United States District Court,
D. Massachusetts.

VIVID TECHNOLOGIES INC,
Plaintiff.
v.
AMERICAN SCIENCE & ENGINEERING, INC,
Defendant.

No. Civ.A. 96-11059-REK

July 10, 1997.

A patent infringement suit was brought. The District Court, Keeton, J., construing the terms in claims for a patent covering devices to scan airline baggage, held that: (1) "correspond to" means that the pixels illuminated on the display screen pictorially represent an object, or parts of the object, that attenuated or scattered a quantity of radiation; (2) "at least a presettable level" means that the pixels illuminated on a display screen represent an object, or parts of the object, that scatters or attenuates a quantity of radiation, interaction with the object, equal to or more than the quantified threshold that can be preset by a machine operator before each scanning of the object; and (3) "in a predetermined single color" means illuminating pixels on a display screen in colors (other than black and white and shades thereof) that correspond to the attenuation and scattering of radiation, above a predetermined level, as it interacts with scanned materials.

Order accordingly.

For purposes of patent on device to scan airline baggage, term "in a first predetermined single color" appearing in claim means illuminating pixels on a display screen in colors (other than black and white and shades thereof) that correspond to the attenuation and scattering of radiation, above a predetermined level, as it interacts with scanned materials.

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Kenneth R. Berman, Sherin & Lodgen, Boston, MA, for Vivid Technologies Incorporated, Counter-Defendant.

Memorandum and Interlocutory Order Construing Claims 5 and 8 of the '283 Patent

KEETON**, District Judge.**

In this action, the plaintiff, Vivid Technologies ("Vivid"), seeks a declaratory judgment that it does not infringe patent No. 5,253,283, (" '283 patent"), held by American Science & Engineering, Inc., or, in the alternative, that the '283 patent is invalid. It is AS & E's position that Vivid makes, uses, or sells a system that reads, element for element, on claims 5 and 8 of the '283 patent and that Vivid infringes claims 5 and 8 of that patent. AS & E's assertion of infringement is premised on AS & E's construction of claims 5 and 8 of the '283 patent.

The only issue that this court is now deciding is the construction of claims 5 and 8 of the '283 patent. Pursuant to the teachings of Markman v. Westview Instruments Inc., 517 U.S. 370, 116 S.Ct. 1384, 134 L.Ed.2d 577 (1996), as a matter of case management, this court scheduled briefing and oral argument on this issue because an order determining claim construction, even if provisional in the sense that it is interlocutory and not an appealable order, may nevertheless enable the parties and the court to focus discovery in a way that makes more efficient use of party and court resources as the case proceeds until it is ripe for entry of a final and appealable judgment in this court. *See* Markman, 116 S.Ct. at 1394 ("functional approach" of courts); Ethicon Endo-Surgery, Inc., v. United States Surgical Corp., 93 F.3d 1572, 1577 (Fed.Cir.1996) (deciding that a *Markman* hearing would be beneficial to determine the scope of the claims at issue). If, however, after proceeding farther into consideration of other issues in this case, the court determines that its interlocutory order construing claims 5 and 8 is in any respect not precisely correct in light of the better-developed record, which is at that time before the court because of summary judgment proceedings (or for any other reason), the court will be prepared to reconsider its interlocutory ruling on claim construction and modify or vacate it, as then appears appropriate.

I. UNDISPUTED FACTUAL BACKGROUND

It is undisputed that AS & E and Vivid both manufacture and sell x-ray machines that detect explosives in baggage. Such machines have (i) a source of radiation, (ii) a detector, (iii) software, and (iv) a display. When a bag passes between the source and the detector, the source directs radiation toward the bag. The interaction of the radiation with the contents of the bag is electronically analyzed and then converted and communicated to a monitor where an image of the inside of the bag is reproduced.

Both AS & E and Vivid make x-ray machines that measure both transmitted radiation (radiation that is attenuated by the bag's contents) and scattered radiation (radiation that is deflected by the bag's contents). The addition of a capability of detecting and making use of scattered radiation has been a breakthrough in x-ray technology. Scattered radiation, unlike transmitted radiation, can aid in detecting plastic compounds often used in explosives because plastics scatter more radiation than they attenuate. Also, scattered radiation can aid in detecting contraband objects that are shielded behind materials of high atomic number. Transmitted radiation cannot translate the often confused and complicated environment of electronic signals into an identifiable image of a threat object.

The use of scattered radiation in the new art at issue is, thus, one strategy for both discriminating between different kinds of materials used in explosives and enabling the translation of complex surroundings in order to find shielded contraband objects. Scattered radiation and transmitted radiation can be used together to detect a variety of different threat substances in a variety of complex environments.

In a machine built to AS & E's specifications, detectors located directly across from the source detect the amount of transmitted radiation that is not attenuated by the bag's contents, and detectors in other locations

detect the amount of radiation that is scattered by the bag's contents. Electronic equipment associated with the detectors converts the detected radiation to electric signals. The software analyzes the electric signals and then directs an image of the x-rayed object to be displayed on a monitor.

The images of the x-rayed objects are displayed in units of pixels. Pixels are tiny dot-like components of a grid on a monitor. They emit light in different intensities.

The radiation detected may be translated into light represented by pixels in shades of gray (from white to black) or in color. An image is formed by patterns or groupings of lit pixels.

II. CLAIM CONSTRUCTION

A. General Principles and Themes of Claim Construction

1. Steps of Analysis, Guides, and the Emphasis on Plain Language

[1] The determination of a literal infringement claim requires a two-step analysis. *See* Southwall Techs., Inc. v. Cardinal IG Co., 54 F.3d 1570, 1575 (Fed.Cir.), *cert. denied,* 516 U.S. 987, 116 S.Ct. 515, 133 L.Ed.2d 424 (1995). First, the court interprets the asserted claims to determine their scope and meaning. *See* Markman, 116 S.Ct. at 1387. This is strictly a matter of law for the judge to decide based on the evidentiary proffers before the court, briefs on the law, and oral arguments of counsel. *Id. See also* Metaullics Sys. Co., L.P. v. Cooper, 100 F.3d 938, 939 (Fed.Cir.1996) (observing that "[j]udges derive their interpretive advantage relative to juries not only from their training in how but also from their knowledge of when to interpret and construe instruments"). Second, the trier of fact, if reasonable triers of fact could differ, must determine whether the evidence proffered in the particular case supports a finding that the claims as construed by the court "read on" to the accused device or process. *See* Southwall Techs., 54 F.3d at 1575; SmithKline Diagnostics, Inc., v. Helena Laboratories Corp., 859 F.2d 878, 889 (Fed.Cir.1988). Only the first step, the claim construction, is to be provisionally decided by the court at this time.

[2] The United States Court of Appeals for the Federal Circuit has identified sources that a court may use as guides bearing upon how to interpret the disputed claims. *See* Vitronics Corp. v. Conceptronic, Inc., 90 F.3d 1576, 1581-83 (Fed.Cir.1996); SmithKline Diagnostics, Inc. 859 F.2d at 881. In construing the claims of a patent, the court must first consider the intrinsic evidence of record, "the most significant source of the legally operative meaning of disputed claim language." Vitronics, 90 F.3d at 1582. Intrinsic evidence comprises (1) the words of the patent; (2) the patent's specification; and (3) the patent's prosecution history, if it is in evidence. *Id.*

[3] [4] The purpose of a claim-construction analysis is to determine the meaning that would be given to each disputed term by a person of ordinary skill in the relevant art. *See* Haynes Int'l, Inc. v. Jessop Steel Co., 8 F.3d 1573, 1578 n. 4 (Fed.Cir.1993). If the court determines, after full consideration of the intrinsic evidence, that the claims are ambiguous, the court may then look to extrinsic evidence, including expert testimony from those versed in the disputed technology. CVI/Beta Ventures, Inc. v. Tura LP, 112 F.3d 1146, 1152-53 (Fed.Cir.1997); Vitronics, 90 F.3d at 1583.

[5] The Federal Circuit has observed, however, that in most cases the court can resolve a dispute over meaning by considering intrinsic evidence alone. *See* Vitronics, 90 F.3d at 1582. In such cases, when the

public record unambiguously describes the scope of the patented invention, reliance on any extrinsic evidence is improper. *See* id. at 1583; Southwall Techs. Inc., 54 F.3d at 1578 ("evidence extrinsic to the patent and prosecution history, such as expert testimony, cannot be relied on to change the meaning of the claims when that meaning is made clear by those documents"). This is so because intrinsic evidence alone constitutes the public record of the patentee's claim, a record on which the public-including competitors and non-competitors-are entitled to rely. If courts allowed the modification of the public record by extrinsic evidence when the record was clear on its face, this right of public reliance would be stripped of most of its relevant meaning. *See* Vitronics, 90 F.3d at 1583.

A claim is construed in light of the claim language ... not in light of the accused device.... It is only after the claims have been construed without reference to the accused device that the claims, as so construed, are applied to the accused device to determine infringement.

SRI International v. Matsushita Elec. Corp. of America, 775 F.2d 1107, 1118 (Fed.Cir.1985) (quotations and citations omitted). It is, therefore, improper and misleading for AS & E in its memoranda filed with this court to refer constantly to Vivid's device as a guideline for construing the '283 patent. Under AS & E's own acknowledgement of the rule that a claim is not to be construed in relation to the accused device, the court will be in a position to proceed to considering Vivid's device and conducting an infringement analysis only after construing claims 5 and 8 of the '283 patent, and in the light of that construction.

As every dictionary illustrates by giving multiple definitions for a single word, many words have varied meanings. A drafter's manifested choice among varied meanings is commonly indicated by context. When the context is one in which the same phrase is used in two or more claims, ordinarily the choice is that the phrase has the same meaning in the two or more places. *Cf.* Southwall Techns., Inc., 54 F.3d at 1579 ("The fact that we must look to other claims using the same term when interpreting a term in an asserted claim mandates that the term be interpreted consistently in all claims.").

[6] A "construing court does not accord the specification, prosecution history, and other relevant evidence the same weight as the claims themselves, but consults these sources to give the necessary context to the claim language." Eastman Kodak Co. v. Goodyear Tire & Rubber Co., 114 F.3d 1547, 1551 (Fed.Cir.1997). In other words, plain words of the claims anchor the meaning of the claims. Other components of the patent may supply context and may support or clarify that plain meaning.

2. Specification

[7] The court is to consult the patent specification primarily "to determine whether the inventor has used any terms in a manner inconsistent with their ordinary meaning." Vitronics, 90 F.3d at 1582. *See also* Bell Communications Research, Inc. v. Vitalink Communications Corp., 55 F.3d 615, 619-21 (Fed.Cir.1995).

Although words in a claim are generally given their ordinary and customary meaning, a patentee may choose to be his own lexicographer and use terms in a manner other than their ordinary meaning as long as the special definition of the term is clearly stated in the patent specification or file history.

Vitronics, 90 F.3d at 1582 (citations omitted).

[8] A construing court's use of the specification to discern a claim term's unique meaning should be reasonably bounded, however. Primarily, specification language may serve to provide appropriate context to

determine the claim's meaning; it does not add to the claims those limitations that appear only in the specification and no where else. Electro Med. Sys., S.A. v. Cooper Life Sciences, Inc., 34 F.3d 1048, 1054 (Fed.Cir.1994) ("claims are not to be interpreted by adding limitations appearing only in the specification"); In re Van Geuns, 988 F.2d 1181, 1184 (Fed.Cir.1993) ("limitations are not to be read into the claims from the specification").

3. Prosecution History

[9] The prosecution history ("file wrapper and contents") of the patent consists of the entire record of proceedings in the Patent and Trademark Office.

"This includes all express representations made by or on behalf of the applicant to the examiner to induce a patent grant.... Such representations include amendments to the claims and arguments made to convince the examiner that the claimed inventionmeets the statutory requirements...."

Standard Oil Co. v. American Cyanamid Co., 774 F.2d 448, 452 (Fed.Cir.1985). The patent's prosecution history is important for "limit[ing] the interpretation of claim terms so as to exclude any interpretation that was disclaimed during prosecution." Southwall Techs., Inc., 54 F.3d at 1576 (citations omitted). *See also* Standard Oil, 774 F.2d at 452 (finding the prosecution record of critical significance in determining the meaning and scope of the claims especially when the inventor has made express representations as to reasons for amendments and changes to the device).

B. Claim Language

The disputed claims are recited below:

5. An apparatus for displaying information resulting from the inspection of an object with penetrating radiation, comprising:

[i] means for illuminating an object with penetrating radiation

[ii] means for receiving radiation which is transmitted through said object

[iii] means for receiving radiation which is backscattered from said object

[iv] means for displaying pixels *which correspond to at least a first presettable level of attenuation of the transmitted radiation in a first predetermined single color,* and

[v] means for displaying pixels *which correspond to at least a second presettable level of backscattered radiation in a second predetermined single color*.

8. A method of displaying information resulting from the inspection of an object with penetrating radiation, comprising the steps of,

[i] illuminating an object with penetrating radiation

[ii] after said radiation interacts with said object, receiving radiation which is transmitted through said object and radiation which is backscattered from said object,

[iii] displaying pixels *which correspond to at least a first presettable level of attenuation of the transmitted radiation in a first predetermined single color,* and

[iv] displaying pixels *which correspond to at least a second presettable level of backscattered radiation in a second predetermined single color*.

(Docket No. 50, Ex. 1 at 5) ('283 Patent Claims 5, 8) (emphasis added). Because the two claims at issue share the emphasized language, the interpretation of which is disputed, and differ only in that claim 5 describes the "apparatus" and claim 8 describes the "method," I interpret the common language of claims 5 and 8 together. In particular, a dispute exists between AS & E and Vivid regarding the meaning of the underlined language of elements [iv] and [v] in claim 5 and elements [iii] and [iv] in claim 8.

C. Analysis of "Correspond To"

[10] Under the '283 patent, pixels "correspond[ing] to" transmitted radiation are displayed in one color and pixels "correspond[ing] to" backscattered radiation are displayed in a second color. AS & E contends that "correspond to" means that pixels are lit on the display monitor according to, among other things, a certain amount of measured radiation attenuated or backscattered by an object. AS & E further asserts that pixels are not images. AS & E rejects the assertion that their patent requires that an image of the radiated object be displayed on the monitor. Vivid, on the other hand, argues that "correspond to" refers to the pictorial representation, by pixels, of the part of the object that scattered or attenuated a certain amount of radiation. Also, Vivid suggests that this part of the patent describes a system that not only identifies what parts of objects caused the scattering or attenuation of the radiation in amounts above a certain level, but also presents that information in the form of a colored image of the part of that object that backscattered and the part that attenuated the specified amount of radiation.

The court now determines that the ordinary meaning of "correspond to" forecloses neither "image" nor "pixel." Thus AS & E's interpretation is at odds with a common-sense meaning of "correspond to." Although the lit pixels may not form a complete image of the object that is x-rayed, they correspond to characteristics of that object. The pixels display information about the point at which the interaction occurred between the radiation and the object scanned. They indicate whether or not the strength of the signal from the interaction exceeds the designated level and, by shading, give some information about how far the strength of the signal exceeds the designated level. Described in another way, the pattern made by the pixels of different colors develops an image of the threat object. That image and some of its characteristics appear on a screen for easy visual inspection. The image can be of either the entire object radiated or part of the object radiated.

In the specification are several places where its language supports this interpretation of "correspond to." According to the specification, the device

has the characteristic that the signals in any instant ... can be *mapped* to a particular region of the object ... Accordingly, as those skilled in the art are aware, a signal, or a group of signals ... can be used to represent a pixel, an *elementary portion of an image* that will be formed and displayed.

(Docket No. 50, Ex. 1 at 3 ('283 Patent, col. 3 at lines 18-26)) (emphasis added). The reference to "mapping" is appropriately interpreted to mean that the lit pixels form a pattern that shows, as a map shows, where

varied objects are located so that the operator of a machine can identify the specific object containing the threat material. The lit pixels forming "an elementary portion of an image" of that object thus alert the device's operator to the location of the threat material and its location in the bag, as they "correspond to" signals from radiation passing through or scattering from the object and the bag.

In a similar vein, the following passage from the specification supports this interpretation of the phrase "correspond to."

In the case of the transmitted beam detected by the transmission detector ..., the intensity of the pixel can be used to *represent the attenuation presented to the illumination beam by the portion of the object* ... which was illuminated when the pixel was generated. By like token, the *intensity of the pixel generated by the backscatter detector can be mapped to that region of the object* ... whose illumination by the penetrating pencil beam ... produced the backscattered x-rays which generated the pixel.

(Docket No. 50, Ex. 1 at 4 ('283 Patent col. 3, lines 31-37)) (emphasis added). Neither of these specification excerpts indicates that the "inventor has used any terms in a manner inconsistent with their ordinary meaning," Vitronics, 90 F.3d at 1582, nor do the specification excerpts add limitations that appear only in the specification and not in the claim itself. *See* Electro Med. Sys., S.A., 34 F.3d at 1054. Both excerpts provide appropriate context for the phrase "correspond to" and reinforce the phrase's ordinary meaning.

Finally, the prosecution history further supports the plain meaning of the phrase "correspond to." During the prosecution of the patent, the inventor had to amend his claims in order to distinguish his device from prior art, the Macovski patent '381. In so doing, he explains that when pixels are colored due to a certain amount of either backscattered or transmitted radiation, the pixels must appear on the display as an image that matches the part of the object that scattered or attenuated the radiation.

[T]here is a priority of display in accordance with the present invention, so that pixels which exceed both a first preset level of attenuation and *which also exceed a second preset level of backscatter, are displayed in the single color corresponding to exceeding the second preset level of backscatter*. Thus, in accordance with the present invention, each pixel is displayed in an unambiguous color. In Macovski, there is no mechanism for determining priority so that the color display of overlapping areas will be ambiguous. (See column 3, lines 55-56 of Macovski).

(Docket No. 50, Ex. 5 at 53) (emphasis added). For this statement by AS & E to make sense, each pixel that is displayed in a *single unambiguous color* must represent a specific part of the radiated object. This makes it necessary to have a formula for resolving priority between two different colors, both of which depend on radiation interacting with the same part of an object that both scatters and attenuates a requisite amount of the kind of radiation for notice to be taken.

Thus, to refer to a pixel as "correspond[ing] to" a level of backscattered or attenuated radiation means, according to all these different sources of information to be considered, that the pixels illuminated on the display screen pictorially represent an object, or parts of the object, that attenuated or scattered a quantity of radiation.

D. Analysis of "At Least a ... Presettable Level"

[11] Claims 5 and 8 describe an apparatus or a means for displaying colored pixels that correspond to "at

least a first presettable level of attenuation" or "at least a second presettable level of backscattered radiation."

1. "Presettable Level"

Although having taken a different position in earlier proceedings in this case, AS & E now contends that the term "presettable" means that the level settings-variable thresholds of measured radiation below which radiated objects will not be illuminated in color-are set or changed *during a scan based on information derived from the object during the scan*. The plain meaning of a "presettable level" does not support such an interpretation. Nor does the prosecution history support such an interpretation. Instead, I conclude that "presettable level" refers to a level "presettable" by the operator according to a decision made by the operator in advance of a scan. A signal that exceeds that level of radiation will cause a pixel to be displayed in some chosen color. With the benefit of observing that display of color, the operator is able to adjust the "presettable level" for another scan.

The plain language of the phrase precludes AS & E's construction. "Pre" and " *pre* settable" necessarily imply before some fixed point in time. In this context, the point is the time when a scan begins. Before the beginning of each new scan, the operator decides to leave the "presettable" level where it is, or change it to another "presett[ing]." To adopt AS & E's contrary interpretation would render the prefix "pre" meaningless. It would violate the principle that claim limitations are to be interpreted as having meaning when the language of the claim is clear. *See* Unique Concepts, Inc. v. Brown, 939 F.2d 1558, 1563 (Fed.Cir.1991).

Also, the prosecution history of the '283 patent refutes this most recent revision of AS & E's arguments about claim interpretation. The prosecution history reinforces an interpretation that gives meaning to the prefix "pre" in "presettable," as enabling the operator to set a threshold, before the object is scanned, so that if radiation detected is below that level the object will not be illuminated in the chosen color.

When AS & E initially applied for the '283 patent, its device did not have this presettability feature. In those circumstances, the patent examiner rejected the patent because prior art systems already used thresholding to determine whether an amount of radiation would cause the illumination of a pixel. The examiner said that AS & E's proposed device did no more than display images of objects above a base level threshold "below which radiation received will ultimately not be displayed." (Docket No. 50, Ex. 1 at 43). The examiner said this was a limitation "inherent [in] all detectors," and it made the proposed device claims unpatentable above prior art. (Id.)

AS & E amended its original '283 patent to distinguish it from the prior art that the examiner had referred to in his rejection letter. To this second proposed '283 patent, AS & E added the "presettable" function. AS & E wrote the following in its Patent Application Letter:

In distinction thereto, in accordance with the present invention, appropriate reference levels for any given application are programmed into the system.... *These pre-set levels may obviously be changed,* so that pixels which appear in a first color in a system where the first and second levels are present at certain values, may appear in different colors, when the preset levels are changed. *This flexibility to preset the threshold levels at which pixels are displayed in a single, unambiguous color is a useful feature of the present invention, which is totally absent from [prior art].*

(Id. at 52-53) (emphasis added).

That the presettability function was added to obtain allowance of the patent application makes it particularly important to a proper construction of the claims. *See* Standard Oil, 774 F.2d at 452. The language in AS & E's Patent Application Letter strongly supports this court's interpretation of "presettable levels." AS & E' now argues that the combination of presettability with adjustability somehow rebuts this plain-language interpretation, but AS & E's current position is an example of an attempt to obfuscate a clean and clear manifestation of meaning. It is clear from the prosecution history and the nature of the described machine and the described process that the threshold must be set before scanning the object, but that, if needed, the threshold can be lowered or raised before a second scanning. It was this adjustability of thresholds, so they could be set anew before each new passing of the object through the x-ray machine, that made the device novel in the market.

Based on the plain meaning of the word "presettable," the prosecution history, and the purpose of the device in general to scan objects for threat material based on a measured amount of radiation, I conclude that the phrase "presettable levels" means that the pixels illuminated on a display screen represent an object, or part of the object, that scatters or attenuates a quantity of radiation, interacting with the object, equal to or more than the threshold *set before each scanning of the object*.

2. "At Least"

[12] AS & E, in a change of position, has generated another dispute over the meaning of "at least" as it is positioned before "a first presettable level of attenuation" and "a second presettable level of backscattered radiation," in claims 5 and 8. AS & E now asserts that "at least" does not modify the word "level" but instead means that thresholding is only one factor of many that could determine the color of a pixel. This argument is not persuasive because it does not point to any other word or phrase for "at least" to modify without distorting the plain meaning in some other way.

The common sense understanding of the words "at least" in the context of the other elements of claims 5 and 8 is that a pixel will be displayed in a specified color whenever the radiation from the part of the object associated with that pixel reaches or exceeds the specified quantitative level (the "presettable" threshold).

In several places the patent specification underscored this meaning. I will turn first to a passage quoted below, but only after responding to an argument of AS & E.

AS & E argues that the passage quoted below is only a "preferred embodiment" and cannot be interpreted to be a "limitation." That rule regarding claim construction, however, does not make the language of the specification totally out-of-bounds as a factor to be considered, along with others. I consider it here only as a factor, not as itself a "limitation."

Early in the patent specification, the inventor explains the function and significance of the device in terms of the relation of the colored pixels to a quantified predetermined level of attenuation:

In the preferred embodiment of the invention, three colors are used to display the three types of materials which are of the most importance, as follows:

a) pixels which represent *more than a predetermined level* of attenuation

b) pixels which represent *more than a predetermined level* of backscatter, and

c) the remainder of the energy which is transmitted through the object.

(Docket No. 50, Ex. 1 at 5 ('283 Patent, col. 2, lines 37-41)) (emphasis added). The words "more than," as used to modify "predetermined level," indicate that pixels are illuminated when the radiation exceeds a certain threshold. The fact that the phrase "at least" is in the same position and used in a similar fashion in the disputed sentences of claims 5 and 8, reinforces the interpretation that "at least" is a quantitative modification of the word "level."

If this were not enough, further along in the same column, the specification reads:

Pixels corresponding to the second category are displayed in a second color, e.g. red, with the brightness of the color increasing from medium red to bright red as the *level of backscatter increases above a second predetermined level*.

(Docket No. 50, Ex. 1 at 3 ('283 Patent, col. 2, lines 37-41)) (emphasis added). The use of the word "increase" to modify the word "level" in the above paragraph reinforces the quantitative implication inherent in the word "level," especially for the purposes of this patent and device. Many more phrases throughout the patent specification support this interpretation. (*See* Docket No. 50, Ex. 1 at 4 ('283 Patent, col. 4, lines 23-33, 58-60)).

Other claims of the '283 patent also confirm the court's interpretation of the words "at least" as modifying the word "level." Claims 6 and 9, which are dependant on claims 5 and 8 respectively, state that a pixel for which the measured attenuation "is less than" the level recited in claims 5 and 8 is displayed in a third single color. This confirms that the language in claims 5 and 8, "at least ... a presettable level of ... radiation," refers to a quantitative threshold.

Nowhere in either of the patent claims, or in the patent specification, or in the prosecution history, does the patent even suggest that a pixel can be colored by any process other than by comparing the measured radiation, which is scattered or attenuated by an object, with the pre-set threshold level of scattered or attenuated radiation.

For the above reasons, I conclude that "at least" modifies the word "level" and that the phrase "at least a first presettable level of ... radiation" means that for a pixel to be illuminated in color the corresponding radiation needs to exceed the quantified threshold that can be pre-set by a machine operator before each scanning of the object.

E. Analysis of "In a ... Predetermined Single Color"

[13] The plain meaning of the phrase "in a first predetermined single color" for attenuation and "in a second predetermined single color" for backscatter is straightforward. Pixels are illuminated in a color, which is chosen beforehand, when the amount of scattered or attenuated radiation reaches a certain level. Similarly, in ordinary language, when concerning a monitor or a display screen as the claim does in this case, the word "color" precludes black-and-white.

AS & E contends that both black and white are colors and either could be one of two or more

"predetermined single color[s]." Changing "color" to "colors" is an unwarranted manipulation of words, and AS & E's sense that this change is needed to support its argument is a red flag. In a similar vein, AS & E argues that black and white are simply different degrees of intensity of one color-gray. This manipulation of words and meanings, also, is unpersuasive. In some contexts, perhaps, more could be said in favor of recognizing black and white as colors than in favor of calling them only shades of gray. But the more basic point is that in ordinary usage in conversations and communications about display screens, "color" refers to something more "colorful" than black and white. Thus, a proper interpretation of "color" in relation to pixelated image displays precludes black and white and shades of gray.

Indeed, the first sentence of the patent specification draws this distinction: "The present invention is directed to an inspection system having a color display." (Docket No. 50, Ex. 1 at 3 ('283 patent, col. 1, lines 5-6)). To interpret "color display" as indistinct from black-and-white monitors would write the word "color" out of the patent.

Several other passages in the patent specification support this common-sense interpretation. In the first column of the patent specification, the inventor says

In the equipment of the prior art, images are *typically presented in a scale of gray tones* wherein black may represent highly attenuated transmitted energy and white may represent highly scattered energy, and the transmitted and scattered energy may be presented on separate displays. *Such images of gray tones may be difficult for an operator to quickly or accurately interpret*. Additionally, a large number of rapidly passing gray tone images may become monotonous to watch.

To obviate this problem, it has heretofore been proposed to use color images.

(Docket No. 50, Ex.1 at 3 ('283 Patent, col. 1, lines 37-47)) (emphasis added). As is clear from the inventors' reasoning reproduced above, the invention was meant to be distinct from prior art that used mainly shades of black and white to mark threat materials. The invention, in designated instances and ways, replaces the range of gray tones with colors. Examples are listed in the specification using three colors.

[P]ixels which fall within the first category are displayed in a *first color, e.g., blue,* with pixels close to a first predetermined level of attenuation being displayed in a medium blue, with the shade of the color becoming brighter as the magnitude of the attenuation increases.

Pixels corresponding to the second category are *displayed in a second color, e.g., red, ...*

Finally, pixels corresponding to the third category are *displayed in a third color, for example, green ...*

There thus is provided a display wherein *each pixel has a unique recognizable color to provide quick and accurate identification of materials and objects,* and wherein there is not mixing of colors. By displaying only the three most important types of materials in the object being inspected in *three discrete colors, ambiguities are minimized or eliminated, and the operator is presented with a display which can be rapidly evaluated*.

(Docket No. 50, p. 53 ('283 patent, col. 2, lines 30-43, col. 5, lines 6-13)) (emphasis added). Given that the purpose of the use of the invention in a context like that presented by this case is to enable operators to spot different threat objects quickly by displaying them in different colors rather than in "monotonous" gray

tones, any construction of the claims that would allow black-and-white to serve as one of the colors in the display would render the word "color," as in "color display," indistinct from "a scale of gray tones."

According to the prosecution history, in order to distinguish the present device from prior art, the patent officer agreed that white was a color, as used in Macovski '318, but also stated that white, as used in Macovski '318, was distinct from AS & E's "single colors" as described in the pending '283 patent.

Claims 1-4 ... are rejected ... as unpatentable over Macovski '318. *Macovski '318 discloses all of the elements of applicant's claimed invention except that Macovski displays one type of interaction in black-and-white and a second type in color*. One of ordinary skill in the art would have substituted single-color display for Macovski's display as an obvious design choice. Clearly one of the "single colors" is white in Macovski and the other "single color" is broadly disclosed as a color display, which would stand out as clearly as applicant's single colors.

(Docket No. 29, Ex. E at 2-3) (emphasis added). As explained by the above recitation, AS & E had to amend its patent application to distinguish its invention specifically from Macovski '381. In so doing, among other things, AS & E describes a device that marks threat materials on the display monitor in colors like blue, red and green and not in white (or black) and some other color as in the Macovski patent. AS & E, therefore, limited its claims to this construction in an effort to gain approval for the '283 patent. CVI/Beta Ventures, Inc. v. Tura LP, 112 F.3d at 1155.

Exercising its assigned function under the Markman v. Westview Instruments, Inc., 116 S.Ct. at 1384, this court determines that the phrase "in a first predetermined single color" means illuminating pixels on a display screen in colors (other than black and white and shades thereof) that correspond to the attenuation and scattering of radiation, above a predetermined level, as it interacts with scanned materials.

F. Absence of Ambiguity

Since none of the disputed claims is ambiguous, no need exists to address the extrinsic evidence of expert witness affidavits. CVI/Beta Ventures, Inc., 112 F.3d 1146, 1152 (Fed.Cir.1997); Vitronics, 90 F.3d at 1583.

Interlocutory Order Construing Claims 5 and 8 of the '283 Patent

For the reasons stated above, the court determines and declares that the following interpretations apply to the identified phrases in claims 5 and 8 of the '283 patent:

(1) "correspond to" means that the pixels illuminated on the display screen pictorially represent an object, or parts of the object, that attenuated or scattered a quantity of radiation;

(2) "at least a presettable level" means that the pixels illuminated on a display screen represent an object, or parts of the object, that scatters or attenuates a quantity of radiation, interaction with the object, equal to or more than the quantified threshold that can be pre-set by a machine operator before each scanning of the object;

(3) "in a ... predetermined single color" means illuminating pixels on a display screen in colors (other than black and white and shades thereof) that correspond to the attenuation and scattering of radiation, above a predetermined level, as it interacts with scanned materials.

It is so ORDERED.

D.Mass.,1997.
Vivid Technologies, Inc. v. American Science & Engineering, Inc.