

United States District Court,  
S.D. New York.

**SCANNER TECHNOLOGIES CORP,**  
Plaintiff.

v.

**ICOS VISION SYSTEMS CORP., N.V,**  
Defendant.

No. 00 CIV 4992(DC)

**Jan. 11, 2002.**

Lucas & Just, LLP, By: David L. Just, New York, New York, George A. Leone & Associates By: George A. Leone, Minneapolis, Minnesota, for Plaintiff.

Brown Rudnick Freed & Gesmer, P.C. By: Brian L. Michaelis, James W. Stoll, Boston, Massachusetts, Cohen, Pontani, Lieberman & Pavane, New York, New York, for Defendant.

### ***MEMORANDUM DECISION***

**CHIN, J.**

In this patent case, plaintiff Scanner Technologies Corp. ("Scanner") alleges that defendant ICOS Vision Systems Corp., N.V. ("ICOS") infringed upon Scanner's rights in U.S. Patent No. 6,064,756 (the "'756 Patent") and U.S. Patent No. 6,046,757 (the "'757 Patent"). The case involves technology and processes used to inspect "ball grid arrays," which are used in electronic devices. The Court is called upon to consider such terms as "illumination source," "side view image," "crescent shape," "x, y, and z values," "triangulation calculation," "three dimensional position," and "pre-calculated calibration plane."

The parties submitted briefs and participated in a *Markman* hearing to aid the Court in construing the patent claims. After reviewing the evidence and the briefs, the Court construes the disputed patent terms as set forth below.

### ***BACKGROUND***

#### ***I. The Patents***

This case involves two patents: the '756 Patent and the '757 Patent. Scanner alleges that ICOS infringes both patents by selling, offering for sale, and servicing a device called CyberSTEREO. (Compl.para.para. 9, 11).

Patents '756 and '757 were issued on May 16, 2000, to Elwin M. Beaty and David P. Mork-the two inventors of the apparatus and method in question. (Compl.para. 6). Mork assigned his rights in the patents to Beaty, the CEO and majority shareholder of Scanner. (Compl.para. 8). Beaty granted Scanner an

exclusive right to the patents.

The patents relate to a three dimensional inspection of ball array devices, including ball grid arrays ("BGAs") and bump on wafers ("Bump on Wafers"). The '756 Patent pertains to the inspection apparatus and the '757 Patent pertains to the method. A BGA, as defined by Scanner, "is an array of solder balls mounted on a circuit board." (Scanner Br. at 1). A Bump on Wafer device, as defined by Scanner, "is a ball array device having solder balls mounted directly on a thin slice of semiconductor material, such as silicon." (Scanner Br. at 1).

BGAs are used in computer chips and can be found in devices such as personal computers, cellular telephones, electronic organizers, and compact disk players. It is important that all solder balls are positioned precisely at the same height. A minute difference in height, even as small as a human hair, could render the BGA useless. Because the economics involved render repairs impractical, a defective BGA usually means the entire electronic device must be discarded. As a result, the industry has sought to develop an inspection machine to enable manufacturers of ball array devices to inspect BGAs and Bump on Wafers in a fast and efficient manner. The patents at issue pertain to such an inspection device.

## II. *The Claims*

The relevant claims of the Patents, with the disputed terms underscored, are as follows: FN1

FN1. Unless otherwise noted, references are to the '756 Patent. The language in the two patents is nearly identical. The disputed terms appear in other claims of the Patents as well, not quoted here. The construction of the terms set forth herein controls with respect to the other claims as well.

1. A three dimensional inspection apparatus for ball array devices having a plurality of balls, wherein the ball array device is positioned in a fixed optical system, the apparatus comprising:  
(a) an *illumination apparatus* positioned for illuminating the ball array device; FN2

FN2. Claim 1(a) of the '757 Patent reads instead: "the process comprising the steps of: a) illuminating the ball array device...."

(b) a first camera disposed in a fixed focus position relative to the ball array device for taking a first image of the ball array device to obtain a characteristic circular doughnut shape image from at least one ball;  
(c) a second camera disposed in a fixed focus position relative to the ball array device for taking a second image of the ball array device to obtain a *side view* image of the at least one ball; and

(d) a processor, coupled to receive the first image and the second image, that applies *triangulation calculations* on related measurements of the first image and the second image to calculate a *three dimensional position* of the at least one ball with reference to a *pre-calculated calibration plane*.

2. The three dimensional inspection apparatus of claim 1 wherein the second image comprises a segment having a crescent shape.

7. The three dimensional inspection apparatus of claim 1 wherein the second image is obtained at a low angle of view.

(Col.18, 1.34-Col.19, 1.5).

## *DISCUSSION*

### *I. Applicable Law*

A patent infringement analysis involves a two-step process. *Cybor Corp. v. FAS Techs., Inc.*, 138 F.3d 1448, 1454 (Fed.Cir.1998). First, the court construes the patent by determining the scope and meaning of the patent claims asserted. *Id.* (citing *Markman v. Westview Instruments, Inc.*, 517 U.S. 370, 371-73 (1996)). Second, the construed claims are compared to the allegedly infringing device to determine if an infringement occurred. *Id.* (citation omitted).

The construction of a patent is a question of law for the court, not of fact for the jury. *Markman*, 517 U.S. at 372. Patent construction lies within the province of the court because the judge, based on his or her training and discipline, is generally more qualified than a jury to interpret patent terms. *Id.* at 388-89.

A patent consists of a written description called the specification, which is usually accompanied by drawings, and the claims. The claims are at the end of the patent and define the invention. 35 U.S.C. s. 112; *Markman*, 517 U.S. at 373. A claim may be independent or dependent. 35 U.S.C. s. 112. A dependent claim refers to a claim previously set forth and specifies an additional limitation of the invention. *Id.*

In determining claim construction, the court first considers intrinsic evidence. *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed.Cir.1996). The court can rely on extrinsic evidence only in the event that intrinsic evidence alone does not resolve the ambiguities. *Id.* at 1583.

Intrinsic evidence includes the language of the patent-including the claims and specification-and the prosecution history. *Id.* at 1582; *Hsin Ten Enter. USA, Inc. v. Clark Enters.*, 149 F.Supp.2d 60, 63 (S.D.N.Y.2001). "A technical term used in a patent document is interpreted as having the meaning that it would be given by persons experienced in the field of the invention, unless it is apparent from the patent and prosecution history that the inventor used the term with a different meaning." *Hoescht Celanese Corp. v. BP Chems. Ltd.*, 78 F.3d 1575, 1578 (Fed Cir.1996) (citations omitted). "There is a heavy presumption in favor of the ordinary meaning of claim language." *Kraft Foods, Inc. v. International Trading Co.*, 203 F.3d 1362, 1366 (Fed.Cir.2000) (internal quotation omitted).

In construing a claim, the court may not import an additional limitation into the claim. It is an entirely appropriate practice, however, for the court to look to the specification to aid its interpretation. *Ethicon Endo-Surgery, Inc. v. United States Surgical Corp.*, 93 F.3d 1572, 1578 (Fed.Cir.1996) (citation omitted). "Although the written description may aid in the proper construction of a claim term, limitations, examples, or embodiments appearing only there may not be read into the claim." *Kraft Foods*, 203 F.3d at 1366.

The court may also consider the patent's prosecution history-that is, the record of proceedings before the Patent and Trademark Office. *Vitronics*, 90 F.3d at 1582. Although the prosecution history may be used to assist in construing the claims, it may not " 'enlarge, diminish, or vary' the [claim] limitations." *Hsin Ten*,

149 F.Supp.2d at 63 (quoting *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 980 (Fed.Cir.1995), *aff'd*, 517 U.S. 370 (1996)).

If intrinsic evidence is not, alone, sufficient to resolve all claim disputes, the court looks to extrinsic evidence. *Vitronics*, 90 F.3d at 1583; *Hsin Ten*, 149 F.Supp.2d at 64. Extrinsic evidence includes all evidence outside the patent language and file, including expert and inventor testimony, dictionaries, and treatises. *Key Pharms. v. Hercon Labs. Corp.*, 161 F.3d 709, 716 (Fed Cir.1999) (citing *Markman*, 52 F.3d at 980). The court may, in its own discretion, consider extrinsic evidence for background and education, but it may not use such evidence to contradict the terms in the claims. *Key Pharms.*, 161 F.3d at 716 (citing *Markman*, 52 F.3d at 980-81).

Patents must meet the statutory enablement requirement. *See* 35 U.S.C. s. 112, para. 1. Accordingly, terms must be interpreted in such a manner that the invention is functional, *i.e.*, it can achieve the intended result. *Union Pacific Res. Co. v. Chesapeake Energy Corp.*, 236 F.3d 684, 690 (Fed.Cir.2001) ("To satisfy section 112 of the 1952 Patent Act, the specification must enable a person of ordinary skill in the art to make and use the invention." (citing 35 U.S.C. s. 112, para. 1)).

Under the doctrine of claim differentiation, "two claims of a patent are presumptively of different scope." *Kraft Foods*, 203 F.3d at 1366-67 (citations omitted). Claim differentiation, however, "only creates a presumption that each claim in a patent has a different scope; it is 'not a hard and fast rule of construction.'" *Id.* at 1368 (quoting *Comark Communications, Inc. v. Harris Corp.*, 156 F.3d 1182, 1186 (Fed.Cir.1998)).

## ***II. Claim Construction of Disputed Terms***

The parties disagree as to the construction of five terms found within the patents: illumination source (or illuminating); side view; triangulation calculation; three dimensional position; and pre-calculated calibration plane. I address each term in turn.

### ***A. Illumination Source***

The primary issue regarding the terms "illumination source" and "illuminating" is whether the patent limits the invention to one illumination source, or, on the other hand, whether there may be more than one illumination source. Scanner argues that there may be more than one illumination source. ICOS argues that the patents are limited to one illumination source only. Based on the plain language of the patents, I agree with ICOS.

In the patent language, all references to the light source are in the singular, not the plural, form. *See, e.g.*, (Col. 18, l. 38 ("an illumination apparatus")); (Col. 2, l. 31 ("[a] light source")). Courts have held that where the patent language refers to a term in the singular, that term should be interpreted in the singular. *See, e.g., Institutform Techs., Inc. v. Cat Contracting, Inc.*, 99 F.3d 1098, 1105 (Fed.Cir.1996) (holding that reference "to 'a cup' and 'the cup' ... suggest[s] that only one cup is involved"); *N. Am. Vaccine, Inc. v. Am. Cyanamid Co.*, 7 F.3d 1571, 1575-76 (Fed.Cir.1993) (The patent referred to "a terminal portion," and "[w]hile it is generally accepted in patent parlance that 'a' can mean one or more, ... there is no indication in the patent specification that the inventors here intended it to have other than its normal singular meaning.").

Scanner asserts that column 12 includes references to two light sources where it states: "the design of the lighting for the bottom view" (Col.12, ll.6-8), and "the design of the lighting for a side perspective view." (Col.12, ll.39-40). Scanner further contends that the patents must involve more than one light source for the

apparatus to be functional. These arguments, however, are not persuasive. First, there is nothing that indicates that the references in column 12 are necessarily to two (or more) light sources. In other words, the reference to "the design of the lighting" for the bottom and side view may be to one light source. Second, the use of the singular form in numerous references to the light source trumps the one instance in column 12 where there is an arguably ambiguous reference to "the design of lighting" for two views. Third, the inventors had ample opportunity to indicate their intention of having two light sources instead of one. Fourth, the Court is not persuaded that the intended goal of the apparatus cannot be achieved with one light source.

In contrast to the language referring to only one illumination source, the patents refer explicitly to two cameras: "a first camera" and "a second camera." Hence, the drafters explicitly referred to two cameras when they intended more than one. Presumably, they would have used similar language had they intended multiple light sources.

Because the plain language sufficiently shows that the illumination apparatus is limited to one light source, the Court does not rely on extrinsic evidence in construing this term. *Hsin Ten*, 149 F.Supp.2d at 63-64 (citing *Vitronics*, 90 F.3d at 1585).

## **B. Side View**

The dispute over the term "side view" in claim 1 raises two issues: first, whether the side view image created by the second camera must be crescent shaped; and second, what range of angles generates a side view image. As to the first issue, Scanner asserts that a side view image is not limited to only a crescent shape; ICOS contends that a side view image must be a crescent shape. As to the second issue, Scanner asserts that with no crescent shape limitation, a side view image is not limited to one taken at a low angle; ICOS contends that a side view image must be taken from an angle between 14 and 25 degrees. I first address whether the term "side view" is limited such that a side view image must be crescent shaped.

The plain language of the patents and the doctrine of claim differentiation show that while the preferred embodiment may include a crescent shaped side view image, a side view image is not limited to only crescent shapes. In analyzing the language of the patents, the Court first looks to the claim language; here, the language of claim 1, the independent claim, does not expressly include such a limitation. ( *See, e.g.*, Col. 18, ll. 46-47).

Next, the Court looks to the language of the specification for aid in construing the claims. *Kraft Foods*, 203 F.3d at 1368. *See also* *Ethicon Endo-Surgery*, 93 F.3d at 1578. Here, in the specification, side view is described as producing a crescent shape. ( *See e.g.*, Col. 4, l. 16 & Col. 12, l. 41). Nowhere in the specification, however, are side view images limited only to crescent shapes. The specification, instead, demonstrates that the preferred embodiment includes a crescent shaped side image. But "[t]here is no basis for reading a limitation from the preferred embodiment into the language of the claim." *Turbocare Div. of Demag Delaval Turbomachinery Corp. v. Gen. Elec. Co.*, 264 F.3d 1111, 1123 (Fed.Cir.2001) (citing *Laitram Corp. v. Cambridge Wire Cloth Co.*, 863 F.2d 855, 865 (Fed.Cir.1988)) ("References to a preferred embodiment, such as those often present in a specification, are not claim limitations.").

ICOS argues that the limitation written in the specification may be read into the claim, and ICOS relies on the recent Federal Circuit decision in *Kraft Foods* for that proposition. *Kraft Foods*, 203 F.3d at 1368 (adopting written description of rigidity of back panel where claim lacks language of rigidity). While the

Federal Circuit decision in *Kraft Foods* does support this argument, the same court held otherwise in another recent decision. *See Rexnord Corp. v. Laitram Corp.*, Case No. 00-1395, slip op. at 10 (Fed.Cir. Nov. 15, 2001) (reversing the district court's decision because the district court "relied solely on the preferred embodiment in the written description and its drawings (which admittedly reads on the narrower meaning of the key word) and ... the prosecution history").

The two Federal Circuit cases, however, are not contradictory because the facts differ. After careful analysis it is apparent that *Rexnord* is applicable here. Specifically, the language of the written description in *Kraft Foods*-that "[a]ny of the back panels would be constructed of a relatively stiff material[.]" *Kraft Foods*, 203 F.3d at 1367 (emphasis in original, internal quotation omitted)-indicates that there is only one embodiment, *i.e.*, one with relatively stiff material. Here, the language of the specification does not limit the side view image to only crescent shapes. Instead, the mere fact that the specification refers to the side view image as crescent shaped suggests that the preferred embodiment is one that creates a crescent shaped image. Accordingly, the plain language of the patents does not limit a side view image to a crescent shaped image.

Under the doctrine of claim differentiation, independent claim 1 and dependent claim 2 must be read to have different limitations. Because claim 2 expressly defines the second image as a crescent shape, and because claims 1 and 2 are presumptively different in scope, the doctrine would suggest that a crescent shape limitation cannot be read into claim 1. *Wenger Mfg., Inc. v. Coating Mach. Sys., Inc.*, 239 F.3d 1225, 1233 (Fed.Cir.2001). *See also* 35 U.S.C. s. 112. The only different limitation added by claim 2 is that the second image is a crescent shape; the requirement of a crescent shape therefore cannot be found in claim 1.

Although "claim differentiation only creates a presumption that each claim in a patent has a different scope[,] ... at least one limitation must differ." *Kraft Foods*, 203 F.3d at 1368 (citation omitted). Here, if a crescent shape limitation were read into claim 1, claim 2 would be superfluous. Moreover, the doctrine applies here because "[c]laim differentiation ... is clearly applicable when there is a dispute over whether a limitation found in a dependent claim should be read into an independent claim, and that limitation is the only meaningful difference between the two claims." *Wenger Mfg.*, 239 F.3d at 1233.

Hence, I conclude that the term "side view" in claim 1 is not limited to a view that produces only crescent shapes.

I turn next to the issue of the position of the second camera such that the camera produces a side view image. As an initial note, it is uncontested that a side view image cannot be one taken from a 90 degree angle or a top angle view, and it must differ from one taken by the first camera. ( *See Scanner Br.* at 14-15; *ICOS Post-Hr. Br.* at 19).

Scanner asserts that there are no limits to the viewing angle other than those that are uncontested. ICOS argues that to produce a side view image, the viewing angle must be a low angle, specifically between 14 and 25 degrees. ICOS's argument to limit the viewing range is based on the presumption that the side view image is crescent shaped. Specifically, ICOS argues that it is this range of angles that will produce the crescent shaped image. Because the Court has concluded that there is no crescent shape limitation, and because the patents contain no language limiting the viewing angle to 14 to 25 degrees, ICOS's argument to limit the viewing angle to 14 to 25 degrees is rejected.

ICOS's argument that the viewing angle must be a low angle fails under the doctrine of claim differentiation. Because claim 7 is dependent on claim 1, and because claim 7 expressly states that the

second image is obtained at a low angle, a low angle limitation cannot be read into the term "side view." See 35 U.S.C. s. 112. If a "low angle" limitation were read into claim 1, then claim 7 would have no limitations separate from claim 1. *Wenger Mfg.*, 239 F.3d at 1233.

In sum, as to the term "side view": the side view image is not limited to crescent shaped; the viewing angle may not be a 90 degree angle, a top view angle, or identical to the angle created by the first camera; and the viewing angle is not limited to a "low angle."

### ***C. Triangulation Calculation***

Both parties offer a definition for the term "triangulation calculation." Scanner adopts the definition for "triangulation" set forth in *The Photonics Dictionary*: "A method of measuring distance by recording a single scene from two different points of perspective." *The Photonics Dictionary*, Book 4, Laurin Publishing Co., Inc. (Pittsfield, MA) (43<sup>rd</sup> ed.1997). Scanner proposes to add the following sentence to this definition: "triangulation involves the use of trigonometric functions, whether explicit or embedded." (Scanner Post-Hr. Br. at 13). ICOS asserts that triangulation calculation involves "the use of trigonometric formulas to determine unknown properties of a triangle using known properties of the same triangle." (ICOS Post-Hr. Br. at 21-22).

The Court concludes that there is no significant disagreement between the parties as to the definition of triangulation calculation. For the purposes of this case, the Court adopts the definition of triangulation set forth in *The Photonics Dictionary*, with the further understanding that triangulation calculation involves the use of trigonometric principles.

### ***D. Three Dimensional Position***

The parties present nearly identical definitions for "three dimensional position." Scanner asserts that the term refers to "the X, Y and Z values for the top of at least one ball of a ball grid array." (Scanner Post-Hr. Br. at 13). ICOS asserts the following definition: "the determination of the *actual* X, Y and Z coordinate positions of the balls." (ICOS Post-Hr. Br. at 23). Because these definitions are similar, it is apparent that the parties do not genuinely dispute the definition of the term as it applies to the patents at issue. The Court adopts the definition set forth by Scanner. Accordingly, for the purposes of this case, "three dimensional position" is defined as "the X, Y and Z values for the top of at least one ball of a ball grid array."

### ***E. Pre-calculated Calibration Plane***

The dispute concerning the term "pre-calculated calibration plane" is over whether the calculation occurs in two dimensions or whether it involves a Z coordinate as well. The parties do not dispute that the calculation occurs prior to the inspection, or run-time. Scanner asserts that the term is defined as a calculation of a representation of a calibration plane in two dimensions where a three dimensional model is formed by views from two different cameras. (Scanner Post-Hr. Br. at 14). ICOS asserts that the term includes the calculation of the Z=0 world plane during the calibration process. (ICOS Post-Hr. Br. at 22).

Figure 2B is "a flow chart illustrating the steps within the pre[-]calculated calibration process." (Tr. at 144, ll. 1-3). The final step of Figure 2B, step 114, states "define X and Y world coordinates." Step 114 does not include any reference to determining the Z=0 world plane. ( See Fig. 2B). According to the written specification describing step 114, however, the process includes determining the Z=0 world plane as well. ( See Col. 7, ll. 6-8 ("In step 114 the processor defines the X and Y world coordinate and the Z=0 plane.")).

Because the description of Figure 2B expressly states that the processor defines the Z=0 world plane, the term "pre-calculated calibration plane" is construed to define the X and Y world coordinates and the Z=0 world plane.

### *CONCLUSION*

After considering all of the evidence in the record, the Court construes the disputed terminology of the '756 Patent and '757 Patent as follows:

A. *Illumination source*: The invention has only one illumination source.

B. *Side View*: Side view as used in claim 1 is not limited to a view that produces a crescent shape; the viewing angle is not a 90 degree angle, a top view angle, or an angle identical to the one created by the first camera; and the viewing angle is not limited to a "low angle."

C. *Triangulation Calculation*: The Court adopts the definition of triangulation set forth in *The Photonics Dictionary* and adds that triangulation calculation involves the use of trigonometric principles.

D. *Three Dimensional Position*: The term is defined as the X, Y, and Z values for the top of at least one ball of a ball grid array.

E. *Pre-calculated Calibration Plane*: The term is construed to define the X and Y world coordinates and the Z=0 world plane.

Dispositive motions, if any, shall be filed on or before February 8, 2002. Opposition papers shall be filed on or before March 7, 2002. Reply papers, if any, shall be filed on or before March 21, 2002. If no motions are filed, the parties shall appear for a status conference on February 8, 2002 at 11:00 a.m. in Courtroom 11A.

SO ORDERED.

S.D.N.Y., 2002.

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