

**IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE**

ALIGN TECHNOLOGY, INC.,	:	
	:	
Plaintiff,	:	
	:	
v.	:	C.A. No. 17-1648-LPS
	:	
3SHAPE A/S and 3SHAPE INC.,	:	
	:	
Defendants.	:	

John W. Shaw, Karen E. Keller, and Jeff Castellano, SHAW KELLER LLP, Wilmington, DE
Mark L. Levine, Michael J. Valaik, and Benjamin R. Montague, BARTLIT BECK LLP,
Chicago, IL
John M. Hughes and Daniel C. Taylor, BARTLIT BECK LLP, Denver, CO
Attorneys for Plaintiff

Joanna J. Cline and James H.S. Levine, TROUTMAN PEPPER HAMILTON SANDERS, LLP,
Wilmington, DE
Kimberly Coghill, Arvind Iyengar, Ryan Ellis, and Gerar Mazarakis, TROUTMAN PEPPER
HAMILTON SANDERS LLP, Washington DC
William Belanger, Frank D. Liu, L. Andrew Tseng, Brittane Petrik, Ryan Deck, and Ana Spone,
TROUTMAN PEPPER HAMILTON SANDERS LLP, Boston, MA
Kristie Butler, TROUTMAN PEPPER HAMILTON SANDERS LLP, Princeton, NJ
Attorneys for Defendants

MEMORANDUM OPINION

June 7, 2021
Wilmington, Delaware


STARK, U.S. District Judge:

Pending before the Court are the parties' claim construction disputes related to terms in U.S. Patent Nos. 7,092,107 (the "'107 patent"), 8,638,447 (the "'447 patent"), 8,638,448 (the "'448 patent"), and 9,615,901 (the "'901 patent"). The parties submitted briefs, exhibits, expert declarations, and tutorials. (*See, e.g.*, D.I. 155, 157-60, 165-67) The Court held a claim construction hearing on March 1, 2021, at which both sides presented oral argument.¹ (D.I. 180) ("Tr.")

I. LEGAL STANDARDS

The ultimate question of the proper construction of a patent is a question of law. *See Teva Pharm. USA, Inc. v. Sandoz, Inc.*, 574 U.S. 318, 325-26 (2015) (citing *Markman v. Westview Instruments, Inc.*, 517 U.S. 370, 388-91 (1996)). "It is a bedrock principle of patent law that the claims of a patent define the invention to which the patentee is entitled the right to exclude." *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005) (internal citation and quotation marks omitted). "[T]here is no magic formula or catechism for conducting claim construction." *Id.* at 1324. Instead, the Court is free to attach the appropriate weight to appropriate sources "in light of the statutes and policies that inform patent law." *Id.*

"[T]he words of a claim are generally given their ordinary and customary meaning . . . [which is] the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention, i.e., as of the effective filing date of the patent application."

¹ The Court allowed 3Shape to consider whether it wanted an opportunity to respond in writing to alleged "new arguments" made by Align at the hearing. (*See* Tr. at 116-17) After meeting and conferring, the parties informed the Court that "no additional briefing is requested to address the positions put forth by Align at the March 1, 2021 claim construction hearing." (D.I. 176)

The parties agree on the construction of four terms, and those agreed-upon constructions will be adopted by the Court. (*See* D.I. 155)

Id. at 1312-13 (internal citations and quotation marks omitted). “[T]he ordinary meaning of a claim term is its meaning to the ordinary artisan after reading the entire patent.” *Id.* at 1321 (internal quotation marks omitted). The patent “specification is always highly relevant to the claim construction analysis. Usually, it is dispositive; it is the single best guide to the meaning of a disputed term.” *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996).

While “the claims themselves provide substantial guidance as to the meaning of particular claim terms,” the context of the surrounding words of the claim also must be considered. *Phillips*, 415 F.3d at 1314. Furthermore, “[o]ther claims of the patent in question, both asserted and unasserted, can also be valuable sources of enlightenment . . . [b]ecause claim terms are normally used consistently throughout the patent.” *Id.* (internal citation omitted).

It is likewise true that “[d]ifferences among claims can also be a useful guide For example, the presence of a dependent claim that adds a particular limitation gives rise to a presumption that the limitation in question is not present in the independent claim.” *Id.* at 1314-15 (internal citation omitted). This “presumption is especially strong when the limitation in dispute is the only meaningful difference between an independent and dependent claim, and one party is urging that the limitation in the dependent claim should be read into the independent claim.” *SunRace Roots Enter. Co., Ltd. v. SRAM Corp.*, 336 F.3d 1298, 1303 (Fed. Cir. 2003).

It is also possible that “the specification may reveal a special definition given to a claim term by the patentee that differs from the meaning it would otherwise possess. In such cases, the inventor’s lexicography governs.” *Phillips*, 415 F.3d at 1316.

It bears emphasis that “[e]ven 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 words or expressions of manifest

exclusion or restriction.” *Hill-Rom Servs., Inc. v. Stryker Corp.*, 755 F.3d 1367, 1372 (Fed. Cir. 2014) (quoting *Liebel-Flarsheim Co. v. Medrad, Inc.*, 358 F.3d 898, 906 (Fed. Cir. 2004)) (alteration in original) (internal quotation marks omitted).

In addition to the specification, a court “should also consider the patent’s prosecution history, if it is in evidence.” *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 980 (Fed. Cir. 1995), *aff’d*, 517 U.S. 370 (1996). The prosecution history, which is “intrinsic evidence,” “consists of the complete record of the proceedings before the [Patent and Trademark Office] and includes the prior art cited during the examination of the patent.” *Phillips*, 415 F.3d at 1317. “[T]he prosecution history can often inform the meaning of the claim language by demonstrating how the inventor understood the invention and whether the inventor limited the invention in the course of prosecution, making the claim scope narrower than it would otherwise be.” *Id.*

“In some cases . . . the district court will need to look beyond the patent’s intrinsic evidence and to consult extrinsic evidence in order to understand, for example, the background science or the meaning of a term in the relevant art during the relevant time period.” *Teva*, 574 U.S. at 331. “Extrinsic evidence consists of all evidence external to the patent and prosecution history, including expert and inventor testimony, dictionaries, and learned treatises.” *Markman*, 52 F.3d at 980. For instance, technical dictionaries can assist the court in determining the meaning of a term to those of skill in the relevant art because such dictionaries “endeavor to collect the accepted meanings of terms used in various fields of science and technology.” *Phillips*, 415 F.3d at 1318. In addition, expert testimony can be useful “to ensure that the court’s understanding of the technical aspects of the patent is consistent with that of a person of skill in the art, or to establish that a particular term in the patent or the prior art has a particular meaning in the pertinent field.” *Id.* Nonetheless, courts must not lose sight of the fact that “expert reports

and testimony [are] generated at the time of and for the purpose of litigation and thus can suffer from bias that is not present in intrinsic evidence.” *Id.* Overall, while extrinsic evidence “may be useful to the court,” it is “less reliable” than intrinsic evidence, and its consideration “is unlikely to result in a reliable interpretation of patent claim scope unless considered in the context of the intrinsic evidence.” *Id.* at 1318-19. Where the intrinsic record unambiguously describes the scope of the patented invention, reliance on any extrinsic evidence is improper. *See Pitney Bowes, Inc. v. Hewlett-Packard Co.*, 182 F.3d 1298, 1308 (Fed. Cir. 1999).

Finally, “[t]he construction that stays true to the claim language and most naturally aligns with the patent’s description of the invention will be, in the end, the correct construction.” *Renishaw PLC v. Marposs Societa’ per Azioni*, 158 F.3d 1243, 1250 (Fed. Cir. 1998). It follows that “a claim interpretation that would exclude the inventor’s device is rarely the correct interpretation.” *Osram GmbH v. Int’l Trade Comm’n*, 505 F.3d 1351, 1358 (Fed. Cir. 2007) (internal quotation marks omitted).

II. CONSTRUCTION OF DISPUTED TERMS

A. The “Light Beams” Terms

1. “light beams”²

Align
“directional projection of light energy; may consist of parallel, diverging, or converging rays”
3Shape
“directional projections of light energy propagating along the z-axis, each projection having its own source, that generate or propagate from a plurality of illuminated spots”
Court
“directional projections of light energy”

² This term appears in all claims of the ’107, ’447, and ’448 patents, and claims 8-19 of the ’901 patent.

The parties agree that “light beams” are “directional projections of light energy.”³

3Shape then adds several additional limitations, none of which is warranted.

3Shape first proposes that the light beams are “propagating along the Z axis.” (D.I. 157 at 3) 3Shape points to the specification disclosure that “[i]ncident light beams 48 form an array of light beams . . . propagating along the Z axis.” (’107 patent at 6:4-6; *see also* D.I. 157 at 3) This is not a clear and unmistakable disavowal of projections that are *not* along the z axis; it is improper to read this limitation from the specification into the claims. *See Liebel-Flarsheim*, 358 F.3d at 906. Furthermore, in connection with Figure 1, the specification discloses “split[ting] the parent beam 30 into a plurality of incident light beams 36.” (’107 patent at 5:28-29) The “incident light beams 36,” as depicted in Figure 1, do not appear to propagate solely along the z-axis. (*See id.*, Fig. 1; *see also* Tr. at 31) The specification also discloses an embodiment in which the returned light beams “travel[] *initially* in the Z axis” and are then “reflected in the direction of the detection optics generally designated 60.” (’107 patent at 6:25-31) (emphasis added) 3Shape’s proposed limitation would read this embodiment out of the claims, a result that is “rarely, if ever correct.” *EPOS Techs. Ltd. v. Pegasus Techs. Ltd.*, 766 F.3d 1338, 1347 (Fed. Cir. 2014) (internal citation omitted).

3Shape next proposes that “each light beam is projected from its own source.” (D.I. 157 at 4) The specification, however, teaches that “each incident light beam *or a group of incident light beams* may be emitted by a different light emitter.” (’107 patent at 3:55-56) (emphasis added) The specification also discloses an embodiment in which “[a] plurality of incident light beams are produced by splitting a parent beam.” (*Id.* at 3:53-54) 3Shape contends that when

³ The phrase “directional projection” in Align’s proposed claim construction is in the singular form. However, in its opening claim construction brief, Align submits that “[t]he parties agree that ‘light beams’ are ‘directional projections of light energy.’” (*See* D.I. 160 at 3)

light beams are generated by splitting a parent light beam (rather than by light emitters) using a grating or a micro lens array (*see id.* at 5:27-28), the source of the light beams “is not the parent beam emitter” and, instead, the light beams are “formed downstream of the microlens array/grating.” (D.I. 157 at 4; *see also id.* Ex. F ¶¶ 56-57) 3Shape’s definition of “source,” however, does not find support in the specification; the only “source” mentioned in the specification is a “laser source.” (’107 patent at 5:35) 3Shape’s definition of “source” is also confusing, as the grating and the micro lens array do not emit light energy. (*See* D.I. 167 at 4; *see also id.* Ex. 7 ¶¶ 7-8)

Finally, 3Shape proposes that the light beams must “either generate or propagate from a plurality of illuminated spots,” based on 3Shape’s contention that the specification “consistently and exclusively describes generating illuminated spots from light beams as the mechanism for measuring the surface topology of an object.” (D.I. 157 at 3) 3Shape highlights the “present invention” language in the “Summary of the Invention” section of the specification, arguing that the disclosures describing the “present invention” – including those referring to “beams generating a plurality of illuminated spots” and “returned light beams propagating from each of these spots” – should be construed as a disavowal of any undisclosed features. (*See* Tr. at 17-19, 29; *see also* ’107 patent at 2:12-61) The Court is not persuaded that the highlighted portion of the “Summary of the Invention” – either by itself or in combination with the other specification disclosures cited by 3Shape – rises to the level of a “clear and unmistakable disclaimer” that limits the scope of “light beams” to only those that “generate or propagate from a plurality of

illuminated spots.”⁴ *See Thorner v. Sony Computer Entm’t Am. LLC*, 669 F.3d 1362, 1367-68 (Fed. Cir. 2012).

The Court has omitted from its construction Align’s proposed “may consist of parallel, diverging, or converging rays,” a modification to which Align indicated at the hearing it did not object. (*See* Tr. at 11)

2. “array/plurality of incident light beams”⁵

Align No construction necessary, but if necessary: “an array/plurality of light beams propagating along the optical axis illuminating an object”
3Shape “beams of light propagating in parallel along the z-axis where each beam independently illuminates a different x-y position in a Cartesian frame along the surface of an object”
Court “an array/plurality of light beams propagating along the optical axis illuminating an object”

This term needs construction because it relates to a material dispute between the parties regarding claim scope. *See O2 Micro Int’l Ltd. v. Beyond Innovation Tech. Co.*, 521 F.3d 1351, 1361 (Fed. Cir. 2008). For the reasons stated in connection with the “light beams” term, the Court rejects 3Shape’s proposed limitation that the incident light beams must propagate “in

⁴ During the International Trade Commission’s (the “ITC”) Section 337 Investigation No. 337-TA-1090, the parties had a dispute over whether the claimed function of the term “optical system” should be construed as limited to “illuminate spatially independent spots.” (*See* D.I. 157 Ex. N at 27-29) The ITC found that the disclosures describing the “present invention” in the “Summary of the Invention” section of the specification – including “the beams generating a plurality of illuminated spots on the structure” – did not limit claim scope. (*See id.* at 29-31) Having considered the ITC’s claim construction analysis, *see Texas Instruments, Inc. v. Cypress Semiconductor Corp.*, 90 F.3d 1558, 1569 (Fed. Cir. 1996) (“The district court can attribute whatever persuasive value to the prior ITC decision that it considers justified.”), the Court finds it supports its conclusion.

⁵ This term appears in claims 1 and 2 of the ’107 patent, claims 4, 17, 19, 20, 23, and 24 of the ’447 patent, claims 2, 11, 15, 17-21, 23, and 25-29 of the ’448 patent, and claims 8, 13, 15, and 17 of the ’901 patent.

parallel along the z-axis.” The Court also rejects 3Shape’s proposed limitation that “each beam independently illuminates a different x-y position in a Cartesian frame along the surface of an object.” The specification states only that “light beams are arranged in an X-Y plane,” but it does not require that each light beam *independently* illuminates a *different* x-y position, as proposed by 3Shape. (’107 patent at 6:4-5; *see also* D.I. 160 at 6-7) Hence, the Court adopts Align’s proposed construction, which is consistent with the specification.

3. “returned light beam(s)”⁶

Align “light beams generated by the return of incident light beams from the three-dimensional structure/dentition”
3Shape “beam(s) of light each returned from a corresponding illuminated spot”
Court “light beams generated by the return of incident light beams from the three-dimensional structure/dentition”

As explained in connection with the “light beams” term, the Court rejects 3Shape’s proposed construction that the returned light beams must propagate from “a corresponding illuminated spot.” The Court instead adopts Align’s proposed construction, which is supported by the specification. (*See, e.g.*, ’107 patent at 6:28-29) (“Each returned light beam 54 corresponds to one of the incident light beams 36.”)

B. “spot-specific position”⁷

Align “the relative in-focus position”
3Shape “position along the z-axis where the illuminated spot is at maximum intensity denoting the relative in-focus position”

⁶ This term appears in claim 1 of the ’107 patent, claims 1, 10, 12, 17, 18, and 24 of the ’447 patent, claims 1, 8, 10, 15, 16, 21, 23, 24, and 29 of the ’448 patent, and claims 8, 9, 11, 12, 15, 18, and 19 of the ’901 patent.

⁷ This term appears in claim 1 of the ’107 patent.

Court “the relative in-focus position”
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The Court adopts Align’s proposed construction as it reflects the definition of the term given by the inventor. *See Phillips*, 415 F.3d at 1316 (“[T]he inventor’s lexicography governs.”). The specification expressly teaches that “[t]he term ‘spot-specific position (SSP)’ will be used to denote the relative in-focus position regardless of the manner in which it is determined.” (’107 patent at 3:6-8)

The specification discloses at least three methods for determining the “spot-specific position:” (1) “by measuring the intensity per se” (’107 patent at 3:1-2); (2) “by measuring the displacement (S) derivative of the intensity (I) curve (dI/dS) and determining the relative position in which this derivative function indicates a maximum intensity” (*id.* at 3:2-6); and (3) “by extrapolation from the measured values or other mathematical signal processing methods” (*id.* at 3:38-41). Because the third method contemplates “illuminated spots where a maximum illuminated intensity [is] not reached” (*id.* at 3:36-38), 3Shape’s proposed construction, which requires that “the illuminated spot is at maximum intensity,” appears to (improperly) read that method out of the claim scope. Even assuming 3Shape’s proposal would not exclude that embodiment (*see* Tr. at 48-51), the Court nonetheless does not find a “clear and unmistakable disclaimer” to limit the scope of “spot-specific position” to a position “where the illuminated spot is at maximum intensity,” as proposed by 3Shape. *See Thorner*, 669 F.3d at 1367-68.

C. The “Processor” Terms⁸

1. **“a processor coupled to the detector unit and configured to determine a surface topology of the patient’s dentition based at least in part on a first intensity of a first returned light beam of the first wavelength component and a second intensity of a second returned light beam of the second wavelength component”⁹**

Align

This limitation is not subject to § 112 ¶ 6:

No construction necessary, but if necessary: “an image processor in communication with the detector unit and programmed to determine a surface topology of the three-dimensional structure based at least in part on the measured intensities of the plurality of returned light beams”

If this limitation is subject to § 112 ¶ 6:

Structure: a processor programmed to determine the in-focus distance at least in part by determining a first intensity of a first returned light beam of the first wavelength component and a second intensity of a second returned light beam of the second wavelength component

Function: determine a surface topology of the patient’s dentition based at least in part on a first intensity of a first returned light beam of the first wavelength component and a second intensity of a second returned light beam of the second wavelength component

3Shape

This limitation is subject to § 112 ¶ 6:

Structure: a processor programmed to determine the in-focus distance (spot-specific position) by determining a maximum measured intensity of each light beam returned from a corresponding illuminated spot

Function: to determine a surface topology of the patient’s dentition based at least in part on a first intensity of a first returned light beam of the first wavelength component and a second intensity of a second returned light beam of the second wavelength component

Alternatively, if this term is not subject to § 112 ¶ 6:

“a processor coupled to the detector unit and configured to determine a surface topology of the patient’s dentition by determining a maximum measured intensity for each of the first returned light beam of the first wavelength component and second returned light beam of the second wavelength component”

Court

This limitation is not subject to § 112 ¶ 6. No construction necessary.

⁸ In construing the “processor” terms, the Court has considered (as the parties have as well) the ITC’s construction of substantially the same terms in the same patents during Section 337 Investigation No. 337-TA-1090. (See D.I. 157 Ex. N at 34-46)

⁹ This term appears in claim 1 of the ’447 patent and claims 1 and 10 of the ’448 patent.

Since the disputed terms do not use the word “means,” there is a rebuttable presumption that the claims do not invoke § 112 ¶ 6. *Williamson v. Citrix Online, LLC*, 792 F.3d 1339, 1348 (Fed. Cir. 2015). The presumption can be overcome by showing that “the claim term fails to recite sufficiently definite structure.” *Id.* at 1349 (internal citation and quotation marks omitted). 3Shape has not carried the burden of rebutting the presumption.

Relying on Federal Circuit precedent, including *Aristocrat Techs. Austl. PTY Ltd. v. Int’l Game Tech.*, 521 F.3d 1328 (Fed. Cir. 2008), and *EON Corp. IP Holdings LLC v. AT&T Mobility LLC*, 785 F.3d 616 (Fed. Cir. 2015), 3Shape contends that the “processor” terms fail to recite sufficiently definite structure – and thus invoke § 112 ¶ 6 – because the claims do not recite the algorithms for performing the claimed function. (See D.I. 157 at 10-11) 3Shape’s reliance is misplaced because these cases address whether the *specification* discloses sufficient corresponding structure to support a means-plus-function claim after § 112 ¶ 6 has been invoked, not whether the *claim* recites “sufficiently definite structure” to avoid the invocation of § 112 ¶ 6. See *Techno View IP, Inc. v. Facebook Techs., LLC*, 2018 WL 6427874, at *5 n.6 (D. Del. Dec. 7, 2018) (“*Aristocrat* rule . . . applies only after Section 112, paragraph 6 *has been* invoked; it does not apply when determining whether the statute *should be* invoked.”).¹⁰

The Court agrees with Align that the “processor” terms do not invoke § 112 ¶ 6 because the word “processor,” as used in these terms, connotes sufficient structure and is not a “nonce” or “functional” word. (See D.I. 160 at 12) Here, the “processor” terms “provide an input-output

¹⁰ As 3Shape’s citation to *Velocity Patent LLC v. Mercedes-Benz USA, LLC*, 2016 WL 5234110, at *6 (N.D. Ill. Sept. 21, 2016), demonstrates, courts are not uniform on this point. (See D.I. 165 at 10) In the absence of binding authority, the Court is persuaded by *Techno*. The Court recognizes that the ITC construed the “processor” as invoking § 112 ¶ 6. (See D.I. 157 Ex. N at 36-42) This, too, is not binding on this Court – and the Court notes that the ITC did not have the benefit of *Techno*’s analysis of the applicability of *Aristocrat*.

structure for the processor and explain how the processor interacts with the other components of the claim.” *See Masimo Corp. v. Philips Elecs. N. Am. Corp.*, 2015 WL 7737308, at *7-8 (D. Del. Dec. 1, 2015). For example, the claims at issue recite a “detector unit” that “measure[s] intensity of returned light beams,” and that a “processor” is “coupled to the detector unit” and uses the “the . . . intensity of . . . returned light beam” as an input to “determine a surface topology” as the output. (*See, e.g.*, ’447 patent, cl. 1) Hence, the “processor” terms here disclose sufficient structure to avoid the invocation of § 112 ¶ 6. *See, e.g., Techno*, 2018 WL 6427874, at *6-8; *3G Licensing, S.A. v. Blackberry Ltd.*, 2018 WL 4375091, at *7 (D. Del. Sept. 13, 2018).

The Court further rejects 3Shape’s proposed non-§ 112 ¶ 6 construction, which would require that the processor is configured to determine surface topology by “determining a maximum measured intensity” for the returned light beams. First, 3Shape’s proposal reads the phrase “at least in part” out of the claims and treats the intensity of light as the exclusive basis for determining surface topology. Also, for the reasons explained in connection with the term “spot-specific position,” the Court is not persuaded that the claim scope should be limited to “determining a maximum measured intensity.” Claim differentiation further weighs against 3Shape’s proposal. (*See* D.I. 167 at 13) Claim 11 of the ’447 patent, which depends on claim 1, recites determining surface topology based at least in part on the “maximum intensity of the . . . returned light beam” (’447 patent, cl. 11), creating a presumption that the scope of claim 1 is not limited to “determining a maximum measured intensity” – a presumption 3Shape has not persuasively rebutted. *See Versa Corp. v. Ag-Bag Int’l Ltd.*, 392 F.3d 1325, 1330 (Fed. Cir. 2004) (“The doctrine of claim differentiation ‘creates a presumption that each claim in a patent has a different scope.’”).

Having reached the foregoing conclusions, there is no remaining dispute the resolution of which requires the Court to construe this term.

2. “a processor coupled to the detector unit and configured to determine a surface topology of the three-dimensional structure based at least in part on the measured intensities of the plurality of returned light beams”¹¹

Align

This limitation is not subject to § 112 ¶ 6:

No construction necessary, but if necessary: “an image processor in communication with the detector unit and programmed to determine a surface topology of the three-dimensional structure based at least in part on the measured intensities of the plurality of returned light beams”

If this limitation is subject to § 112 ¶ 6:

Structure: a processor programmed to determine the in-focus distance at least in part based on the measured intensities of the plurality of returned light beams

Function: determine a surface topology of the three-dimensional structure based at least in part on the measured intensities of the plurality of returned light beams

3Shape

This limitation is subject to § 112 ¶ 6:

Structure: a processor programmed to determine the in-focus distance (spot-specific position) by determining a maximum measured intensity of each light beam returned from a corresponding illuminated spot

Function: to determine a surface topology of the three-dimensional structure based at least in part on the measured intensities of the plurality of returned light beams

Alternatively, if this term is not subject to § 112 ¶ 6:

“a processor coupled to the detector unit and configured to determine a surface topology of the three-dimensional structure by determining a maximum measured intensity of each light beam returned from a corresponding illuminated spot”

Court

This limitation is not subject to § 112 ¶ 6. No construction necessary

For the reasons stated in connection with the previous “processor” term, the Court rejects 3Shape’s non-§ 112 ¶ 6 proposal, which would limit the method for determining surface topology to “determining a maximum measured intensity” of returned light beams. The Court

¹¹ This term appears in claim 17 of the ’447 patent and claims 15 and 23 of the ’448 patent.

has already construed the term “returned light beams,” and that construction should apply here.

There is no further dispute in connection with this term that requires a construction.

3. **“a processor coupled to the detector unit and configured to determine a surface topology of the portion of the three-dimensional structure based at least in part on the measured characteristic of the plurality of returned light beams”¹²**

Align

Not indefinite.

This limitation is not subject to § 112 ¶ 6:

No construction necessary, but if necessary: “an image processor in communication with the detector unit and programmed to determine a surface topology of the three-dimensional structure based at least in part on a measured characteristic of the plurality of returned light beams”

If this limitation is subject to § 112 ¶ 6:

Structure: a processor programmed to determine the in-focus distance at least in part based on the measured characteristics of the plurality of returned light beams

Function: determine a surface topology of the portion of the three-dimensional structure based at least in part on the measured characteristic of the plurality of returned light beams

3Shape

Indefinite.

To the extent found not indefinite, this limitation is subject to § 112 ¶ 6:

Structure: a processor programmed to determine the in-focus distance (spot-specific position) by determining a maximum measured intensity of each light beam returned from a corresponding illuminated spot

Function: to determine a surface topology of the portion of the three-dimensional structure based at least in part on the measured characteristic of the plurality of returned light beams

Alternatively, if this term is not subject to § 112 ¶ 6:

“a processor coupled to the detector unit and configured to determine a surface topology of the portion of the three-dimensional structure by determining the maximum measured intensity of each light beam returned from a corresponding illuminated spot”

Court

Not indefinite. This limitation is not subject to § 112 ¶ 6. No construction necessary

¹² This term appears in claim 8 of the '901 patent.

For the reasons that will be provided with respect to the “characteristic” terms, the Court does not find that 3Shape has proven, by clear and convincing evidence, that this term is indefinite. As explained in connection with the previous “processor” terms, no construction is necessary.

D. The “Focusing Optics” / “Optical System” Terms

1. “focusing optics defining one or more focal planes forward said probing face in a position changeable by said optics”¹³

Align

This limitation is not subject to § 112 ¶ 6:

No construction necessary, but if necessary: “one or more optical components that focus light beams to one or more focal planes”

If this limitation is subject to § 112 ¶ 6:

Structure: confocal optics, relay optics, an endoscopic probing member, and equivalents thereof

Function: defining one or more focal planes forward said probing face in a position changeable by said optics

3Shape

This limitation is subject to § 112 ¶ 6:

Structure: confocal optics operating in a telecentric mode, relay optics, and an endoscopic probing member operating as a light guide to ensure total internal reflection

Function: defining one or more focal planes forward said probing face in a position changeable by said optics

Alternatively, if this term is not subject to § 112 ¶ 6:

“one or more optical lenses used to focus each of the array of light beams to one or more focal planes”

Court

This limitation is not subject to § 112 ¶ 6: “one or more optical components that focus light beams to one or more focal planes”

The disputed limitation does not use the word “means.” Therefore, it is presumed not to invoke § 112 ¶ 6. *See Williamson*, 792 F.3d at 1348. 3Shape has failed to satisfy its burden to rebut the presumption.

¹³ This term appears in claim 1 of the ’107 patent.

3Shape’s expert, Dr. Zavislan, opines that neither “focusing optics” nor “optical system” denotes any particular structure, so the claim language “merely recites the function.” (D.I. 157 Ex. F ¶¶ 80, 82) Align’s expert, Dr. Hesselink, counters that “focusing optics” and “optical system” “connote a specific and definite structure or class of structures” and, in particular, denote “a physical structure, namely one or more optical elements, i.e. lenses, mirrors, beam splitters, polarizers, etc.” (D.I. 160 Ex. 1 ¶ 38)

The Court is persuaded by Dr. Hesselink’s opinion, which is supported by both extrinsic and intrinsic evidence. The dictionary definition of the term “optical system” – “[a] collection comprising mirrors, lens, prisms, and other devices, placed in some specified configuration, which reflect, refract, disperse, absorb, polarize, or otherwise act on light” – “by itself connotes some structure.” (*Id.* Ex. 2; *see also Apex Inc. v. Raritan Computer, Inc.*, 325 F.3d 1364, 1373 (Fed. Cir. 2003) (finding that dictionary definition of “circuit” – “the combination of a number of electrical devices and conductors that . . . fulfill some desired function” – by itself connotes some structure)) The specification also teaches that the components involved in performing the functions recited in the disputed terms, including “confocal optics 42” (used interchangeably with “focusing optics (42)” and “optical element 42”), “relay optics 44,” and “endoscopic probing member 46,” are “generally as known per se” (’107 patent at 5:51-54), further confirming that the “focusing optics” and “optical system” terms connote sufficient structure to a person of ordinary skill in the art (“POSA”). (*See* D.I. 160 at 14-15)

3Shape contends that “focusing optics” and “optical system” are “generic placeholders for any set of components performing the recited function.” (D.I. 165 at 13) To avoid the invocation of § 112 ¶ 6, however, a claim needs only to recite some structure. 3Shape’s seeming requirement of specific structure is “unduly restrictive.” *GoDaddy.com, LLC v. RPost*

Commc'ns Ltd., 2016 WL 212676, at *55 (D. Ariz. Jan. 19, 2016) (citing *Lighting World, Inc. v. Birchwood Lighting, Inc.*, 382 F.3d 1354, 1359-60 (Fed. Cir. 2004)); *see also CCS Fitness, Inc. v. Brunswick Corp.*, 288 F.3d 1359, 1370 (Fed. Cir. 2002) (holding that connotation of precise physical structure is not necessary condition to avoid invocation of § 112 ¶ 6). To avoid invocation of § 112 ¶ 6, “it is sufficient if the claim term is used in common parlance or by persons of skill in the pertinent art to designate structure, even if the term covers a broad class of structures and even if the term identifies the structures by their function.” *Lighting World*, 382 F.3d at 1359-60; *see also Personalized Media Commc'ns v. Int'l Trade Comm'n*, 161 F.3d 696, 704 (Fed. Cir. 1998) (“[N]either the fact that a ‘detector’ is defined in terms of its function, nor the fact that the term ‘detector’ does not connote a precise physical structure in the minds of those of skill in the art detracts from the definiteness of structure.”).¹⁴

3Shape’s proposed non-§ 112 ¶ 6 construction limits the scope of “focusing optics” to “one of more optical lenses,” which is unwarranted because there is no “clear and unmistakable disclaimer” that would exclude other non-lens optical components. *See Thorner*, 669 F.3d at 1367-68.

2. **“optical system configured to generate an illuminated region on a portion of a patient’s dentition, wherein the first wavelength component is focused at a first focal plane and the second wavelength component is focused at a second focal plane”¹⁵**

Align

This limitation is not subject to § 112 ¶ 6:

No construction necessary, but if necessary: “one or more optical components that focus light beams”

If this limitation is subject to § 112 ¶ 6:

¹⁴ The Court has considered but is not persuaded by the ITC construction of the “optical system” terms as invoking § 112 ¶ 6. (*See* D.I. 157 Ex. N at 26-27)

¹⁵ This term appears in claim 1 of the ’447 patent and claims 1 and 10 of the ’448 patent.

Structure: confocal optics, relay optics, an endoscopic probing member, and equivalents thereof

Function: generate an illuminated region on a portion of a patient's dentition, wherein the first wavelength component is focused at a first focal plane and the second wavelength component is focused at a second focal plane

3Shape

These limitations are each subject to § 112 ¶ 6:

Structure: diffraction or refraction optics, grating, microlens array, an optics expander, a beam splitter, confocal optics operating in a telecentric mode to focus each wavelength component to a different focal plane, relay optics, and an endoscopic probing member operating as a light guide to ensure total internal reflection

Function: generate an illuminated region on a portion of a patient's dentition

Alternatively, if this term is not subject to § 112 ¶ 6:

"one or more optical lenses to produce a plurality of incident light beams and focus each wavelength component to different focal planes on a portion of a patient's dentition"

Court

This limitation is not subject to § 112 ¶ 6. The term "optical system" is construed as "one or more optical components that focus light beams"

The Court has found, in connection with construing the term "focusing optics," that the "optical system" terms do not invoke § 112 ¶ 6. At the hearing, the parties agreed that the Court would only need to construe the term "optical system," and that the Court's construction of the term "optical system" does not affect the other elements recited in the "optical system" terms. (See Tr. at 77-78, 82-83) As explained in connection with the "focusing optics" term, 3Shape's proposed non-§ 112 ¶ 6 construction improperly limits the scope of "optical system" to "one of more optical lenses." The Court instead adopts Align' proposed construction.

3. "optical system configured to focus the plurality of incident light beams"¹⁶

Align

This limitation is not subject to § 112 ¶ 6:

No construction necessary, but if necessary: "one or more optical components that focus light beams"

¹⁶ This term appears in claim 17 of the '447 patent, claims 15 and 23 of the '448 patent, and claim 8 of the '901 patent.

If this limitation is subject to § 112 ¶ 6: Structure: confocal optics, relay optics, an endoscopic probing member, and equivalents thereof Function: focus the plurality of incident light beams
3Shape These limitations are each subject to § 112 ¶ 6: Structure: a beam splitter, confocal optics operating in a telecentric mode to focus the each of the plurality of incident light beams at different x-y locations along the focal plane, relay optics, and an endoscopic probing member operating as a light guide to ensure total internal reflection Function: focus the plurality of incident light beams Alternatively, if this term is not subject to § 112 ¶ 6: “one or more optical lenses to focus each of the plurality of incident light beams to different x-y locations along the focal plane”
Court This limitation is not subject to § 112 ¶ 6. The term “optical system” is construed as “one or more optical components that focus light beams”

For the same reasons given in connection with the previous “optical system” term, the Court construes “optical system” as “one or more optical components that focus light beams.”

E. The “Characteristic” Terms

1. “measuring a characteristic of a plurality of returned light beams”¹⁷

Align Not indefinite. No construction necessary, but if necessary, plain and ordinary meaning.
3Shape Indefinite. If found not indefinite, then: “measuring the intensity of a plurality of returned light beams”
Court Not indefinite. The term “characteristic” is construed as “any property of light that could be measured.”

¹⁷ This term appears in claim 15 of the ’901 patent.

3Shape has not satisfied its burden to prove, by clear and convincing evidence, that the claim “fail[s] to inform, with reasonable certainty, those skilled in the art about the scope of the invention.” *Nautilus, Inc. v. Biosig Instruments, Inc.*, 572 U.S. 898, 901 (2014).

The term “characteristic” is neither used nor defined in the specification. At the hearing, Align contended that the plain and ordinary meaning for the term “characteristic” should be “any property of light that could be measured.” (*See* Tr. at 87) According to 3Shape’s expert, Dr. Zavislan, there is “no description of what the claimed ‘characteristics’ are, or how they are measured, and that “one skilled in the art would not be able to reasonably ascertain the scope of the claimed ‘characteristic.’” (D.I. 157 Ex. F ¶ 93) Align’s expert, Dr. Hesselink, however, opines that “[l]ight has a number of well-known measurable properties,” and “[t]he fact that there are a range of such properties would not have prevented a person of ordinary skill from understanding the scope of this claim language.” (D.I. 160 Ex. 1 ¶ 56) The Court is persuaded by Dr. Hesselink, and agrees with Align that the specification’s reference to intensity and other “detectable parameter[s],” including “wavelength, phase, different duration or pulse pattern” (’901 patent at 4:22-24), would serve as examples to guide a POSA to “readily understand the term ‘characteristic’ when used in the context of a ‘characteristic’ of light.” (D.I. 160 at 20; *see also id.* Ex. 1 ¶ 57) Therefore, the “characteristic” terms are not indefinite.

3Shape’s proposed construction, which limits the scope of “characteristic” to the intensity of light, is unduly restrictive, as the specification also discloses other “detectable parameter[s].” (’901 patent at 4:22-24) Thus, the Court construes the term “characteristic” consistent with the plain and ordinary meaning provided by Align, which is “any property of light that could be measured.” This construction will also apply to other disputed terms that refer to “characteristic.”

2. “determining a surface topology of the portion of three-dimensional structure based at least in part on the measured characteristic of the plurality of returned light beams”¹⁸

Align
No construction necessary, but if necessary, plain and ordinary meaning.
3Shape
Indefinite. If found not indefinite, then: “determining a surface topology of a portion of the three-dimensional structure based on the maximum measured intensity of each light beam returned from a corresponding illuminated spot”
Court
Not indefinite. The term “characteristic” is construed as “any property of light that could be measured”

As explained above, the Court construes “characteristic” as “any property of light that could be measured.” The Court has already construed the term “returned light beams,” and that construction applies here. There is no further dispute in connection with this term that requires a construction.

F. “focal plane”¹⁹

Align
“a position where one or more light beams from the optical system are focused”
3Shape
“flat surface onto which the light beams are focused by optical lenses”
Court
“a position where one or more light beams from the optical system are focused”

The parties’ dispute focuses on whether the “focal plane” must be a flat surface. The Court agrees with Align that it need not. The word “flat” does not appear anywhere in the specification; nor could 3Shape identify a “clear and unmistakable disclaimer” that would

¹⁸ This term appears in claim 15 of the ’901 patent.

¹⁹ This term appears in claim 1 of the ’107 patent, claims 1, 7, 10, 17, 19, 20, and 24 of the ’447 patent, claims 1, 5, 7, 10, 13-15, 19-21, 23, and 27-29 of the ’448 patent, and claims 8, and 10-19 of the ’901 patent.

exclude a non-flat surface from the scope of “focal plane.” *See Thorner*, 669 F.3d at 1367-68. Relying on the dictionary meaning of “plane,” which refers to “a flat or level surface,” 3Shape contends that its proposed construction “reflects the ordinary and customary meaning of ‘focal plane.’” (D.I. 157 at 7-8; *see also id.* Ex. I) However, 3Shape’s approach of construction by combining ordinary dictionary definitions of “focal” and “plane” is generally disfavored and, more importantly, is not how a POSA would understand the term at issue here. (*See* D.I. 167 at 7; *see also Network Commerce, Inc. v. Microsoft Corp.*, 422 F.3d 1353, 1360 (Fed. Cir. 2005) (finding that construing compound terms by “combin[ing] individual dictionary definitions” is not “a tenable theory in light of the specification”)) Align’s expert, Dr. Hesselink, explains that “it was well known in the field” that “a focal plane will rarely if ever form a flat surface,” a point to which 3Shape’s expert provides no rebuttal. (*See* D.I. 160 Ex. 1 ¶ 20)

G. The “Detector Unit” Terms

1. “a detector unit configured to measure intensities of a plurality of returned light beams / detector unit configured to measure intensity of returned light beams”²⁰

Align

This limitation is not subject to § 112 ¶ 6:

No construction necessary, but if necessary: “an array of sensing elements for measuring the intensities of light beams”

If this limitation is subject to § 112 ¶ 6:

Structure: an array of sensing elements or matrix, or equivalents thereof

Function: measure intensities of plurality of returned light beams / measure intensity of returned light beams

3Shape

This limitation is subject to § 112 ¶ 6:

Structure: an imaging optics, a matrix comprising an array of pinholes, and a CCD camera with a matrix of sensing elements each corresponding to one pinhole in the array

Function: to measure intensities of a plurality of returned light beams

²⁰ This term appears in claim 17 of the ’447 patent and claims 1, 10, 15, and 23 of the ’448 patent.

Alternatively, if this term is not subject to § 112 ¶ 6:

“an array of pixels of an image sensor where each returned light beam originating from an illuminated spot is associated with a corresponding pixel”

Court

This limitation is not subject to § 112 ¶ 6: “an array of sensing elements for measuring the intensities of returned light beams”

3Shape conceded at the hearing that the “detector unit” terms are not subject to § 112 ¶ 6. (See Tr. at 101) Considering the parties’ competing non-§ 112 ¶ 6 proposals, the Court agrees with Align that 3Shape’s construction improperly restricts the claim scope by reading limitations into the claims from a preferred embodiment describing a “CCD camera [that] has a matrix or sensing elements each representing a pixel of the image and each one corresponding to one pinhole in the array.” (See D.I. 167 at 17-18; *see also* ’447 patent at 6:36-7:22)²¹ Further, as explained in construing the term “returned light beams,” the Court also rejects 3Shape’s proposed limitation that each returned light beam originates from “an illuminated spot.” The Court adds “returned” to Align’s proposed construction, which is in all other respects correct.

2. “detector unit configured to measure a characteristic of a plurality of returned light beams”²²

Align

Not indefinite.

This limitation is not subject to § 112 ¶ 6:

No construction necessary, but if necessary: “an array of sensing elements for measuring a characteristic of a plurality of returned light beams”

If this limitation is subject to § 112 ¶ 6:

Structure: an array of sensing elements or matrix, or equivalents thereof

Function: measure a characteristic of a plurality of returned light beams

²¹ 3Shape’s proposal also raises claim differentiation concerns. (See D.I. 167 at 18) For example, claim 16 of the ’448 patent, which depends on the disputed claim 15, recites “each sensor element being configured to measure intensity from a corresponding returned light beam in the plurality of returned light beams” (’448 patent, cl. 16), suggesting that the scope of the disputed terms are presumed to be broader than 3Shape’s proposal.

²² This term appears in claim 8 of the ’901 patent.

3Shape

Indefinite.

To the extent not found indefinite, this limitation is subject to § 112 ¶ 6:

Structure: an imaging optics, a matrix comprising an array of pinholes, and a CCD camera with a matrix of sensing elements each corresponding to one pinhole in the array

Function: to measure a characteristic of a plurality of returned light beams

Alternatively, if this term is not subject to § 112 ¶ 6:

“an array of pixels of an image sensor where each returned light beam originating from an illuminated spot is associated with a corresponding pixel”

Court

This limitation is not subject to § 112 ¶ 6: “an array of sensing elements for measuring a characteristic of a plurality of returned light beams”

The Court has found that the “characteristics” terms are not indefinite. For the same reasons given in connection with the previous “detector unit” term, the Court rejects 3Shape’s proposed construction and adopts Align’s proposed construction.

H. “wavelength component”²³ / “parent light beam comprising a first wavelength component and a second wavelength component”²⁴

Align

“wavelength component”: “a component of light”

“parent light beam comprising a first wavelength component and a second wavelength component”: No construction necessary, but if necessary, plain and ordinary meaning: “light beam comprising light emitted from one or more light emitters with a first wavelength and a second wavelength”

3Shape

“wavelength component”: “wavelength of light that has its focus in a plane differently distanced from the structure than other wavelengths of light”

“parent light beam comprising a first wavelength component and a second wavelength component”: “light beam comprising light emitted from a first laser emitter with a first wavelength and a second laser emitter with a second wavelength”

Court

“wavelength component”: “a component of light that has a certain wavelength”

“parent light beam comprising a first wavelength component and a second wavelength component”: “light beam comprising light emitted from one or more light emitters with a first wavelength and a second wavelength”

²³ This term appears in claims 1-7, 10, and 12 of the ’447 patent and claims 1-14 of the ’448 patent.

²⁴ This term appears in claim 1 of the ’447 patent and claims 1 and 10 of the ’448 patent.

With respect to the “wavelength component” term, the Court rejects 3Shape’s proposed limitation that different wavelength components must have different focal planes. The specification states that “[t]ypically, each of said light components has its focus in a plane differently distanced from the structure than other light components.” (See ’447 patent at 4:15-17) (emphasis added) The use of the word “typically” implies that different light components do not always need to have different focal planes. (See D.I. 160 at 8; *see also Honeywell Int’l, Inc. v. Nikon Corp.*, 589 F. Supp. 2d 433, 450-51 (D. Del. 2008) (“[B]y using the word ‘typically,’ the ’371 specification confirms that the stated ‘2 to 16 degree’ rotation is not a limitation.”)) 3Shape’s proposed construction would also render another claim element in the same claim superfluous (*see* D.I. 167 at 6; *see also* ’447 patent at 8:44-47 (“wherein the first wavelength component is focused at a first focal plane and a second wavelength component is focused at a second focal plane”)), a disfavored result. *See, e.g., Elekta Instrument S.A. v. O.U.R. Sci. Int’l, Inc.*, 214 F.3d 1302, 1305-07 (Fed. Cir. 2000) (refusing to adopt claim construction that would render claim language superfluous).

Align’s proposed construction reads “wavelength” out of the claim. Hence, the Court construes the term “wavelength component” as “a component of light that has a certain wavelength.”

Turning to the term “parent light beam comprising a first wavelength component and a second wavelength component,” 3Shape’s proposed construction, again, improperly imports limitations from exemplary embodiments disclosed in the specification. (See ’447 patent at 4:9-13 (“In accordance with another embodiment, the parent light beam is composed of different light components, generated by different light emitters.”); *see also id.* at 8:15-17 (“The different light components composing parent beam 152 may for example be different wavelengths, a

different one transmitted from each of laser emitters 154A-C.”) 3Shape does not identify any clear and unmistakable disclaimer to limit the claim scope to these embodiments.²⁵ *See Thorner*, 669 F.3d at 1367-68. Hence, the Court rejects 3Shape’s proposed construction and adopts Align’s.

I. “sensing face”²⁶

Align
No construction necessary, but if necessary, plain and ordinary meaning: “an optical interface located at the forward end of the probe”
3Shape
“an optical surface that provides an absolute depth reference position to the scanned object”
Court
“an optical interface located at the forward end of the probe, which provides an absolute depth reference position to the scanned object”

This term needs construction because it has no well-understood meaning in the art and the parties have a dispute over its scope. (*See* D.I. 157 at 8; *id.* Ex. F ¶ 72; *see also* *O2 Micro*, 521 F.3d at 1361) 3Shape does not materially dispute that the “sensing face” is, as proposed by Align, “an optical interface located at the forward end of the probe,” but it insists that the “sensing face” also provides “an absolute depth reference position to the scanned object.” (*See* D.I. 157 at 8) Contrary to Align’s contention that there is “no basis” to construe the term “sensing face” in the context of “spot-specific position” (*see* D.I. 160 at 11), 3Shape’s proposed construction is supported by the specification, which discloses that “the SSP [i.e., spot-specific

²⁵ Claim differentiation again weighs against 3Shape’s proposed construction. Claim 14 of the ’447 patent, which depends on claim 1, recites that “the illumination unit comprises a first light emitter to generate the first wavelength component and a second light emitter to generate the second wavelength component.” Claim 15, which in turn depends on claim 14, further narrows the claim scope to “laser emitters.” (*See* D.I. 160 at 8-9; *see also* ’447 patent, cls. 14-15) Hence, the scope of the disputed term in claim 1 is presumed not to be limited to these narrowing elements that are only recited in dependent claims.

²⁶ This term appears in claims 3 and 17 of the ’447 patent and claims 20 and 28 of the ’448 patent.

position] is *always* a relative position as the absolute position depends on the position of the sensing face.” (See ’447 patent at 3:24-26) (emphasis added) Pointing to the next sentence in the specification, which explains that “[h]owever the generation of the surface topology does not require knowledge of the absolute position” (see *id.* at 3:26-28), Align contends that its proposal is a “better construction.” (See Tr. at 114) This disclosure does not, however, change the fact that the position of the sensing surface “always” provides a reference for the absolute position, even if that absolute position is not necessarily used in the determination of surface topology. Hence, the Court agrees with 3Shape that “provides an absolute depth reference position to the scanned object” is a limitation that should be included in the construction.

J. “optics expander unit configured to expand the parent light beam into an array of incident light beams”²⁷

Align

This limitation is not subject to § 112 ¶ 6:

No construction necessary, but if necessary: “optical component(s) that expand the parent light beam into an array of incident light beams”

If this limitation is subject to § 112 ¶ 6:

Structure: an optical component that increases the aperture of a light beam and/or expands the parent light beam into an array of incident light beams, and equivalents thereof

Function: expand the parent light beam into an array of incident light beams

3Shape

This limitation is subject to § 112 ¶ 6:

Structure: an optical component that increases the aperture of a laser light source emitting a parent light beam, and a microlens array or grating for splitting the parent light beam into multiple incident light beams

Function: to expand the parent light beam into an array of incident light beams

Alternatively, if this term is not subject to § 112 ¶ 6:

“a grating or microlens array to split the parent light beam into multiple incident light beams”

Court

This limitation is not subject to § 112 ¶ 6: “optical component(s) that expand the parent light beam into an array of incident light beams”

²⁷ This term appears in claim 4 of the ’447 patent and claims 2 and 11 of the ’448 patent.

The disputed limitation does not use the word “means.” Therefore, it is presumed not to invoke § 112 ¶ 6. *See Williamson*, 792 F.3d at 1348. 3Shape has not carried its burden of rebutting the presumption.

3Shape contends that the phrase “optics expander” does not impart sufficient structure to the nonce term “unit.” (D.I. 157 at 16) 3Shape’s expert, Dr. Zavislan, states that the term “optics expander unit” is not a term understood in the art to denote any particular structure, so it would not be understood by a POSA to generate an array of incident light beams. (*Id.* Ex. F ¶ 84; D.I. 165 Ex. V ¶ 15) Align’s expert, Dr. Hesselink, opines that the term “optics expander unit” connotes definite structure and refers to a specific category of devices used to expand the cross sectional beam shape. (D.I. 160 Ex. 1 ¶ 47)

The Court is persuaded by Dr. Hesselink’s opinion. 3Shape lists the “optics expander” as one of the underlying structures for the term “optical system,” undermining its contention that “optics expander” does not connote structure. (*See* D.I. 160 at 17; *see also* D.I. 155 at 13) Further, the fact that a dependent claim recites that “the optics expander unit comprises a grating or a microlens array” (*see* ’447 patent, cl. 5) further suggests that § 112 ¶ 6 does not govern here, since it “add[s] limitations that either describe particular structural features or flesh[es] out whether the term has a particular structural meaning.”²⁸ *TEK Global, S.R.L. v. Sealant Sys. Int’l*, 920 F.3d 777, 786 (Fed. Cir. 2019) (citing *Diebold Nixdorf, Inc. v. Int’l Trade Comm’n*, 899 F.3d 1291, 1298 (Fed. Cir. 2018)).

²⁸ The case cited by 3Shape (*see* D.I. 165 at 17), *Laitram Corp. v. Rexnord, Inc.*, 939 F.2d 1533, 1538 (Fed. Cir. 1991), is inapposite. It states that, after § 112 ¶ 6 has been invoked, dependent claims reciting structures cannot expand, by virtue of claim differentiation, the scope of the underlying structure supporting an independent means-plus-function claim beyond what is disclosed in the specification. The case is not applicable when determining whether § 112 ¶ 6 should be invoked.

The Court further rejects 3Shape’s proposed non-§ 112 ¶ 6 construction as it reads limitations from an embodiment into the claim. *See Liebel-Flarsheim*, 358 F.3d at 913. The specification, which discloses that “[t]he light beam 30 then passes through a module 38, which *may, for example*, be a grating or a micro lens array which splits the parent beam 30 into a plurality of incident light beams,” (’447 patent at 5:37-40) (emphasis added), does not exclude other optical components that also function to expand a parent light beam into an array of incident light beams. Hence, the Court adopts Align’s proposed construction.

K. “intensity profile”²⁹

Align
No construction necessary, but if necessary, plain and ordinary meaning: “collection of intensity measurements”
3Shape
“intensity measurements of a returned light beam from a corresponding illuminated spot along the depth (z) direction”
Court
“collection of intensity measurements”

The parties agree that this term describes intensity measurements. As explained in connection with the term “returned light beams,” the Court rejects 3Shape’s proposed construction that the returned light beam is from “a corresponding illuminated spot.” Further, the limitations of “returned light beam” and “along the depth dimension” are already recited as other elements in the same claim, and do not need to be included in the construction of “intensity profile.” (*See* D.I. 160 at 12)

III. CONCLUSION

The Court will construe the disputed terms as explained above. An appropriate Order follows.

²⁹ This term appears in claim 10 of the ’447 patent.

**IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE**

ALIGN TECHNOLOGY, INC.,	:	
	:	
Plaintiff,	:	
	:	
v.	:	C.A. No. 17-1648-LPS
	:	
3SHAPE A/S and 3SHAPE INC.,	:	
	:	
Defendants.	:	

ORDER

At Wilmington this 7th day of June, 2021:

For the reasons set forth in the Memorandum Opinion issued this date,

IT IS HEREBY ORDERED that the following claim terms of U.S. Patent Nos. 7,092,107 (the “’107 patent”), 8,638,447 (the “’447 patent”), 8,638,448 (the “’448 patent”), and 9,615,901 (the “’901 patent”) are construed as shown below.

The following agreed-upon constructions are adopted:

Terms	Agreed Constructions
“a module . . . configured to generate a plurality of incident light beams” (’447 patent, claim 17)	This limitation is subject to § 112 ¶ 6: Structure: grating, microlens array, optics expander, or equivalents thereof Function: generate a plurality of incident light beams
“illumination unit configured to generate a plurality of incident light beams” (’448 patent, claims 15 and 23; ’901 patent, claim 8)	This limitation is subject to § 112 ¶ 6: Structure: (1) one or more light emitter(s), semiconductor laser(s), or laser emitter(s) in conjunction with diffraction or refraction optics, grating, microlens array, or an optics expander; or (2) a plurality of light emitters, semiconductor lasers, or laser emitters, <i>see</i> ’447 Patent at 4:3-4; or (3) equivalents thereof Function: generate a plurality of incident light beams

“illumination unit configured to transmit a parent light beam” (’447 patent, claims 1 and 17; ’448 patent, claims 1 and 10)	This limitation is subject to § 112 ¶ 6 Structure: one or more light emitter(s), semiconductor laser(s), laser emitter(s), or equivalents thereof Function: transmit a parent light beam
“probing member” (’447 patent, claims 3 and 17; ’448 patent, claims 15 and 23; ’901 patent, claims 8, 10, 14-16, and 20)	“a probe that is used to determine the surface topology of a three-dimensional structure”

The parties’ claim construction disputes are resolved as shown below:

Terms	Court’s Constructions
“light beams” (’107, ’447, and ’448 patents, all claims; ’901 patent, claims 8-19)	“directional projections of light energy”
“array/plurality of incident light beams” (’107 patent, claims 1 and 2; ’447 patent, claims 4, 17, 19, 20, 23, and 24; ’448 patent, claims 2, 11, 15, 17-21, 23, and 25-29; ’901 patent, claims 8, 13, 15, and 17)	“an array/plurality of light beams propagating along the optical axis illuminating an object”
“returned light beam(s)” (’107 patent, claim 1; ’447 patent, claims 1, 10, 12, 17, 18, and 24; ’448 patent, claims 1, 8, 10, 15, 16, 21, 23, 24, and 29; ’901 patent, claims 8, 9, 11, 12, 15, 18, and 19)	“light beams generated by the return of incident light beams from the three-dimensional structure/dentition”
“spot-specific position” (’107 patent, claim 1)	“the relative in-focus position”
“a processor coupled to the detector unit and configured to determine a surface topology of the patient’s dentition based at least in part on a first intensity of a first returned light beam of the first wavelength component and a second intensity of a second returned light beam of the second wavelength component” (’447 patent, claim 1; ’448 patent, claims 1 and 10)	This limitation is not subject to § 112 ¶ 6. No construction necessary
“a processor coupled to the detector unit and configured to determine a surface topology of the three-dimensional structure based at least in part on the measured intensities of the plurality of returned light beams” (’447 patent, claim 17; ’448 patent, claims 15 and 23)	This limitation is not subject to § 112 ¶ 6. No construction necessary
“a processor coupled to the detector unit and configured to determine a surface topology of	Not Indefinite. This limitation is not subject to § 112 ¶ 6. No construction necessary

the portion of the three-dimensional structure based at least in part on the measured characteristic of the plurality of returned light beams” (’901 patent, claim 8)	
“focusing optics defining one or more focal planes forward said probing face in a position changeable by said optics” (’107 patent, claim 1)	This limitation is not subject to § 112 ¶ 6: “one or more optical components that focus light beams to one or more focal planes”
“optical system configured to generate an illuminated region on a portion of a patient’s dentition, wherein the first wavelength component is focused at a first focal plane and the second wavelength component is focused at a second focal plane” (’447 patent, claim 1; ’448 patent, claims 1 and 10)	This limitation is not subject to § 112 ¶ 6. The term “optical system” is construed as “one or more optical components that focus light beams”
“optical system configured to focus the plurality of incident light beams” (’447 patent, claim 17; ’448 patent, claims 15 and 23; ’901 patent, claim 8)	This limitation is not subject to § 112 ¶ 6. The term “optical system” is construed as “one or more optical components that focus light beams”
“measuring a characteristic of a plurality of returned light beams” (’901 patent, claim 15)	Not indefinite. The term “characteristic” is construed as “any property of light that could be measured”
“determining a surface topology of the portion of three-dimensional structure based at least in part on the measured characteristic of the plurality of returned light beams” (’901 patent, claim 15)	Not indefinite. The term “characteristic” is construed as “any property of light that could be measured”
“focal plane” (’107 patent, claim 1; ’447 patent, claims 1, 7, 10, 17, 19, 20, and 24; ’448 patent, claims 1, 5, 7, 10, 13-15, 19-21, 23, and 27-29; ’901 patent, claims 8, and 10-19)	“a position where one or more light beams from the optical system are focused”
“a detector unit configured to measure intensities of a plurality of returned light beams / detector unit configured to measure intensity of returned light beams” (’447 patent, claim 17; ’448 patent, claims 1, 10, 15, and 23)	This limitation is not subject to § 112 ¶ 6: “an array of sensing elements for measuring the intensities of returned light beams”
“detector unit configured to measure a characteristic of a plurality of returned light beams” (’901 patent, claim 8)	This limitation is not subject to § 112 ¶ 6: “an array of sensing elements for measuring a characteristic of a plurality of returned light beams”

“wavelength component” (’447 patent, claims 1-7, 10, and 12; ’448 patent, claims 1-14)	“a component of light that has a certain wavelength”
“parent light beam comprising a first wavelength component and a second wavelength component” (’447 patent, claim 1; ’448 patent, claims 1 and 10)	“light beam comprising light emitted from one or more light emitters with a first wavelength and a second wavelength”
“sensing face” (’447 patent, claims 3 and 17; ’448 patent, claims 20 and 28)	“an optical interface located at the forward end of the probe, which provides an absolute depth reference position to the scanned object”
“optics expander unit configured to expand the parent light beam into an array of incident light beams” (’447 patent, claim 4; ’448 patent, claims 2 and 11)	This limitation is not subject to § 112 ¶ 6: “optical component(s) that expand the parent light beam into an array of incident light beams”
“intensity profile” (’447 patent, claim 10)	“collection of intensity measurements”


 UNITED STATES DISTRICT JUDGE