United States District Court,
C.D. California.

SURFWARE, INC,
v.
CELERITIVE TECHNOLOGIES, INC.

No. CV 08-6753 AHM (AJWx)

June 3, 2009.

Dawn Terri Collins, Joel P. Kelly, Nicky Jatana, Talya Friedman, Jackson Lewis LLP, Los Angeles, CA, Jennifer A. Trusso, Steven M. Hanle, Sheppard Mullin Richter & Hampton LLP, Costa Mesa, CA, Kenneth H. Wennergren, Wennergren Law Offices, Ventura, CA, for Surfware, Inc.

Aaron S. Welling, Bryan S. Banks, C. Mark Kittredge, Perkins Coie Brown & Bain PA, Phoenix, AZ, Donald J. Kula, Sang Min Lee, Perkins Coie LLP, Santa Monica, CA, for Celeritive Technologies, Inc., et al.

A. HOWARD MATZ**, District Judge.**

S. Eagle Deputy Clerk

I. INTRODUCTION

Surfware, Inc.'s ("Surfware") action against Defendants Celeritive Technologies, Inc. ("Celeritive"), Glenn Coleman, Evan Sherbrooke, and Terry Sorensen alleges fifteen causes of action, including infringement of United States Patent No. 7,451,013 ("the '013 patent"). The '013 patent covers "a method for generating ... a tool path ... for milling a region of a workpiece by a milling cutter." ('013 patent at col. 2:24-27.) The parties dispute the proper construction of four terms used in independent claims 14 and 35. They also contest whether the steps in those claims must be performed in the order listed in the patent. Finally, they disagree about what is the least confusing definition of a term used in dependent claims 15, 16, 36, and 37. The Court received two sets of simultaneous briefs on these issues, and on May 12, 2009 it conducted a *Markman* hearing. At the hearing, the Court circulated tentative constructions of each term, which the parties had a full opportunity to address during oral argument. The constructions the Court adopts in this Order account for the arguments made at the hearing, and in some instances vary from the tentative constructions it circulated at that hearing.

II. BACKGROUND FN1

FN1. This Court reviewed the factual and procedural background of this case in its March 9, 2009 order denying Plaintiff's motion for a preliminary injunction, and it will recount only the basic facts here.

The inventions claimed by the '013 patent relate to a method for controlling a milling machine that removes material from a solid block to create manufactured parts. This computer aided manufacturing ("CAM") method produces numerical codes that control the position and movement of the cutter. The path traveled by the cutter is known as a "tool path."

On March 9, 2009, this Court denied Plaintiff's motion for a preliminary injunction because Defendants raised serious questions regarding whether their invention infringes on the '013 patent. For the purposes of adjudicating that motion only, the Court constructed some of the claim terms now at issue. The constructions in this Order supersede those preliminary constructions.

III. THE CLAIMS AT ISSUE

Independent claim 14 of the '013 patent is reproduced below, with the disputed terms underlined:

14. A method for generating a tool path for milling a region of a workpiece by a single milling cutter, the tool path including one or more passes, the method comprising the steps of:

creating a family of concentric *indexed circles* at each of two or more separate and distinct selected points within the region;

connecting together the circles of adjacent families of circles having an identical index to form *isoloops;*

generating the tool path by *blending between the isoloops,* and

outputting instructions for controlling the milling cutter in accordance with the tool path.

The steps in independent claim 35 are identical to claim 14, but claim 35 encompasses "An article of manufacture comprising a computer readable medium having stored thereon computer executable instructions for generating a tool path for milling a region of a workpiece by a single milling cutter, the tool path including one or more passes, the instructions performing the steps of ...." In addition to disputing the underlined terms, the parties dispute whether these steps must be performed in the sequence listed.

Dependent claims 15 and 16 are reproduced below, with the disputed terms underlined:

15. The method of claim 14, wherein the selected points are branch points of a *medial axis transform*.

16. The method of claim 15, wherein the locations of the branch points are determined using the *medial axis transform*.

Dependent claims 36 and 37 are identical to claims 15 and 16, but they encompass the "article of manufacture" specified in claim 35.

IV. PRINCIPLES OF CLAIM CONSTRUCTION

The court, not the jury, must construe the meaning and scope of patent terms. Markman v. Westview Instruments, Inc., 52 F.3d 967, 979 (Fed.Cir.1995) (en banc), *aff'd,* 517 U.S. 370, 116 S.Ct. 1384, 134 L.Ed.2d 577 (1996). In construing disputed claim terms, the court should look first to intrinsic evidence.

Vitronics Corp. v. Conceptronic, Inc., 90 F.3d 1576, 1582 (Fed.Cir.1996). Intrinsic evidence includes the language of the claims, the specification, and the file history, if in evidence. *Id*. The claims themselves are of "primary importance, in the effort to ascertain precisely what it is that is patented." Phillips v. AWH Corp., 415 F.3d 1303, 1312 (Fed.Cir.2005). The "words of a claim 'are generally given their ordinary and customary meaning.' " *Id*. The "ordinary and customary meaning" of a claim term is judged from the perspective of a person of ordinary skill in the art. *Id*. at 1313.

Such a person "is deemed to read the claim term not only in the context of the particular claim in which the disputed term appears, but in the context of the entire patent, including the specification." *Id*. "Consistent with that general principle, ... 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. "In other cases, the specification may reveal an intentional disclaimer, or disavowal, of claim scope by the inventor." *Id*. The Federal Circuit emphasized in *Phillips* that "the 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.' " *Id*. at 1315 (quoting Vitronics, 90 F.3d at 1582). A specification need not define a term expressly in order to be a useful reference. It may also define terms by implication. *Id*. at 1321 (citing Vitronics, 90 F.3d at 1582).

On the other hand, one of the "cardinal sins" of patent law is reading a limitation from the written description into the claims. *Id*. at 1320 (quoting SciMed Life Sys., Inc. v. Advanced Cardiovascular Sys., Inc., 242 F.3d 1337, 1340 (Fed.Cir.2001)). This problem often arises when a patent describes only a single embodiment. In that case, it is not required that the claims of the patent be construed as being limited to that embodiment. *Id*. at 1323. *See also* Saunders Group, Inc. v. Comfortrac, Inc., 492 F.3d 1326, 1332 (Fed.Cir.2007) ("Even where a patent describes only a single embodiment, claims will not be read restrictively unless the patentee has demonstrated a clear intention to limit the claim scope ...."); Intamin, Ltd. v. Magnetar Techs. Corp., 483 F.3d 1328, 1333 (Fed.Cir.2007) ("a narrow disclosure in the specification does not necessarily limit broader claim language"). "[T]he line between construing terms and importing limitations can be discerned with reasonable certainty and predictability if the court's focus remains on understanding how a person of ordinary skill in the art would understand the claim terms." *Id*. at 1323.

The Federal Circuit has also instructed district courts to look to the patent's prosecution history. Although the history "often lacks the clarity of the specification," it "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*. at 1317.

In most situations, analysis of this intrinsic evidence alone will resolve any ambiguity in a disputed claim term. Vitronics, 90 F.3d at 1583. However, extrinsic evidence "may be considered if the court deems it helpful in determining the 'true meaning of the language used in the patent claims.' " Phillips, 415 F.3d at 1318 (quoting Markman, 52 F.3d at 980). Extrinsic evidence refers to evidence that is external to the patent and its file history, such as expert testimony, inventor testimony, dictionaries, and technical treatises and articles. Vitronics, 90 F.3d at 1584. Although generally "less reliable than the patent and its prosecution history," the Federal Circuit has "noted the help that technical dictionaries may provide to a court 'to better understand the underlying technology' and the way in which one of skill in the art might use the claim terms." Phillips, 415 F.3d at 1318. Accordingly, courts may freely consult dictionaries and may rely on dictionary definitions when construing claims, to the extent the dictionary definition does not contradict a

definition found in the patent documents. Vitronics, 90 F.3d at 1584 n. 6. Similarly, although "conclusory, unsupported assertions by experts as to the definition of a claim term are not useful to a court," such evidence is "useful ... for a variety of purposes, such as to provide background on the technology at issue, to explain how an invention works, 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." Phillips, 415 F.3d at 1318. A court, however, "should discount any expert testimony 'that is clearly at odds with the claim construction mandated by the claims themselves, the written description, and the prosecution history, in other words, with the written record of the patent.' " Id. at 1318 (quoting Key Pharms. v. Hercon Labs. Corp., 161 F.3d 709, 716 (Fed.Cir.1998)).

"While a trial court should certainly not prejudge the ultimate infringement analysis by construing claims with an aim to include or exclude an accused product or process, knowledge of that product or process provides meaningful context for the first step of the infringement analysis, claim construction." Wilson Sporting Goods Co. v. Hillerich & Bradsby Co., 442 F.3d 1322, 1326-27 (Fed.Cir.2006).

Finally, although the Federal Circuit has "acknowledged the maxim that claims should be construed to preserve their validity, we have not applied that principle broadly, and we have certainly not endorsed a regime in which validity analysis is a regular component of claim construction." Phillips, 415 F.3d at 1327. Rather, the maxim is limited to cases in which " 'the court concludes, after applying all the available tools of claim construction, that the claim is still ambiguous.' " *Id.* (quoting Liebel-Flarsheim Co. v. Medrad, Inc., 358 F.3d 898, 911 (Fed.Cir.2004)).

III. "*CREATING* A FAMILY OF CONCENTRIC *INDEXED CIRCLES*"

The parties contest the meaning of the phrase "creating ... circles" and the meaning of "indexed," both of which are used in claims 14 and 35. I conclude that neither of the parties' proposed constructions is consistent with the intrinsic and extrinsic evidence, and I adopt constructions that vary slightly from the tentative constructions circulated at the *Markman* hearing.

A. "Creating a Circle"

The parties' proposed constructions are as follows:

Plaintiff's Proposal	Defendants' Proposal
creating a circle: calculating values that define the set of all points in a plane equidistant from a center point	**circle:** A closed curve of all points within the same plane that are equidistant from a fixed center point. An arc is not a circle unless all its points are equidistant from a center point and the arc spans a full 360 degrees. A point and a distance by themselves are not a circle. In the context of a computer program, an object need not have been physically plotted in order to constitute a circle, but the program must at least have designated the object as an object with the attributes and behavior of a circle.

The underlying dispute over this heavily contested term was central to the motion for a preliminary injunction: whether or not the creation of an arc is equivalent to the creation of a circle. In light of the parties' briefs and their arguments at the *Markman* hearing, the Court adopts the following construction:

creating a circle-Calculating values that define the set of all points in a plane equidistant from a center point, and specifying that the values represent all such points. Merely calculating a center point and a distance (or "radius") would not create or comprise a circle. Points equidistant from a center point that would constitute an "arc" if reduced to tangible form would not become a circle until and unless the points extended a full 360 degrees and all of the points were equidistant from the center point.

The reasons for adopting this construction are discussed below. Both sides relied primarily on extrinsic evidence in support of their constructions, and the Court consequently bases its conclusion largely on those sources.

1. ***Dictionary definitions of "circle"*** FN2

FN2. I begin with the dictionary definition of "circle" because it is logical to pin down a definition of "circle" before looking to the intrinsic evidence to understand what it means to "create" a circle by means of a computer program, which is the crux of the parties' dispute. *See* Phillips, 415 F.3d at 1324 ("[A] judge who encounters a claim term while reading a patent might consult a general purpose or specialized dictionary to begin to understand the meaning of the term, before reviewing the remainder of the patent to determine how the patentee has used the term. The sequence of steps used by the judge in consulting various sources is not important; what matters is for the court to attach the appropriate weight to be assigned to those sources in light of the statutes and policies that inform patent law.")

Both sides draw on dictionaries to define the term "circle." The only difference in their approach is that Defendants rely on general purpose dictionaries, while Plaintiff draws from mathematical dictionaries. Defendants' preferred definition is "a closed plane curve every point of which is equidistant from a fixed point within the curve." *Merriam-Webster's Collegiate Dictionary* (10th ed.1996). Plaintiff's preferred definition is "the set of all points in a plane equidistant from a center point." Potel Decl. I para. 10; Potel Decl. II para. 7. Plaintiff's sources are more authoritative because the parties agree that the patent describes a mathematical process. The Court thus adopts this definition of "circle."

2. ***The specification***

"The inquiry into how a person of ordinary skill in the art understands a claim term provides an objective baseline from which to begin claim interpretation." Phillips, 415 F.3d at 1313. "Importantly, the person of ordinary skill in the art is deemed to read the claim term not only in the context of the particular claim ... but in the context of the entire patent, including the specification ...." *Id*. The Federal Circuit has urged district courts to look to the patent specification to illuminate the meaning of terms used in the claims. *See id*. at 1315 ("the specification 'is always highly relevant to the claim construction analysis. Usually, it is dispositive ....") (citation omitted).

Defendants rely on the patent's specification to argue that (1) the patent makes clear distinctions between arcs (or semicircles) and circles; and (2) the patentee intended "circle" to entail a "*closed* plane curve." Plaintiff objects to this reliance on the specifications, but its vague and general analysis is not helpful. I conclude that Defendants' reliance on the specifications is acceptable because they have not "imported" limitations from the specifications into the claims. Rather, they have identified repeated uses of the disputed language in the specification that illuminate the term's meaning.

As to Defendants' first argument concerning distinctions made in the patent between circles and arcs, the

patent's Definitions section, the descriptions of the preferred embodiments, and language in other claims are revealing. For example, the patent's "Definitions" section, which is under the "Detailed Description of the Invention," defines a "circular arc" as "the set of all points equidistant from a fixed point called the center, i.e. a *portion* of a circle." ('013 patent 4 :55) (emphasis added). In the description of the Sixth Preferred Embodiment, the patent defines arcs as "*pieces* of the original circles." *Id*. at 20:33-34 (emphasis added). Defendants cite several other spots in the specifications and the claims themselves containing or reflecting distinctions between circles and arcs, and circles and radii or center points. *See* Ds' Brief at 8:28-9:17; 11:12-25. Some are more probative than others, but together these distinctions show that the specification cannot be reconciled with a definition that would encompass the creation of a circular arc. Nowhere does the specification conflate the creation of an "arc" and the creation of a "circle." *See* Intamin, 483 F.3d at 1336 (finding support for court's construction in fact that patent specification used term consistent with the construction).

However, as to Defendants' second argument, concerning whether a circle entails a *closed* curve, the specifications do not support the conclusion that the patentee intended "circle" to entail a "*closed* plane curve." Although figures in the specification show closed curves, those figures are obviously for illustrative purposes. I also agree with Plaintiffs that "closed" suggests a visual representation of a circle, which is not appropriate in the context of computer software creation (discussed below).

3. *The ordinary and customary meaning of "creating circles" in the field of software development*

Although claim 14 refers only to a method for creating a tool path, claim 35 claims a software program that is to perform the claimed methods. Furthermore, the opening paragraph of the "Field of the Invention" section of the '013 patent states, "[t]his invention relates to computer aided manufacturing and more specifically to a method and apparatus for generating a computer numerical control program for controlling a numerical control machine." ('013 patent 1 :15-18.) The parties thus agree that the terms should be construed in the context of creating software.

Both sides enlisted competing experts to educate the Court on the ordinary and customary meaning of "creating circles" in the field of software design. Plaintiff's expert, Michael J. Potel, Ph.D. has significant experience in software development and "computer graphics." Defendants' expert, Professor Gerald Farin, has a great deal of experience in the field of computer aided design: he has designed CAD software; authored 100 papers and authored/edited over 20 books in the field of geometric modeling, including leading textbooks on Computer Aided Design; is the editor-in-chief of the journal *Computer Aided Geometric Design;* received an award for achievements in computer aided geometric design; teaches courses in computer aided geometric design; and has many other relevant credentials. *See* Farin Decl. para.para. 4-8. Defendants also rely on expert declarations from Defendant Evan Sherbrooke, who created the allegedly infringing software and previously participated in developing Plaintiff's embodiment of the '013 patent.

Farin's declaration for Defendants explains that when a software program "creates" a circle, it requires two things: (a) a center point and a radius that define the set of all points in a plane equidistant from a center point; and (b) some indication that those values are meant to create a circle, such as an associated method or algorithm. Without such an indication, a center point and a radius could be used to define many different shapes, including an equilateral triangle, a regular pentagon, or any other regular polygon. They could also be used to define three-dimensional objects, such as spheres and cubes. Farin Decl. para.para. 13-20. FN3

FN3. Sherbrooke's declaration for Defendants states similarly that "[i]t is not enough simply to have calculated parameters that *could* be used to define and create a circle. You have to tell the computer that an object that looks and acts like a circle exists at a particular location." Sherbrooke Decl. para. 10. Sherbrooke then details the mechanics of computer programming, explaining that in object oriented programming languages a circle "object" would be defined by the radius and center point values, and an associated "method." He states that in non-object oriented programming languages, the radius and center values are "tightly associated with methods that operate on and manipulate the data." Id. para. 19.

Based on the above considerations, I conclude that the evidence of the ordinary and customary meaning of "creating a circle" in the field of software development requires a construction that specifies that creating a circle involves not just "calculating values that define" a circle, but specifying that those values comprise a circle, as opposed to some other figure.

4. ***Prosecution history***

Defendants contend that during the application process the patentee argued to the United States Patent and Trade Office that its invention was not obvious because previous patents that involved the use of "medial axis transforms" did not entail the creation of families of concentric indexed circles. Therefore, they assert, Plaintiff cannot now argue that merely specifying a radius and center is equivalent to "creating a circle." Plaintiff contests this conclusion, but even if Plaintiff is correct on this issue, its analysis would show only that the prosecution history does not support either side's preferred construction. Thus, because the factors above compel the conclusion that specifying a radius and center *per se* is not equivalent to "creating a circle," the Court need not reach this issue.

For the these reasons, the Court adopts the above construction, which incorporates elements of Plaintiff's and Defendants' proposals.

B. "creating a family of concentric *indexed* circles"

The parties contest the construction of the term "indexed":

Plaintiff's Proposal	Defendants' Proposal
family of concentric *indexed* circles: two or more circles with the same center point uniquely identified within each family	**creating a family of concentric *indexed* circles:** Bringing into existence two or more complete circles whose center is the same but whose points are located at different distances from that center, with each such circle numbered consecutively according to its relative distance from the boundary of the workpiece.

The Court concludes that Defendants' proposal is too narrow because it requires that the indexing be done by *consecutive numbering,* to the exclusion of letters or symbols. Plaintiff's construction is too broad because it does not convey that the indexing must be based upon a circle's location. At the *Markman* hearing, the Court circulated a tentative construction that was almost identical to the following construction, which it now adopts: FN4

FN4. The Court's tentative construction used the word "location" rather than "position." The Court has substituted "position" to make the construction more consistent with the prosecution history.

family of concentric indexed circles-Two or more complete circles with the same center point but whose points are located at different distances from that center, with each such circle identified according to its position.
Plaintiff did not object to this construction. Defendants objected that the construction fails to specify that the indexing must be done according to a circle's location relative to the outer boundary of the workpiece and relative to other circles in the circle family. But this objection lacks support in the patent claim, specifications, or prosecution history.
1. ***Prosecution history***

The prosecution history reveals that the patentee understood both that the index could be something other than a number and that the index would be related to a circle's location. The prosecution history does not, however, support Defendants' contention that the indexing must be done based upon the circle's position relative to the part boundary and to other circles.

The patentee stated to the patent examiner that "An index is a *number or a symbol or expression* to *indicate a position in an arrangement* .... [I]ndexing is a feature of an embodiment of the invention which provides the means for uniquely identifying each circle in each family of concentric circles." Trusso Decl., Exh. P., p. 22 (emphasis added).

This definition of the term "index" by the patentee clearly encompasses the requirement of denoting a *position,* but it does not require that the position be determined relative to the outer boundary of the workpiece or other circles in the circle family.

2. ***The specification***

Defendants point out that the patent's Sixth Preferred Embodiment describes an invention in which circles within a family are indexed by "numbering the circles from the outside in an ascending scale." ('013 patent 20 :28-30). This language is consistent with the statement in the prosecution history that the circles must be numbered based on their position. This single embodiment alone does not, however, support the conclusion that numbering must be based on a circle's position relative to the part boundary or to other circles. *See* Phillips, 415 F.3d at 1323 ("[W]e have expressly rejected the contention that if a patent describes only a single embodiment, the claims of the patent must be construed as being limited to that embodiment.")

Defendants try to buttress the significance of this single embodiment by invoking the purpose of the invention claimed in the '013 patent. They argue that "[t]he point of indexing is to allow the identification of *identically indexed* circles in adjacent families so that they can be combined to form concentric isoloops. If index numbers were randomly assigned, as Surfware's proposed construction would permit, the 'isoloops' could be non-concentric and intersecting, which would yield a bizarre tool path when blended according to the subsequent 'generating' step." Ds' Brief at 15. Defendants illustrate this argument in Figure B to Sherbrooke's declaration, which shows that "connecting circles that are merely 'uniquely identified' rather than numbered according to their relative position would allow isoloops to cross and would not ensure that the isoloops are nested as the '103 patent teaches and shows in Figure 22." Sherbrooke Decl. para. 10. This argument has some force, as it is apparent that the purpose of the invention is to generate relatively efficient tool paths. But the Court has no way of judging whether the resulting tool paths would be truly "bizarre," as Defendants claim, or whether they would be consistent with the patent's purpose. (Plaintiff's expert, Dr. Potel, suggests that even if the resulting tool path would be inferior to the preferred embodiment, "persons of

skill in the art would not understand such a method to be exempted from coverage by the claims as written." Potel Decl. II para. 17.) Thus, the Court is in no position to conclude that this patent's purpose is inconsistent with the construction supported by the other relevant evidence.

For these reasons, the Court adopts the construction stated above.

IV. "*CONNECTING TOGETHER* THE CIRCLES OF ADJACENT FAMILIES OF CIRCLES HAVING AN IDENTICAL INDEX TO FORM *ISOLOOPS*"

The limitation at issue here, found in claims 14 and 35, is "connecting together the circles of adjacent families of circles having an identical index to form isoloops." The parties' proposed constructions are as follows:

Plaintiff's Proposal	Defendants' Proposal
"creating loops that contain arcs of circles with the same index from neighboring circle families"	"Selecting circles that have been assigned identical indexes and using a smoothing technique to connect those circles to form sets of closed loops consisting of pieces of the original circles and smooth curves or lines joining those pieces. Although the resulting isoloops are used in generating the tool path, they are not the toolpath itself."

Plaintiff argues that neither the claim language nor the specification requires a particular technique for connecting circles to form isoloops. Although Plaintiff's position is supported by the "bare" text in claims 14 and 35, some of the limitations proposed by Defendants are supported by language elsewhere in the patent. This language is particularly relevant because the term "isoloop" did not exist until this patent was drafted. It was coined by Defendant Evan Sherbrooke to describe the method claimed by the '013 patent. *See generally* Altiris v. Symantec Corp., 318 F.3d 1363, 1370 (Fed.Cir.2003) ("[T]he claim term will not receive its ordinary meaning if the patentee acted as his own lexicographer and clearly set forth a definition of the disputed claim term in either the specification or prosecution history.")

Based on the analysis set forth below, the Court adopts the following construction of the contested terms, which differs somewhat from the tentative construction it circulated at the *Markman* hearing:

connecting together **the circles of adjacent families of circles having an identical index to form** ***isoloops***-Selecting circles that have been assigned identical indexes and connecting those circles to form sets of loops consisting of pieces of the original circles and curves or lines joining those pieces.

Each section of the analysis below begins with text from Defendants' proposed construction.

A. The Connected Circles Must Have Identical Indexes

"***Selecting circles that have been assigned identical indexes ....***"

Plaintiff's construction describes connecting circles with the "same" index. Defendants describe connecting circles with "identical" indexes. The parties thus agree on this part of the Court's construction, and neither party objected to it at the *Markman* hearing.

B. A "Smoothing Technique" and "Smooth Curves" Are Not Required

"***... and using a smoothing technique to connect those circles to form sets of closed loops consisting of pieces of the original circles and smooth curves or lines ...***"

At the *Markman* hearing, Plaintiff's only objection to the Court's tentative construction was that it included a requirement that the method use a "smoothing technique," and that the pieces of the original circles be joined by "smooth curves or lines." Plaintiff's arguments at the hearing have persuaded the Court that including this requirement would be an improper importation of a single preferred embodiment's features.

1. ***The Sixth Preferred Embodiment***

The claim language-"connecting together the circles of adjacent families of circles having an identical index to form isoloops"-does not refer to any smoothing requirement. Defendants thus rely on the specification's Sixth Preferred Embodiment, which states that

After creating the circle graph, the circles of each family are indexed by numbering the circles from the outside in an ascending scale. The circles having the same index are then joined together into *isoloops, so called because the isoloops are created by joining circles of the same index together*. The joining process creates *some combination of arcs (pieces of the original circles) and blends joining those pieces together*. FIG. 22 is an illustration of the circle families being joined by the isoloops.

Preferably, the *lines* joining two circles together are constructed by: [here, a technique and formulas are described] .... One skilled in the art would recognize that *other blending techniques that would maintain a tangent continuous tool path* could be used to connect the circles.

('013 patent 20 :28-53) (emphasis added). Previously in the specification, before any of the preferred embodiments are described, the patent's "Definitions" section defines "tangent continuous" as "forming a smooth curve." ('013 patent 5 :30). It defines "smooth curve" as "a curve in which the unit tangent to the curve is continuous at every point along the curve." ('013 patent 5 :21).

Defendants argue that because the Sixth Preferred Embodiment states that "[o]ne skilled in the art would recognize that other blending techniques that would maintain a tangent continuous tool path could be used to connect the circles," and because "tangent continuous" is defined earlier as "forming a smooth curve," the patentee meant to limit its claim to methods that use a "smoothing" technique. Defendants also argue that the connections in Figure 22, which is referenced in the Sixth Preferred Embodiment, are tangent continuous and thus smooth.

The Federal Circuit has repeatedly warned against relying solely on a single embodiment to limit the scope of a claim, and Defendants have not pointed to other sections of the patent that would compel the conclusion that a smoothing technique is required. *See* Saunders Group, Inc., 492 F.3d at 1332; Intamin, Ltd., 483 F.3d at 1333; Phillips, 415 F.3d at 1323. *Cf.* ICU Med., Inc. v. Alaris Med. Sys., Inc., 558 F.3d 1368, 1374-76 (Fed.Cir.2009) (adopting narrow construction of claim term where specification "repeatedly and uniformly" used the narrow definition); Kinetic Concepts, Inc. v. Blue Sky Med. Group, Inc., 554 F.3d 1010, 1017-19 (Fed.Cir.2009) (adopting narrower construction where all of the numerous examples in the specification used the narrower meaning); iLOR, LLC v. Google, Inc., 550 F.3d 1067, 1073-75 (although claim language was itself clear, for sake of argument court notes that the specification repeatedly used narrow construction of term, and prosecution history disavowed broader construction); Amazin' Raisins Int'l, Inc. v. Ocean Spray Cranberries, Inc., 306 Fed. Appx. 553, 556-58 (Fed.Cir. Oct.31, 2008) (unpublished decision limiting claim term based upon specification's detailed description of the invention,

which appeared before any preferred embodiment was discussed).

But even if the Sixth Preferred Embodiment alone provided a basis for limiting the claim language, the text upon which Defendants rely does not in fact limit the preferred embodiment to a smoothing technique or smooth connections. It states that "[o]ne skilled in the art would recognize that other blending techniques that would maintain a tangent continuous tool path could be used to connect the circles." That language does not require or imply that *only* techniques maintaining a tangent continuous tool path could be used to connect the circle pieces. Nor does the Sixth Preferred Embodiment define "isoloops" in a manner that compels Defendants' construction. The closest it comes to stating a definition is the statement, "[t]he circles having the same index are then joined together into isoloops, so called because the isoloops are created by joining circles of the same index together." ('013 patent at 20:30-32.) That description of "isoloops" does not require smoothing, and the next sentence does not clearly supplement the meaning of "isoloops." FN5 Defendants also point to what they argue are tangent continuous connections illustrated in Figure 22, which is referenced by the Sixth Preferred Embodiment. But it is not at all clear to the Court how Defendants determined that the lines in the illustration are tangent continuous, particularly in light of Sherbrooke's statement in his declaration that the scale of the figure is too small to tell even whether the connections are straight lines.

FN5. The next sentence reads, "The joining process creates some combination of arcs (pieces of the original circles) and blends joining those pieces together." ('013 patent at 20:32-34.) As discussed below, "blending" is a technique for creating smooth curves.

The Sixth Preferred Embodiment later discusses a method for implementing the step of "generating the tool path by blending between the isoloops." Although this section of the Embodiment says that "[t]he blends are generated using the same exact blending function used ... above," that function is described as a "preferabl[e]" embodiment. ('013 patent at 20:37, 20:54-55.)

2. *Claim language*

Turning to the claim language itself-the most important source of a term's meaning-Plaintiff points out that in contrast to the next limitation in claims 14 and 35 ("generating the tool path by blending between the isoloops"), this limitation does not mention "blending." It is reasonable to assume that if the patentee had intended to require blending in this limitation, it would have said so explicitly. Even if this were not the case, there is nothing in the claim language that supports Defendants' position.

3. *Purpose of the invention*

Finally, Defendants provide an illustration generated by Defendant Evan Sherbrooke that purportedly shows that connecting circles without a "smoothing technique" would allow "bizarre" loops including "self-intersections, sharp corners, and wildly varying engagement angles." Sherbrooke Decl. II at 8-9, Fig. D. Sherbrooke contends that this output would be "fundamentally contrary to the invention." But as noted above, the Court is not in a position to evaluate whether such an output would be "fundamentally contrary to the invention." Even if it were, without some basis in the text of the patent or the prosecution history, that assertion alone is not enough to justify the importation of limitations from one preferred embodiment.

For these reasons, the Court concludes that it is not appropriate to include the "smoothing" requirements in its construction of this limitation.

C. It is Not Necessary to State that the Loops Must Be Closed

"*... to form sets of closed loops ...*"

Plaintiff's expert argued against incorporating this language. He cited a dictionary definition of "loop" and made the observation that "since the isoloops are connected to other isoloops in the blending step, it would be unnecessary and superfluous to require that they be 'closed.' " Potel Decl. II para. 18. The Court found this argument persuasive, and omitted the language from its tentative construction. Defendants did not object at the *Markman* hearing to the omission, and the Court will not include it.

D. It is Not Necessary to State that Isoloops are "Not the Toolpath Itself"

"***Although the resulting isoloops are used in generating the tool path, they are not the toolpath itself.***"

Defendants contend that the next step listed in claims 14 and 35 makes clear that the isoloops are not part of the tool path because it states that the tool path is generated by "blending *between* the isoloops." (emphasis added). They also assert that the Sixth Preferred Embodiment supports this conclusion, as does the prosecution history. The Court was not persuaded by these arguments and omitted the language from its tentative construction. Defendants did not object at the *Markman* hearing to this omission, and the Court will not include it.

V. "GENERATING THE TOOL PATH BY *BLENDING BETWEEN THE ISOLOOPS*"

The limitation at issue here, which is found in claims 14 and 35, is "generating the tool path by blending between the isoloops." The parties' proposed constructions are as follows:

Plaintiff's Proposal	**Defendants' Proposal**
"producing a tool path with connections between the isoloops by interpolation, i.e., a process that produces intermediate values from the isoloops being connected"	"Producing a smooth, continuously spiraling tool path based on weighted averages or other mathematical combinations of successive isoloops as wholes. The tool path so generated must not include sharp turns and must not allow the cutting tool engagement to exceed a predetermined maximum value."

For the reasons stated below, the Court adopts the construction it circulated at the *Markman* hearing:

generating the tool path by *blending between the isoloops*-Producing a smooth tool path based on a process that produces intermediate values from the isoloops being connected.

Unlike the question of a "smoothing" requirement in the previous limitation, a requirement of a "smooth tool path" is supported for this step of the claim by the prosecution history and the specification's definition of "tangent continuous."

A. The Toolpath Must Be "Smooth"

The limitation at issue here is "generating the tool path by blending between the isoloops." Although the patent does not define the term "blending," the patentee explained to the examiner that,

Limitation (c) of claim 28 recites generating the tool path by blending between the isoloops. The blending is *defined* at paragraphs [0170[sic] and [0171] and Fig. 23 *as a method for constructing a tangent continuous*

tool path based on the parameters of the isoloops.

Bagatell Decl., Exh. J at 23 (emphasis added).FN6 As discussed above, the patent defines "tangent continuous" as "forming a smooth curve." (' 013 patent at 5:30). This prosecution history, combined with the patent's definition of "tangent continuous," compels the conclusion that the construction of "blending" must include a requirement of a smooth tool path.

FN6. Attorney Bagatell represented at the *Markman* hearing that "claim 28" became issued claim 14, and Plaintiff did not disagree.

At the *Markman* hearing, Plaintiff argued that the statement in the prosecution history was insignificant because it did not expressly disavow a broader definition of "blending" by distinguishing prior art. *See generally* Omega Eng'g, Inc. v. Raytek Corp., 334 F.3d 1314, 1325 ("[W]e have required the alleged disavowing statements to be both so clear as to show reasonable clarity and deliberateness ... and so unmistakable as to be unambiguous evidence of disclaimer.") But Plaintiff failed to cite or even acknowledge the rule that a "claim term will not receive its ordinary meaning if the patentee acted as his own lexicographer and clearly set forth a *definition* of the disputed claim term in *either* the specification or prosecution history." Altiris, Inc. v. Symantec Corp., 318 F.3d 1363, 1370 (Fed.Cir.2003) (citations omitted) (emphasis added). *See also* 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.") Here, the prosecution history makes clear that the patentee defined blending "as a method for constructing a tangent continuous tool path." The patentee's statement in the prosecution history could hardly be any clearer. In fact, Plaintiff's attorney conceded during the *Markman* hearing that during prosecution of the patent his client defined blending as "a method for constructing a tangent continuous tool path." Transcript at 28:20-29:2.

The Court also notes that the Sixth Preferred Embodiment is consistent with the prosecution history, because it states that "[t]he blends are generated using the same exact blending function" as was used for creating isoloops in the embodiment, which was a function creating a tangent continuous tool path. ('013 patent at 20:54-55).

In light of the prosecution history, the definition of "tangent continuous" in the "Detailed Description of the Invention," and the language in the Sixth Preferred Embodiment, the Court finds that the tool path created by blending must be "smooth." FN7

FN7. At the *Markman* hearing, Defendants argued for the first time that the construction should also state that the tool path must be "based on the parameters of the isoloops." *See* Transcript at 33:20. Unlike the requirement of a smooth tool path, however, Defendants did not show that such a limitation is supported by language in the patent itself. The Court therefore declines to adopt it.

B. It is Not Necessary to State that the Tool Path Must Be "Continuously Spiraling"

Defendants note that the Sixth Preferred Embodiment explains that "[a] *spiral-like* tool path ... is then created by blending between successive isoloops." ('013 patent at 20:53-54 (emphasis added)). But, as

Plaintiff notes, Defendant's proposal that the path be "continuously spiraling" is more limiting than even the preferred embodiment's "spiral-like." The Court therefore omitted the requirement of a continuous spiral from its tentative construction. Defendants did not object at the *Markman* hearing to its omission, and the Court will not include it.

C. It is Not Necessary to State that the Tool Path May Not Include Sharp Turns

Defendants' argument for requiring that the path not include sharp turns is not entirely clear, but it seems to be that the purpose of "blending between the isoloops" is to limit variations in the engagement angle of the cutting tool so that the tool engagement can be maintained as close as possible to a predetermined maximum engagement. Sharp turns would undermine this purpose because they increase a tool's engagement angle. Neither the claim nor the specification mentions sharp turns, and for this reason the Court did not include this requirement in its tentative construction. Defendants did not object at the *Markman* hearing to the omission of this language, and the Court does not include it in its construction.

D. It is Not Necessary to State that the Tool Path Must "Not Allow the Cutting Tool Engagement to Exceed a Predetermined Maximum Value"

"***The tool path so generated must not include sharp turns and must not allow the cutting tool engagement to exceed a predetermined maximum value.***"

Defendants contend that "the patent makes clear from beginning to end that the invention is a method of generating a tool path by controlling the tool engagement." They cite several passages in the specification-including the abstract, "summary of the invention," "detailed description of the invention," and others-that describe the patent's method as one that stores a maximum engagement of the milling cutter and defines passes such that a value of the engagement does not exceed the maximum. *See* '013 patent, front page, 2:24-64, 8:1-3, 8:16-18, 22:36-44, Fig. 3. These passages often refer to this feature as part of the "present invention," and Defendants rely primarily on three Federal Circuit cases in which a specification's reference to the "present invention" was used to limit particular claim language. But in all of those cases the specification's text was tied to particular language in the claim. *See* Verizon Servs. Corp. v. Vonage Holdings Corp., 503 F.3d 1295, 1308 n. 8 (Fed.Cir.2007) (applying description of "present invention" to limit claim term where the specification referred to "the very claim term that is at issue here."); Honeywell Int'l, Inc. v. ITT Indus., Inc., 452 F.3d 1312, 1318 (Fed.Cir.2006) (construing the claim term "fuel injection system component" to mean "a fuel filter," because the only component described in the specification that otherwise met the claim's requirements was a fuel filter); Watts v. XL Sys., Inc., 232 F.3d 877, 882-83 (Fed.Cir.2000) (construing the term "dimensioned such that" based in part on the specification because the specification only described one method in which "tapered external threads [are] dimensioned" and referred to that method in the context of "the present invention"). Here, by contrast, there is no reference to engagement anywhere in claims 14 or 35, let alone the particular text at issue here, and no other language in the limitation suggests that it would be appropriate to read the engagement feature into this claim. To do so would therefore be overreaching of the kind disallowed by the Federal Circuit. *See* Phillips, 415 F.3d at 1323.

VI. *SEQUENCE OF* "THE STEPS OF: CREATING ...; CONNECTING ...; GENERATING ..., AND OUTPUTTING ...."

The parties contest whether the claim language logically requires that the steps in claims 14 and 35 be performed in the order that they are listed:

Plaintiff's Proposal	Defendants' Proposal
The steps of the claimed computer program need not be performed in the order that the steps are written in the claim.	The claimed steps must be completed in order. That is, the families of concentric circles must be created and indexed before adjacent families of circles are connected to form isoloops; the isoloops must be formed before the tool path is generated by blending between the isoloops; and the tool path must be generated before the instructions for controlling the milling machine are outputted.

The Federal Circuit prescribes a two-part test for determining whether "the steps of a method claim that do not otherwise recite an order, must nonetheless be performed in the order in which they are written.... First, we look to the claim language to determine if, as a matter of logic or grammar, they must be performed in the order written.... If not, we next look to the rest of the specification to determine whether it 'directly or implicitly requires such a narrow construction.' " Altiris, 318 F.3d at 1369 (citing Interactive Gift Express, Inc. v. Compuserve, Inc., 256 F.3d 1323 (Fed.Cir.2001)).

Defendants argue that the order of steps listed in the claims is the order in which they must be performed,FN8 but their contention is not supported by the text or the logic of the claim. Defendants argued at the *Markman* hearing that the limitations' reference to "*the* circles," "*the* isoloops," and "*the* tool path" require a specific sequence. But as a matter of grammar, this language is not unambiguous.

FN8. Defendants' briefing on this issue was very cursory, and at the *Markman* hearing they backed away somewhat from their initial position, arguing that "there is at least some sequence-of-steps requirement. It's a question of degree perhaps, but there can't be any doubt that there is a sequence in the steps.... The question that we are mostly debating seems to be whether all the circles in the families have to be created and indexed before the connections between the identically indexed circles begin." Transcript 49:15-18, 50:19-22.

Defendants also argue that logic requires that the steps be listed in the particular order, but their assertion is contested by the declaration of Dr. Potel, who states that the steps can logically be performed in a sequence different from their order in the claims, and that it would in fact be odd for a computer program to perform the steps in the exact order listed in the claims. Potel Decl. I para.para. 23-25. Defendants presented no extrinsic evidence in support of their logic-based position.

Nor is Defendants' position supported by the specification. Although the Sixth Preferred Embodiment does describe performing the steps in the order they are listed in the claims, without clear support in the claims themselves for a particular order it would be inappropriate to read in a limitation from this single embodiment. *See* Altiris, 318 F.3d at 1370 ("Nor are claims ordinarily limited in scope to the preferred embodiment. These principles apply with equal force where ... the limitation to be imported from the specification is an order of method steps ....")

In the absence of claim language clearly requiring a certain sequence and the lack of other intrinsic evidence supporting Defendants' position, and given the extrinsic evidence that logic does not require the listed order of steps, the Court rejects the contention that the steps must be performed in the order proposed by Defendants.

VII. "*MEDIAL AXIS TRANSFORM*"

Dependent claims 15, 16, 36 and 37 refer to the "branch points of a medial axis transform." The parties agree that "branch points" means "points of the medial axis transform that are equidistant from three or more points on the shape's boundary." Their preferred constructions of "medial axis transform" are as follows:

Plaintiff's Proposal	Defendants' Proposal
the center points and corresponding radii of all circles lying within a shape and touching at least two points on the shape's boundary	No construction is necessary. Alternatively, if the term is construed, it should be construed as follows: The medial axis transform for an object is a representation of the object consisting of its medial axis and the distances from each point on that medial axis to the boundary. The medial axis of an object is the set of points inside the object's boundary that have more than one closest point on the object's boundary.

The parties do not dispute that *both* of these proposed constructions are mathematically valid definitions of the term "medial axis transform." Defendants thus argue that "medial axis transform" ("MAT") need not be construed at all. They contend that Plaintiff prefers its description of a "medial axis transform" only because it would suggest to the jury that the creation of circles is a necessary step in creating a MAT. Plaintiff conceded in its opening brief that "Defendants apparently do not dispute that the accused product selects branch points of a 'medial axis transform.' " Plaintiff nevertheless contends that an "*understanding* of that term is necessary to assist the trier of fact in understanding the issues." P's Brief at 24 (emphasis added). Plaintiff argues that its definition is preferable because it is more "mathematically clean" and more widely used than Defendants' proposal.

"Claim construction is a matter of resolution of *disputed meanings and technical scope,* to clarify and when necessary to explain what the patentee *covered by the claims* .... It is not an obligatory exercise in redundancy." U.S. Surgical Corp. v. Ethicon, Inc., 103 F.3d 1554, 1568 (Fed.Cir.1997) (emphasis added). *See also* Vivid Techs., Inc. v. Am. Sci., 200 F.3d 795, 803 (Fed.Cir.1999) ("[O]nly those terms need be construed that are in controversy, and only to the extent necessary to resolve the controversy.")

Here, choosing between the parties' preferred constructions of "medial axis transform" would do nothing to resolve the term's disputed meaning or clarify its technical scope, because the parties do not dispute its meaning or scope. Nor will adopting a preferred definition clarify matters for the jury, because adopting one definition could suggest that the other is incorrect even though it is substantively equivalent. "Splitting the baby" and adopting both definitions would accomplish no more than having the parties present their alternate explanations of the term to the jury. The Court therefore will not construe the term "medial axis transform."

VIII. CONCLUSION

For the foregoing reasons, the Court construes the disputed terms as described above. It further finds that the steps need not be performed in the listed order, and that the term "medial axis transform" need not be

construed.

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