison against some baseline.” *Id.* at 1395. Although the claim language provided “no clues,” the Federal Circuit found guidance from the specification’s “only mention” of a baseline and, to save the term from indefiniteness, construed it to capture the specification’s discussion of the baseline. *Id.* at 1396–97. Similarly, here, the term “high-speed camera” is one of degree that requires a comparison against a standard, non-high-speed, camera. Claims of the ‘146 patent do not provide any objective boundaries to inform a POSITA what would qualify as

a “high-speed” camera. Ex. 1, ¶46. Claims 1 and 22 simply recite that “at least one camera is a high-speed camera” and that 2D images are “recorded using a high-speed camera,” respectively. Claim 16 imposes two wildly varying minimum conditions—*i.e.*, “the high-speed camera records images at a frame rate of at least 500 frames per second or at a frame rate of at least 2000 frames per second”—and thus fail to meaningfully illuminate the boundaries of a high-speed camera. *Id.*

Turning to the specification, the term “high-speed camera” is mentioned once and compared from a “standard digital camera,” as shown in the following passage:

The camera may be a standard digital camera accommodating a standard CCD or CMOS chip with one A/D converter per line of sensor elements (pixels). However, to increase the frame rate the scanner according to the disclosure may comprise a high-speed camera accommodating multiple A/D converters per line of pixels, e.g. at least 2, 4, 8 or 16 A/D converters per line of pixels.

*See* ’146 Patent, 8:1-8 (emphasis added). Much like in *Liberty Ammunition*, the specification’s only mention of a “high-speed camera” and its comparison to a “standard digital camera” “strongly suggest[s]” that the boundaries identified, namely a camera’s ability to accommodate multiple A/D converters per line of pixels, is the “point of comparison for the claims.” *Liberty Ammunition*, 835 F.3d at 1396. Accordingly, the specification’s discussion of a “high-speed camera” must be captured in the construction. *See id.* at 1397 (rejecting the trial court’s

construction “because it does not properly capture the specification’s discussion of [the point of comparison]”); Ex. 1, ¶47.

3Shape’s proposal (“plain and ordinary meaning”) is inadequate. Under Federal Circuit precedent, “determination that a claim term ‘needs no construction’ or has the ‘plain and ordinary meaning’ may be inadequate when a term has more than one ‘ordinary’ meaning or when reliance on a term’s “ordinary” meaning does not resolve the parties’ dispute.” *O2 Micro Int’l Ltd. v. Beyond Innovation Tech. Co.*, 521 F.3d 1351, 1361 (Fed. Cir. 2008). There is no accepted ordinary meaning of the term “high-speed camera” in the art, much less one that is readily apparent to a lay jury to help resolve the dispute. The problem is particularly acute because, as discussed above, a “high-speed camera” is a term of degree for which objective boundaries must be given. As such, it is not only proper but also necessary to resort to the specification in search for the boundaries. *See Interval Licensing LLC v. AOL, Inc.*, 766 F.3d 1364, 1371 (Fed. Cir. 2014) (“Where, as here, we are faced with a ‘purely subjective’ claim phrase, we must look to the written description for guidance.”). Here, the specification supplies such guidance by expressly providing the characteristics by which a “high-speed camera” is distinguished from a “standard digital camera.” That guidance should be adopted.

6. **“switching on and off the at least three monochromatic light sources” (claim 6 of the ‘146 patent; claims 3 and 20 of the ‘667 patent)**

3Shape’s construction improperly redrafts the claims by adding extraneous words (“one or more of”). The claim language is reasonably plain: it requires three or more monochromatic light sources to be switched on and off, not “one or more” as 3Shape tries to artificially and improperly impose. ‘146 patent at cl. 6; ‘667 patent at cl. 3 and 20. The specification also discloses providing different colors by using “at least three light sources” and “merging” the light sources. *See, e.g.*, ‘146 patent at 21:16-22; Ex. 1, ¶48. 3Shape’s attempt to redraft the claims should be rejected. *Lucent Techs., Inc. v. Gateway, Inc.*, 525 F.3d 1200, 1215 (Fed. Cir. 2008) (“[W]hen the claims are susceptible to only one reasonable construction, we will construe the claims as the patentee drafted them.”).

7. **“wherein the probe light is directed towards the object in a direction substantially parallel with the longitudinal axis of the tip” (claim 8 of the ‘146 patent) / “wherein the optical system is [further] configured to direct the probe light towards the object in a direction substantially parallel with the longitudinal axis of the tip” (claims 5 and 22 of the ‘667 patent)**

The claims provide no standard for measuring what constitutes a “substantially parallel” direction with respect to the “longitudinal axis of the tip,” rendering the claims indefinite. “When a ‘word of degree’” such as “substantially” is used, “the court must determine whether the patent provides ‘some standard for measuring that degree.’” *Enzo Biochem, Inc. v. Applera Corp.*, 599 F.3d 1325, 1332 (Fed. Cir. 2010) (quoting *Seattle Box Co. v. Indus. Crating & Packing, Inc.*, 731

F.2d 818, 826 (Fed. Cir. 1984). “[T]erms of degree [are] indefinite, however, when such guidance is lacking.” *Sonix Tech. Co. v. Publications Int’l, Ltd.*, 844 F.3d 1370, 1377 (Fed. Cir. 2017). For example, in *Midwest Athletics & Sports All. LLC v. Ricoh USA, Inc.*, the phrase “a first guide plate pivotable at least substantially about said axis” was found indefinite because there was “no way to determine how much variability the claim language allows.” 2020 WL 6158233, at \*3 (E.D. Pa. Oct. 21, 2020). In particular, the specification disclosed that the guide plate is “pivotable about the rotating shaft” but “provide[d] no information to determine what ‘substantially’ means, either qualitatively or quantitatively.” *Id.* Accordingly, the court concluded that “the term ‘substantially’ is a word of degree that requires the Court to determine some standard for measuring that degree,” “[b]ut the patent does not disclose such a standard in the claim,” rendering the claim indefinite. *Id.*; see also *In re MTeI*, 265 F.Supp. at 474 (terms like “substantially the same information” and “substantially not represented” are indefinite when the patent specification provides no “guidance with respect to delineating the bounds” of those terms).

The claim language is silent on how the probe light must be directed for its orientation to constitute “substantially parallel” with the “longitudinal axis of the tip.” The subsequent “wherein” phrase compounds the issue by imposing an inoperable requirement: if the probe light was already directed towards the object in a direction substantially parallel with the longitudinal axis of the tip, altering its

direction with a mirror “located in the tip” would necessarily reflect the probe light away from the object, not “further ... towards the object.”

The common specification leaves the ambiguity and inconsistency unresolved. The specification does not mention “longitudinal axis of the tip.” While the specification describes an embodiment in which “the probe light is transmitted towards the object in a direction substantially parallel with the optical axis,” this embodiment is contrasted from another embodiment in which the probe light is initially “in a direction different from the optical axis” and then guided towards the object with a “light reflecting element such as a mirror or a prism.” ‘146 patent at 19:13-33; *see also id.* at 23:14-29 (similarly describing the two embodiments, one in which the probe light is “substantially parallel” and another that uses a “mirror”). By drawing from these embodiments, the claims irreconcilably require the probe light to be both (1) directed towards the object in a direction substantially parallel with the longitudinal axis of the tip and (2) further reflected towards the object by a reflective mirror located in the tip. A POSITA would thus be unable to determine the claim scope with reasonable certainty. Ex. 1, ¶¶51-52.

**8. “data for the 3D geometry” (claims 12 and 24 of the ‘146 patent; claims 8 and 15 of the ‘667 patent)**

The use of the term “data for the 3D geometry” in claims 9 and 12 of the ‘146 patent and claims 8 and 15 of the ‘667 patent makes it impossible for a POSITA to understand the claim scope with reasonable certainty, rendering the claims indefinite.

As shown below, claim 12 of the ‘146 patent recites the term “data for the 3D geometry” while claim 9 (from which it depends) recites the same phrase:

| Claim 9                                                                                                                                                                                                                                                                                                                            | Claim 12                                                                                                                                             |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| 9. The intraoral scanner according to claim 1, wherein the hardware processor is further configured to locally process raw 3D data into data for the 3D geometry, such that the data for the 3D geometry is wirelessly transmitted instead of the raw 3D data, and wherein the raw 3D data is based on the plurality of 2D images. | 12. The intraoral scanner according to claim 9, wherein the hardware processor processes the raw 3D data into data for the 3D geometry in real time. |

Claims 8 and 15 of the ‘667 patent suffer from a similar issue.

This claim structure gives rise to two competing interpretations that result in different requirements. Under one interpretation, the second-recited “data for the 3D geometry” may refer to the first-recited “data for the 3D geometry,” in which it must be both “wireless transmitted” and processed from raw 3D data “in real time.” Under another interpretation, the second-recited “data for the 3D geometry” may refer to data that is separate and apart from the first-recited “data for the 3D geometry” and thus does not need to be “wirelessly transmitted.” This leaves a POSITA to operate within a “zone of uncertainty” regarding the scope of these limitations, rendering them indefinite. *Nautilus*, 572 U.S. at 909–10; Ex. 1, ¶55. The confusion is compounded by the fact that the intrinsic record does not even explain what it means to process “raw 3D data into data for the 3D geometry.”

3Shape’s proposed construction assumes the first interpretation discussed above. But 3Shape has no basis to ignore the alternative interpretation—*i.e.*, that

the claims recite different instances of “data for the 3D geometry”—which is equally supported by the plain language of the claims. Ex. 1, ¶56.

The “data for the 3D geometry” phrase of claim 24 of the ‘146 patent renders the claim indefinite for a similar reason. Claim 21, from which claim 24 depends, recites “wirelessly transmitting the data for the 3D geometry.” Claim 24 then recites “locally processing . . . raw 3D data into data for the 3D geometry, such that the data for the 3D geometry is wirelessly transmitted at a reduced data rate . . . .” Given the claim structure, a POSITA is left to wonder if claim 24 requires the “data for the 3D geometry” of claim 21 to be transmitted “at a reduced rate” or some other “data for the 3D geometry” to be transmitted at a reduced rate. Ex. 1, ¶57.

#### **9. “the data for the 3D geometry” (claim 21 of the ‘146 patent)**

Claim 21 does not even recite the term “data,” let alone “data for the 3D geometry” anywhere else. As such, a POSITA cannot determine with reasonable certainty which “data” is required to be wirelessly transmitted. Ex. 1, ¶58. The subsequent phrase (“for the 3D geometry”) does not provide clarity. At best, claim 21 indicates that the claimed “data” relates to the 3D geometry but does not inform what that relation is. While the specification and other claims refer to processing “raw 3D data” into data for the 3D geometry (see ‘146 patent at 9:22-24, 39:24), claim 21 does not even recite raw 3D data or indicate in any way which data qualifies as data “for the 3D geometry.”

### III. THE '221 PATENT

#### A. Technology Overview

The '221 patent relates to scanning a 3D environment with a handheld scanner and visually representing it on a display. See '221 Patent at 1:14-15, 11:24-36, FIG. 1.

#### B. Disputed Terms<sup>4</sup>

##### 1. “physical 3D environment (claims 1, 19, and 33)

Claims 1, 19, and 33 recite a “physical 3D environment” separate and apart from a “3D environment.” Neither the claims nor the specification would allow a POSITA to understand with reasonable certainty the meaning of “physical 3D environment” based on this claim drafting, rendering the claims indefinite.

It is black letter law that “[i]n the absence of any evidence to the contrary, [the court] must presume that the use of [] different terms in the claims connotes different meanings.” *CAE Screenplates Inc. v. Heinrich Fiedler GmbH & Co. KG*, 224 F.3d 1308, 1317 (Fed. Cir. 2000). Here, the claims indisputably recite a “physical 3D environment” and a “3D environment” as distinct terms. As a representative example, claim 1 (reproduced below) recites selecting a “3D environment” with a handheld device, using the handheld device to perform a scanning action “in a

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<sup>4</sup> The parties have agreed to construe the term “3D environment” (claims 1, 19, and 33) to mean “a constellation of physical objects each having a 3D geometry in a three-dimensional space.”

physical 3D environment” and representing both the “physical 3D environment” and the “3D environment” on a display:

- |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                   |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>1. A scanning system for scanning a 3D environment, the scanning system comprising:</p> <ul style="list-style-type: none"> <li>a handheld device including an optical scanner, wherein the 3D environment to be scanned is selected by pointing the optical scanner at the 3D environment; and</li> <li>at least one display remotely connected to the handheld device,</li> <li>wherein the handheld device is adapted for performing at least one scanning action in a physical 3D environment, and the at least one display is adapted for visually representing the physical 3D environment; and</li> </ul> | <p>the handheld device includes a 3D user interface for remotely controlling the display to adjust the view with which the 3D environment is represented on the display,</p> <p>wherein the handheld device comprises at least one motion sensor, and</p> <p>wherein the at least one motion sensor is a sensor that directly detects motion.</p> |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

The claims thus draw a distinction between a 3D environment and a physical 3D environment but do not shed light on what constitutes a 3D environment that is “physical” as opposed to one that is not. *See Profile Prod. LLC v. Encap, LLC*, No. 09-CV-92-SLC, 2009 WL 2134392, at \*3 (W.D. Wis. July 15, 2009) (finding that the term “mulch” and “mulch flakes” should not be interpreted as interchangeable when the claims of the patent distinguish the terms). For example, a POSITA might initially surmise that the “physical 3D environment” relates to the actual area to be scanned (*e.g.*, the patient’s mouth), whereas the “3D environment” concerns the display of such “physical 3D environment,” but the claims do not support such an understanding. Ex. 2, ¶32.

The specification further confuses the issue by maintaining the distinction between a “3D environment” and a “physical 3D environment” without illuminating the meaning of “physical.” For example, the specification expressly defines a “3D environment” to mean “[a] constellation of physical objects each having a 3D

geometry in a three-dimensional space” but omits a definition for a “physical 3D environment.” ‘221 patent at 10:25-26. The specification also describes different actions performed in a “3D environment” versus a “physical 3D environment” but does not describe the distinction or relationship between the two claimed environments. *See, e.g., id.* at 2:10-13 (describing a dual-purpose device “for performing actions in the physical 3D environment ... and for remotely controlling the view of the 3D environment on the display”); 8:52-60 (the operator may change the position of objects “in the 3D environment” but “the physical 3D environment in which the device operates may not be manipulated”).

3Shape’s assertion that the disputed term should be construed to have its plain and ordinary meaning should be rejected. Given the lack of guidance on what it means for a “3D environment” to be “physical” as discussed above, a POSITA would not be able to ascertain the “plain and ordinary” meaning of the term. *See Nautilus*, 572 U.S. 898, 898-99 (2014) (“A patent is invalid for indefiniteness if its claims, read in light of the patent's specification and prosecution history, fail to inform, with reasonable certainty, those skilled in the art about the scope of the invention.”); Ex. 2, ¶¶ 29-33.

**2. “wherein the at least one motion sensor is a sensor that directly detects motion” (Claims 1 and 19)**

Claims 1 and 19 recite a motion sensor that “directly” detects motion but fails to give sufficient guidance as to its meaning. Courts often find a term with no

objective bounds to be indefinite. For example, in *GE Lighting Sols., LLC v. Lights of Am., Inc.*, 663 F. App'x 938 (Fed. Cir. 2016), the Federal Circuit held that “elongated” was indefinite because (1) the term “appears nowhere in the specification” and (2) the use of the term generated “an unresolved ambiguity” which provided “no objective means” for a POSITA to “determine which cores are ‘elongated’ and which are not.” *Id.* at 941. Similarly, in *Halliburton Energy Servs., Inc. v. M-I LLC*, 514 F.3d 1244 (Fed. Cir. 2008), the Federal Circuit held that “fragile gel” was indefinite because it was ambiguous to the “requisite degree of...fragileness.” *Id.* at 1256.

The claims of the ‘221 patent do not provide any clarity on what the bounds of the term “directly” are. The claims do not recite “directly” anywhere else. Nor can any guidance be drawn from the claims’ descriptions about motion detection: claim 1 recites the term “motion” only in the last two “wherein” clauses, but those clauses simply require the handheld device comprise “at least one motion sensor” and the motion sensor be a “sensor that directly detects motion,” respectively. Dependent claim 7 adds to the confusion by reciting that “gestures are *detected* by the at least one motion sensor” rather than “*directly detected*.” The non-overlapping sets of examples of “a sensor that directly detects motion” provided in claims 8 and 20 compound the issue: claim 8 recites “an infrared sensor, a range sensor, or a proximity sensor” whereas claim 20 recites “an accelerometer, gyro, and

magnetometer.” The mere listing of these examples does not inform the boundaries between a sensor that directly detects motion and a sensor that does not.

The specification is also silent regarding what qualifies as “a sensor that *directly* detects motion” as opposed to, for example, a sensor that *indirectly* detect motion. Indeed, the specification never uses the phrase “directly” or “directly detects”—it is only used in claims 1 and 19. At best, the specification again provides examples of motion sensors, such as accelerometers, gyros, and magnetometers (which detect rotations, lateral motion, and/or combined rotation/motion) and infrared sensing motion sensors. *Id.* at 6:64-7:10.

In sum, much like “elongated” cores and “fragile” gel, the term “directly detects motion” in the ’221 patent provides no guidance to a POSITA regarding what motion sensors “directly detect” motion and which do not and therefore renders the claims indefinite. Ex. 2, ¶¶ 34-37.

#### **IV. THE ‘151 PATENT**

##### **A. Technology Overview**

The ’151 patent is directed to determining the shade of a patient’s tooth. ’151 patent at 2:6-9. The ’151 patent describes using an intraoral scanner to generate a “digital 3D representation” comprising shape data and texture data and to compare such digital 3D representation to a “tooth shade guide” to determine the tooth shade. *Id.* at 15:44-49; 17:13-17.

## **B. Disputed Terms**

### **1. “shape data” (claims 1, 13, and 14)**

Defendants’ proposed construction adopts the express definition provided in the specification. ’151 patent at 2:35-36; 2:46-47 (“a digital 3D representation comprising [] shape data expressing the shape of the tooth ...”), 11:57-59, 12:51-53. This express definition is consistent with the claim language, which recites that “shape data” is part of a “digital 3D representation” of the tooth. *See, e.g.*, cl. 1. Defendants’ construction also eliminates any ambiguity by specifying that the data relates to the shape “of the tooth,” not any other structure, and “expresses” the shape of the tooth. 3Shape’s plain and ordinary meaning construction, on the other hand, fails to provide any guidance to the jury. *AFG Industries, Inc. v. Cardinal IG Co., Inc.*, 239 F.3d 1239, 1247 (Fed. Cir. 2001).

### **2. “texture data” (claims 1-3, 7, 10, 13-15)**

Similar to the “shape data” term, Defendants’ construction adopts an express definition in the specification consistent with the claim language (’151 patent at 2:32-33, 2:46-49, 11:60-62, 12:49-51) and eliminates ambiguity by specifying that the data relates to the texture “of the tooth” and “expresses” the texture of the tooth. 3Shape’s proposal fails to provide any such clarity.

### **3. “deriving a certainty score” (claim 1)**

Defendants propose that “deriving a certainty score” be given its plain and ordinary meaning, which is readily evident from the claims and specification. Claim

1 recites that the certainty score “express[es] the certainty of the determined tooth shade value.” ’151 patent cl. 1. Where, as here, the claim language explicitly provides a definition, there is no “basis for reasonably adopting a construction that contradicts the plain meaning.” *Straight Path IP Grp., Inc. v. Sipnet EU S.R.O.*, 806 F.3d 1356, 1361 (Fed. Cir. 2015). Further, the specification provides detailed descriptions of how a certainty score is derived and how the derived certainty score is used. *See, e.g.*, ’151 patent at 18:33-38 (using the Euclidian distance to quantify the closeness of given color value to the known color value of a reference tooth shade value). The certainty score can then be visualized, such as by using “checkmarks” to indicate whether the certainty score is “sufficiently good” or using a “vertical bar.” *Id.* at 13:35-39; 13:65-14:4. A POSITA would therefore understand the term’s plain and ordinary meaning. Ex. 1, ¶60.

3Shape’s proposed construction, on the other hand, adds ambiguity by merely replacing the disputed phrase (“deriving a certainty score”) with another phrase conjured up by 3Shape (“determining an accuracy value”). Courts routinely reject a construction that “merely replaces the claim language with a similar phrase that does not improve comprehension.” *Kimberly-Clark Corp. v. Extrusion Grp., LLC*, No. 1:18-CV-04754-SDG, 2021 WL 302889, at \*5 (N.D. Ga. Jan. 29, 2021) (declining to construe the claim term “mounted to” as “physically attached to”); *see also Rothschild Connected Devices Innovations, LLC v. Coca-Cola Co.*, No. 1:16-

CV-1241-TWT, 2017 WL 5410867, at \*3 (N.D. Ga. Nov. 13, 2017) (declining to construe the claim term “element” as “component”). 3Shape’s substitution does not enhance comprehension but rather injects ambiguity because “accuracy value” appears nowhere in the ‘151 patent, whereas a “certainty score” appears throughout the specification. *See, e.g.*, ’151 patent at 6:49-51, 6:25-27, 9:17-19.

3Shape’s construction is also incomplete, stating only what the determination is “based on”—“the tooth shade value, the texture data, and/or texture information”—and failing to describe what these parameters are compared to in order to derive the certainty score. As discussed above, the specification consistently describes comparing the *determined* parameters of a tooth to the *reference* parameters of a tooth shade value. ’151 patent at 18:33-36.

#### 4. “the certainty measure” (claim 7)

The term “the certainty measure” in claim 7 is indefinite because its claim structure renders the claim scope not ascertainable with reasonable certainty.

Claim 7 depends on claim 1, both of which are reproduced below:

- |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                     |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>1. A method for determining shade of a patient’s tooth, wherein the method comprises:</p> <ul style="list-style-type: none"> <li>obtaining a digital 3D representation of the tooth, where the digital 3D representation comprises shape data and texture data for the tooth; and</li> <li>determining a tooth shade value for at least one point on the tooth based on the texture data of the corresponding point of the digital 3D representation and on known texture values of one or more reference tooth shade values,</li> </ul> <p>wherein the method comprises deriving a certainty score expressing the certainty of the determined tooth shade value.</p> | <p>7. The method according to claim 1, wherein the certainty measure relates to how uniform the sub-scan texture information is at the point, and/or to how close the texture data is to the known texture value of the determined tooth shade value, and/or to the amount of texture information used to derive the texture data at the point.</p> |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

As shown above, there is no other instance of a “certainty measure” to which “*the* certainty measure” of claim 7 has an antecedent basis. At best, claim 1 recites a “certainty score,” but the intrinsic record confirms it is not the same as a “certainty measure.” For example, the specification states that a “certainty score express[es] the certainty of the determined tooth shade value,” whereas a “certainty measure relates to how uniform the sub-scan texture information is at the point.” ’151 patent at 6:25-27; 7:7-8. Indeed, the specification associates sub-scan texture information only with a certainty measure, not with a certainty score. As such, a POSITA would not have understood them to be interchangeable or understood the meaning of a “certainty measure” with reasonable certainty. Ex. 1, ¶63.

3Shape attempts to cure the drafting ambiguity by construing “the certainty measure” to mean “measure of the certainty score.” But 3Shape’s construction fails. Dependent claim 7 adds a wherein clause providing more details concerning “the certainty measure” but the term is nowhere recited in claim 1, much less as something that measures the certainty score. The specification, as discussed above, also does not support the definition manufactured by 3Shape. In sum, 3Shape’s proposed construction does not solve the ambiguity—nor can it—and the term is hopelessly indefinite. *See Halliburton*, 514 F.3d at 1249 (finding claim term “fragile gel” indefinite for lack of antecedent basis where the ambiguity could not be cured by Plaintiff’s or any other construction).

### 5. “the sub-scan texture information” (claim 7)

The term “the sub-scan texture information” as it appears in claim 7 is also indefinite because its lack of antecedent basis similarly renders the claim scope not reasonably ascertainable. Claim 1 does not recite either “sub-scan” or “texture information,” so it is unclear what “*the* sub-scan texture information” refers to.

3Shape’s construction does not cure the problem, as it provides no point of reference for either a “sub-scan,” “texture information,” or “sub-scan texture information, none of which appear in claim 1. Simply defining “texture information” does not resolve the inherent ambiguity in the claim. *See Halliburton*, 514 F.3d at 1249.

### 6. “the amount of texture information” (claim 7)

Claim 1 does not recite “amount of texture information,” so it is unclear what “*the* amount of texture information” refers to. The phrase “amount of texture information” appears in the specification only three times, each time merely parroting the limitation recited in claim 7. ’151 patent at 7:31-33, 7:34-35, 20:25-30. 3Shape seeks to replace “*the* amount of texture information” with “*an* amount of texture information.” But aside from improperly rewriting the claim, 3Shape’s construction also does not account for the fact that “texture information” is not previously used in the claim (or in claim 1), rendering claim 7 hopelessly indefinite. *See Halliburton*, 514 F.3d at 1249.

## 7. “the texture information” (claim 11)

The term “the texture information” as it appears in claim 11 is indefinite because its claim structure renders the claim scope not reasonably ascertainable. The term “texture information” does not appear anywhere in claim 11 or claim 1 (from which it depends). 3Shape attempts to correct this issue by simply replacing “texture information” with “texture data,” which appears in claim 1. But 3Shape’s proposed construction improperly conflates two distinct terms. The terms “texture data” and “texture information” appear throughout the claims and specification in different contexts. For example, claim 7 includes the limitation that “texture information” is used to derive the “texture data” at the point of a tooth. Ex. 1, ¶65.

The specification describes that “texture data for a point on the digital 3D representation are determined by averaging the texture information of the sub-scans,” and that “deriving the texture data for [a] region on the digital 3D representation can comprise combining the corresponding texture information.” *Id.* at 3:10-12; 4:29-31. Thus, “texture information” must be used to “determine” or “derive” “texture data,” indicating that the two terms are distinct. Ex. 1, ¶66.

To the extent that 3Shape argues claim 11 is a typographical error, such an argument would be unavailing. A court may correct an error during claim construction “only 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.” *Parkervision, Inc. v. Apple Inc.*, No. 3:15-CV-1477-J-39JRK, 2019 WL 4385673, at \*12 (M.D. Fla. July 15, 2019) (quoting *Ultimax Cement Mfg. Corp. v. CTS Cement Mfg. Corp.*, 587 F.3d 1339, 1353 (Fed. Cir. 2009)). 3Shape cannot show that the term “the texture information” in claim 11 is a typographical error not subject to reasonable debate. As discussed above, “texture data” and “texture information” are used in distinct contexts throughout the claims and specification, and claim 11 parrots language from the specification specific to “texture information.” Ex. 1, ¶68.

## V. CONCLUSION

For the above reasons, Defendants respectfully request that the Court adopt Defendants’ proposed constructions.

Dated: January 30, 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: January 30, 2023

/s/ Robin McGrath  
Robin Lynn McGrath

**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 January 30, 2023.

Dated: January 30, 2023

/s/ Robin McGrath  
Robin Lynn McGrath