

Centricut v. Esab Group CV-99-039-M 07/09/03  
UNITED STATES DISTRICT COURT

DISTRICT OF NEW HAMPSHIRE

Centricut, LLC,  
Plaintiff

v.

Civil No. 99-039-M  
Opinion No. 2003 DNH 115

Esab Group, Inc.,  
Defendant

v.

Centricut, LLC (New Hampshire)  
and Centricut, LLC (Delaware),  
Counterclaim Defendants

**ORDER**

Centricut, LLC has preemptively sued Esab Group, Inc. ("Esab"), holder of United States patent 5,023,425 ("the '425 patent"), seeking a declaratory judgment that: (1) it has not infringed the '425 patent; (2) the '425 patent is invalid on a variety of statutory grounds;<sup>1</sup> and (3) the '425 patent is unenforceable under the doctrine of laches and estoppel. Esab

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<sup>1</sup> Specifically, Centricut asserts that the '425 patent should be declared invalid, void, and/or unenforceable under 35 U.S.C. § 112, ¶ 2 (for indefiniteness), under §§ 102(a) and (b), under § 103 (for obviousness), and under § 112, ¶ 1 (for failure to meet the enablement requirement and to set forth the best mode).

counterclaims against Centricut, LLC (New Hampshire) and Centricut, LLC (Delaware) (collectively "Centricut"), asserting infringement of the '425 patent and infringement of United States patent Des. 384,682. By order dated February 7, 2002 (document no. 52), the court denied Centricut's motion for partial summary judgment and also ruled against Centricut on its indefiniteness defense. See 35 U.S.C. § 112, ¶ 2. The case was tried to the bench, beginning on October 21, 2002.

### **Infringement**

Under the United States Patent Act, "[e]xcept as otherwise provided . . . whoever without authority makes, uses, offers to sell, or sells any patented invention, within the United States or imports into the United States any patented invention during the term of the patent therefor, infringes the patent." 35 U.S.C. § 271(a).

An infringement analysis requires two steps: construction of the claims, to determine their scope and meaning, and comparison of the properly construed claims to the allegedly infringing device or method. Cybor Corp. v. FAS Techs., Inc., 138 F.3d 1448, 1454 (Fed. Cir. 1998) (en banc). Claim construction . . . is a matter of law . . . . Lockheed Martin Corp. v. Space Sys./Loral, Inc., 249 F.3d 1314, 1323 (Fed. Cir. 2001). The comparison of claims to the accused device

or method, and the corresponding determination of infringement, whether literal or under the doctrine of equivalents, is a question of fact. Tanabe Seiyaku Co. v. United States Int'l Trade Comm'n, 109 F.3d 726, 731 (Fed. Cir. 1997).

J & M Corp. v. Harley-Davidson, Inc., 269 F.3d 1360, 1366 (Fed. Cir. 2001) (parallel citations omitted).

"A claim is literally infringed when the accused device literally embodies each limitation of the claim." Kraft Foods, Inc. v. Int'l Trading Co., 203 F.3d 1362, 1370 (Fed. Cir. 2000) (citing Pall Corp. v. Micron Separations, Inc., 66 F.3d 1211, 1217 (Fed. Cir. 1995)). Infringement under the doctrine of equivalents occurs when "the accused product or process contain[s] elements identical or equivalent to each claimed element of the patented invention." Warner-Jenkinson Co. v. Hilton Davis Chem. Co., 520 U.S. 17, 40 (1997). "The determination of equivalence should be applied as an objective inquiry on an element-by-element basis." Id.

Equivalence is shown by evidence that the accused device contains an element that is not "substantially different" from any claim element that is literally lacking [in the accused device], see [Warner-Jenkinson, 520 U.S. at 40], or that the claimed limitation and the accused component "perform[] substantially the same

function in substantially the same way to achieve substantially the same result," see Ethicon Endo-Surgery, Inc. v. United States Surgical Corp., 149 F.3d 1309, 1321 (Fed. Cir. 1998).

Kraft Foods, 203 F.3d at 1371 (parallel citations omitted).

At issue here are independent Claims 1 and 8 of the '425 patent. The parties stipulated at trial that the only remaining issue is whether the accused Centricut electrodes meet the "work function" limitations of Claims 1 and 8. With respect to work function, Claim 1 discloses

an insert assembly . . . comprising an emissive insert composed of a metallic material having a relatively low work function, and a sleeve surrounding said emissive insert so as to separate said emissive insert from contact with said holder, said sleeve having a radial thickness of at least about 0.01 inches at said front end and being composed of a metallic material having a work function which is greater than that of the material of said emissive insert, and said sleeve being composed of a metal which is selected from group consisting of silver, gold, platinum, rhodium, iridium, palladium, nickel, and alloys wherein at least 50% of the composition of the alloy consists of one or more of said metals  
. . .

'425 patent, col. 7, ll. 30-43 (emphasis added). Claim 8, by contrast, discloses

an insert assembly . . . comprising  
(a) a generally cylindrical emissive insert . . . said emissive insert being composed of a metallic material having a relatively low work function so as to be adapted to readily emit electrons upon an electrical potential being applied thereto, and  
(b) a sleeve positioned . . . about said emissive insert, said sleeve having a radial thickness of at least about 0.01 inches at said front end and being composed of a metallic material having a work function which is greater than that of the material of said holder and greater than that of the material of said emissive insert, said metallic sleeve being selected from the group consisting of silver, gold, platinum, rhodium, iridium, palladium, nickel, and alloys wherein at least 50% of the composition of the alloy consists of one or more of said metals . . .  
.

'425 patent, col. 8, ll. 37-58 (emphasis added).

Given the parties' stipulations, two questions arise: (1) whether the accused electrodes have sleeves made from a metallic material having a work function greater than that of their emissive inserts (which would establish infringement of Claim 1); and (2) whether the accused electrodes have sleeves made from a metallic material having a work function greater than those of

both their emissive inserts and their holders (which would establish infringement of Claim 8).<sup>2</sup>

I. Claim 1

Esab did not offer evidence of work-function testing, but instead sought to prove infringement by demonstrating that the accused electrodes have a relatively long work life, and, therefore, must necessarily have sleeves made of a metallic material having a work function greater than that of their emissive inserts. (Generally speaking, the sleeves at issue are composed of silver and silver alloys, while the emissive inserts are composed of hafnium, and the holders are composed of copper.) Rather than testing the metallic materials from which Centricut made its electrodes, Esab tested the electrodes themselves, by putting them into plasma arc torches and operating the torches until the electrodes failed.

Centricut countered that: (1) work function is a complex phenomenon, dependent upon many variables, such that a single

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<sup>2</sup> While claim construction is the first step in an infringement analysis, see J & M Corp., 269 F.3d at 1366, the parties do not contest the construction of the claim limitations at issue here.

metallic material, like silver, may have multiple work functions, based upon differences in the temperature, cleanliness, and surface characteristics (including oxidation) of a given sample; (2) due to the number of variables affecting work function, general work-function tables commonly used by engineers and metallurgists are virtually useless in determining the work function of a discrete sample of metallic material; (3) it is theoretically possible for a particular sample of silver, with the right set of physical characteristics, to have a work function lower than the work function of a particular sample of hafnium; and (4) Esab misunderstands precisely why its electrodes last longer than those previously available in the marketplace. (Centricut suggested that the arc attaches to the electrode along its centerline, regardless of the metallic material located there, due to the swirling vortex of gasses directing the arc to that particular point. A silver sleeve extends the life of an electrode, Centricut says, not because its comparatively high work function prevents the arc from drifting over to the relatively fragile copper holder, but because silver is a superior heat conductor and forms better bonds with hafnium and copper than hafnium and copper form with each other.)

Centricut established that physical circumstances could be manipulated in such a way that some silver could indeed have a work function lower than that of some hafnium.<sup>3</sup> At the same time, however, it is clear from the scientific references excerpted in Esab's Exhibit 25 that silver commonly has a higher work function than hafnium. Nothing in the record suggests that Centricut made its silver sleeves from one of the relatively few low-work-function forms of silver. It is more likely than not that the accused electrodes' sleeves were made from common forms of silver having a higher work function than hafnium.<sup>4</sup> The

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<sup>3</sup> Standard references report many more work function values for silver than for hafnium. One source lists a single work function for hafnium but sixteen for silver, based upon three different testing methods.

<sup>4</sup> Centricut is, of course, correct in asserting that one cannot look to a reference-book table to conclusively ascertain the work function of a specific sample of metallic material. But, while such evidence might not establish to a physical certainty that the silver used by Centricut has a higher work function than the hafnium in its inserts, those standard references are sufficiently persuasive to support that finding by a preponderance of the evidence. At the appropriate level of understanding, i.e., the perspective of one skilled in the pertinent art, and for the purpose of proving infringement by a preponderance of the evidence, the work-function tables offered by Esab do provide an adequate basis for decision in this case, particularly in the absence of any contradictory evidence on the point. This issue is not, of course, what might be possible, but what is probable with regard to the relative work functions of the silver and hafnium used in the accused electrodes.

court finds that Centricut's electrodes do literally infringe Claim 1 of the '425 patent.

## II. Claim 8

### A. Literal Infringement

Given the infringement of Claim 1, Centricut has also infringed Claim 8's similar limitation regarding electrodes with sleeves that have a higher work function than their emissive inserts. However, Claim 8 includes an additional limitation: the sleeve material must also have a work function higher than that of the material from which the holder is made. In both electrodes, the relevant metallic materials are silver (the sleeve) and copper (the holder).

Unlike silver and hafnium, which have relatively little overlap in terms of the work-function values disclosed in commonly used reference books, the work-function values ascribed to silver and copper do substantially overlap. Many forms of copper have work functions higher than many forms of silver. Thus, the court cannot conclude that it is more likely than not that Centricut manufactured electrodes with silver sleeves having

higher work functions than their surrounding copper holders. While Esab did explain the benefits of using a sleeve made from a material with a higher work function than the emissive insert, the record does not identify any useful benefit associated with a sleeve material having a higher work function than that of the surrounding holder. Because Esab has not proven, by a preponderance of the evidence, that the accused electrode embodies the limitation of a sleeve with a work function higher than that of its holder, Esab has not proven that Centricut literally infringed Claim 8 of the '425 patent. In short, the readily available work-function tables disclose too great an overlap in relative work-function values for silver and copper to give rise to a reliable inference one way or the other. As noted, the accused devices were not tested to determine the actual work functions of the metallic materials from which they were made.

B. Infringement under the Doctrine of Equivalents

In its request for findings of fact and rulings of law, Esab describes the legal standard applicable in proving infringement under the doctrine of equivalents. But, it does not develop an

argument based on the doctrine of equivalents in its post-trial memorandum of law. Given the evidence of record in this case, it is not possible to engage in a meaningful equivalence analysis.

Because Esab did not prove the work function of the copper in Centricut's holders, the court cannot reliably determine whether the accused electrode embodies the limitation disclosed in the patent. Further difficulties arise from Esab's failure to establish: (1) the function to be served by the claimed difference in work function; (2) the way in which that function is performed; and (3) the specific result achieved by the work-function differential. See Kraft Foods, 203 F.3d at 1371 (citation omitted). In other words, Esab's admittedly imprecise description of the physics of plasma arc torch operation is fatal to its claim of infringement under the doctrine of equivalents.

To summarize, Esab has proven by a preponderance of the evidence that Centricut infringed Claim 1, but not Claim 8, of the '425 patent. Because Centricut has not infringed Claim 8, the following discussion of invalidity pertains only to Claim 1.

## **Invalidity**

Centricut argues that even it did infringe the '425 patent, it is not liable to Esab because the '425 patent is invalid on grounds of anticipation and obviousness.

Patents are presumed valid. 35 U.S.C. § 282. Nevertheless, a party may defend against a claim of infringement by attacking the validity of the patent sued upon. See 35 U.S.C. § 282(2). Of course, "[t]he burden of establishing invalidity of a patent or any claim thereof shall rest on the party asserting such invalidity." 35 U.S.C. § 282. "To overcome [the] presumption of validity, the party challenging a patent must prove facts supporting a determination of invalidity by clear and convincing evidence." Schumer v. Lab. Computer Sys., Inc., 308 F.3d 1304, 1315 (Fed. Cir. 2002) (citing Apotex USA, Inc. v. Merck & Co., 254 F.3d 1031, 1036 (Fed. Cir. 2001), cert. denied 534 U.S. 1172 (2002)). Finally, "[i]n analyzing validity, '[t]he first step involves the proper interpretation of the claims [while] [t]he second step involves determining whether the limitations of the claims as properly interpreted are met by the prior art.'" Teleflex, Inc. v. Ficoso N. Am. Corp., 299 F.3d 1313, 1333 (Fed.

Cir. 2002) (quoting Beachcombers, Int'l, Inc. v. WildeWood Creative Prods., Inc., 31 F.3d 1154, 1160 (Fed. Cir. 1994)).<sup>5</sup>

I. Lack of Novelty/Anticipation

Centricut argues that Claim 1 of the '425 patent is invalid for lack of novelty because it was anticipated by Japanese Laid-Open Patent Application No. Sho 60-247491 ("the Kojo patent"), filed on May 24, 1984. Esab counters that the electrode claimed in the '425 patent was not anticipated by the Kojo patent, because the '425 patent claims a "sleeve having a radial thickness of at least about 0.01 inches" while the Kojo patent discloses "a boundary layer . . . formed by plating treatment such as electroplating, chemical plating, etc. or . . . welding or . . . deposition." The court agrees that Claim 1 of the '425 patent was not anticipated by the Kojo patent.

Under the Patent Act, one necessary condition of patentability is novelty. The novelty provision of the Patent Act provides, in pertinent part:

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<sup>5</sup> As with Esab's infringement claim, Centricut's invalidity defenses involve no contested issues of claim construction.

A person shall be entitled to a patent unless-

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for patent, or

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of the application for patent in the United States . . .

35 U.S.C. § 102. "Anticipation under 35 U.S.C. § 102 means lack of novelty, and is a question of fact. To anticipate, every . . . limitation of the claimed invention must be found in a single prior art reference." Beckson Marine, Inc. v. NFM, Inc., 292 F.3d 718, 725 (Fed. Cir. 2002) (quoting Brown v. 3M, 265 F.3d 1349, 1351 (Fed. Cir. 2001)).

Here, Centricut has failed to produce clear and convincing evidence that Claim 1 of the '425 patent was anticipated by the Kojo patent. Specifically, the limitation of a "sleeve having a radial thickness of at least about 0.01 inches" is not present in the Kojo patent. The Kojo patent discloses a "boundary layer" between the emissive insert and the holder, but indicates no minimum thickness requirement. Given the precision with which

sleeve thickness was claimed in the '425 patent, the absence of any indication of thickness in the Kojo patent, and the specific methods of fabrication disclosed in the Kojo patent, which include techniques such as electroplating and chemical plating, Centricut's evidence does not rise to the level of clear and convincing proof that the Kojo patent disclosed a sleeve with a radial thickness of at least about 0.01 inches.

The court is also not persuaded by Landry's testimony regarding his general inspection, at an unspecified time and place, of an electrode similar to those disclosed in the Kojo patent, or conjecture by O'Hara as to the significance of cross-hatching rather than a single line in one of the Kojo patent drawings. While such evidence may be suggestive of a boundary layer of some thickness, it does not clearly and convincingly establish that the boundary layer disclosed in the Kojo patent was, necessarily, at least about 0.01 inches thick.

Accordingly, Claim 1 of the '425 patent is not invalid on grounds of anticipation (or lack of novelty).

## II. Obviousness

Centricut argues that even if the '425 patent is not invalid for lack of novelty, it is invalid for obviousness, in light of the Kojo patent. Esab counters that the electrode claimed in the '425 patent is not rendered obvious by the electrode claimed in the Kojo patent because: (1) the Kojo patent teaches the use of a boundary layer made of "nickel, chrome, etc." rather than silver, while silver is disclosed in the '425 patent as "a preferred material;" (2) prior to the invention of the electrode disclosed in the '425 patent, there was a well-recognized need in the plasma arc cutting industry for longer-lasting oxygen electrodes; (3) the Esab electrode was commercially successful; (4) Centricut emulated the Esab electrode; and (5) a six-person team at Thermal Dynamics, seeking to develop longer-lasting oxygen electrodes, experimented with silver, but never developed a silver sleeve like the one disclosed in the '425 patent. The court agrees that Claim 1 of the '425 patent is not invalid for obviousness.

The non-obviousness provision of the Patent Act provides, in pertinent part:

A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which subject matter pertains. . . .

35 U.S.C. § 103(a).

Obviousness is a legal conclusion based on underlying findings of fact. In re Dembiczak, 175 F.3d 994, 998 (Fed. Cir. 1999). The underlying factual inquiries are: "(1) the scope and content of the prior art; (2) the level of ordinary skill in the prior art; (3) the differences between the claimed invention and the prior art; and (4) objective evidence of nonobviousness." Id.

Beckson Marine, 292 F.3d at 725-26 (parallel citations omitted).

In turn, objective evidence of nonobviousness

includes the commercial success of the patented invention, whether the invention addresses "long felt but unsolved needs," and the failure of others to produce alternatives to the patented invention.

In re GPAC Inc., 57 F.3d 1573, 1580 (Fed. Cir. 1995) (quoting Graham v. John Deere Co., 383 U.S. 1, 17-18 (1966)).

As noted earlier, the Kojo patent discloses a boundary layer, but not a sleeve that is at least 0.01 inches thick. Moreover, Centricut has identified no other prior art that discloses the sleeve element claimed by the '425 patent. So, this is not a case of "obviousness . . . established by combining the teachings of the prior art." In re GPAC, 57 F.3d at 1581 (citation omitted).

More importantly, however, even if Centricut had established that all the elements of Claim 1 of the '425 patent had been taught by some combination of prior art references, Centricut has failed to provide any evidence to support a finding that "the combined teachings of the prior art references . . . suggest, expressly or by implication, the improvements embodied by the invention." Id. (citing In re Sernaker, 702 F.2d 989 (Fed. Cir. 1983)). In other words, Centricut has produced no evidence to show that "the prior art . . . provide[d] a suggestion or motivation" to replace the boundary layer in the Kojo patent with the sleeve claimed in the '425 patent. Heidelberger Druckmaschinen AG v. Hantscho Commercial Prods., Inc., 21 F.3d 1068, 1072 (Fed. Cir. 1994) (citing Northern Telecom, Inc. v.

Datapoint Corp., 908 F.2d 931, 934 (Fed. Cir. 1990); In re Geiger, 815 F.2d 686, 688 (Fed. Cir. 1987) (obviousness cannot be established by combining pieces of prior art absent some "teaching, suggestion, or incentive supporting the combination"). Because no prior art either discloses a sleeve or suggests the benefit of anything thicker than a "boundary layer" between the emissive insert and the holder of an oxygen electrode, Centricut has provided no evidence to demonstrate that it would have been obvious to one skilled in the art of plasma arc cutting that a silver sleeve would increase the effective life of an oxygen electrode.

In terms of the Beckson Marine factors, Centricut has failed to demonstrate that the prior art includes any reference to the sleeve element of the '425 patent (factor 1), which means that the claimed invention is substantially different from the prior art (factor 3). Thus, both factors weigh in favor of Esab. Factor 4, objective evidence of obviousness, also weighs in favor of Esab. The Esab electrode was a commercial success because it lasted longer than other oxygen electrodes, thus meeting a long-standing unsolved need in the plasma arc cutting torch industry.

While there may be lingering questions about the precise electrochemical processes that cause the Esab electrode to last longer than electrodes without a silver sleeve,<sup>6</sup> it is apparent that the addition of the silver sleeve was the inventive step that gave the Esab electrode its commercial advantage. See In re GPAC, 57 F.3d at 1580 (citations omitted).

For the reasons given above, the addition of a silver sleeve to an electrode composed of an emissive insert set in a copper holder was an improvement in electrode design that would not have been obvious to one skilled in the art at the time of the invention claimed in the '425 patent. Accordingly, Centricut has failed to prove, by clear and convincing evidence, that Claim 1 of the '425 patent is invalid for obviousness.

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<sup>6</sup> Centricut makes much of the physical mysteries of plasma arc cutting, to the point of suggesting that plasma arc cutting is a "black art." If indeed plasma arc cutting is so poorly understood, and if advances in the field come exclusively through trial and error, it seems somewhat anomalous for Centricut also to argue that the invention claimed by Esab was obvious. In other words, it is difficult to see how Esab's invention could be obvious when the field of technology from which it sprang is so poorly understood that it qualifies as a "black art."

## **Damages**

Esab seeks both lost profits and enhanced damages for willful infringement. Centricut argues that the proper measure of damages is a reasonable royalty rate rather than lost profits, and that enhanced damages are inappropriate because any infringement was not willful.

The damages provision of the Patent Act provides, in pertinent part:

Upon finding for the claimant the court shall award the claimant damages adequate to compensate for the infringement, but in no event less than a reasonable royalty for the use made of the invention by the infringer, together with interest and costs as fixed by the court.

35 U.S.C. § 284. In determining the proper measure of damages, the following principle applies:

The question to be asked in determining damages is "how much had the Patent Holder and Licensee suffered by the infringement. And that question [is] primarily: had the Infringer not infringed, what would Patent Holder-Licensee have made?"

Aro Mfg. Co. v. Convertible Top Replacement Co., 377 U.S. 476, 507 (1964) (quoting Livesay Window Co. v. Livesay Indus., Inc., 251 F.2d 469, 471 (5th Cir. 1958)).

The Patent Act establishes a "reasonable royalty" as the minimum level of legally adequate damages to compensate for infringement. See King Instruments Corp. v. Perego, 65 F.3d 941, 947 n.2 (Fed. Cir. 1995) (citing Rite-Hite Corp. v. Kelley Co., 56 F.3d 1538 (Fed. Cir. 1995) (en banc)). In other words, "the purpose of [the reasonable royalty] alternative is not to direct the form of compensation, but to set a floor below which damage awards may not fall." Rite-Hite, 56 F.3d at 1544 (citing Del Mar Avionics, Inc. v. Quinton Instr. Co., 836 F.2d 1320, 1326 (Fed. Cir. 1987)). In the event that damages in the amount of a reasonable royalty are inadequate to compensate for infringement, the court may award other damages, such as lost profits.

In addition, "the court may increase the damages up to three times the amount found or assessed." 35 U.S.C. § 284. Finally, "the patent owner [Esab] bears the burden of proving by a preponderance of the evidence the quantum of damages, [which is]

an issue of fact. . . .” Transclean Corp. v. Bridgewood Servs., Inc., 290 F.3d 1364, 1370 (Fed. Cir. 2002) (citing SmithCline Diagnostics, Inc. v. Helena Labs. Corp., 926 F.2d 1161, 1164 (Fed. Cir. 1991)).

#### I. Lost Profits

Esab argues that adequate compensation for Centricut’s infringement consists of profits lost through: (1) Centricut’s sale of infringing electrodes;<sup>7</sup> (2) erosion of the price Esab could charge for its own electrodes, due to infringing competition from Centricut;<sup>8</sup> and (3) Esab’s lost opportunities to sell nozzles and other torch parts that are typically sold along with electrodes.<sup>9</sup> Centricut contends that the proper measure of

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<sup>7</sup> The parties agree that Centricut sold 152,707 infringing electrodes between 1997 and 2002. However, while Esab asserts that it lost profits of \$1,817,672 on those sales, Centricut contends that under a reasonable royalty calculation, Esab’s damages amount to only \$221,425.15.

<sup>8</sup> Esab claims losses of \$903,343 resulting from price erosion.

<sup>9</sup> Esab claims \$1,086,440 in lost profits from nozzle sales it allegedly did not make as a result of Centricut’s sales of infringing electrodes, and \$1,559,588 in profits lost from other torch-part sales it would have made if not for Centricut’s infringement. According to Centricut, if damages are awarded for Esab’s lost profits from sales of nozzles and other torch parts, those damages should also be based on a reasonable royalty, and

damages is a reasonable royalty, and that a reasonable royalty rate is ten percent of the price Centricut charged its customers for the infringing electrodes, because that is the rate Centricut pays Esab under two current licenses, one for a nitrogen electrode and one for a nitrogen nozzle. Centricut further argues that if damages are awarded for lost sales of nozzles and other torch parts, the ten-percent royalty rate should also apply.

The Patent Act directs the court to award damages adequate to compensate for infringement, without specifying any particular form of compensation. See Rite-Hite, 56 F.3d at 1544. Wide latitude is granted in determining damages. See id. at 1543-44; State Indus., Inc. v. Mor-Flo Indus., Inc., 883 F.2d 1573, 1576-77 (Fed. Cir. 1989) ("Deciding how much to award as damages is not an exact science, and the methodology of assessing and computing damages is committed to the sound discretion of the district court.") (citation omitted).<sup>10</sup>

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amount to \$219,826 for nozzle sales and \$155,956 for sales of other torch parts.

<sup>10</sup> This point is underscored by the various ways in which courts have dealt with the availability of damages based upon the sale of unpatented items that are closely associated with

Damage awards for lost profits are governed by the following rule:

To recover lost profits damages for patent infringement, the patent owner must show that it would have received the additional profits "but for" the infringement. The patent owner bears the burden to present evidence sufficient to show a reasonable probability that it would have made the asserted profits absent infringement. See, e.g., Del Mar Avionics, Inc. v. Quinton Instr. Co., 836 F.2d 1320, 1326 (Fed. Cir. 1987).

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patented devices. Such damages have been allowed both in reasonable-royalty cases, see Ga.-Pac. Corp. v. U.S. Plywood Corp., 318 F. Supp. 1116, 1120 (S.D.N.Y. 1970) (listing, as a factor relevant to determining a reasonable royalty, "[t]he effect of selling the patented specialty in promoting sales of other products of the licensee; the existing value of the invention to the licensor as a generator of sales of his non-patented items; and the extent of such derivative or convoyed sales"), and in lost profits cases, see Kalman v. Berlyn Corp., 914 F.2d 1473, 1485 (Fed. Cir. 1990) (affirming award of damages based upon profits lost on sales of unpatented filter screens that were usually sold along with the device disclosed in the patent in suit). Similarly,

[w]hen a patentee seeks damages on unpatented components sold with a patented apparatus, courts have applied a formulation known as the "entire market value rule" to determine whether such components should be included in the damage computation, whether for reasonable royalty purposes, see Leesona Corp. v. United States, 599 F.2d 958, 974 (Ct. Cl. 1979), or for lost profits purposes, see Paper Converting Machine Co. v. Magna-Graphics Corp., 745 F.2d 11, 23 (Fed. Cir. 1984).

Rite-Hite, 56 F.3d at 1549 (parallel citations omitted).

King Instruments, 65 F.3d at 952 (parallel citations omitted).

Lost profits damages are particularly appropriate in the context of a two-supplier market. See Shockley v. Arcan, Inc., 248 F.3d 1349, 1363 (Fed. Cir. 2001) (citing Lam, Inc. v. Johns-Manville Corp., 718 F.2d 1056, 1068 (Fed. Cir. 1983)); see also State Indus., 883 F.2d at 1578 (“In the two-supplier market, it is reasonable to assume, provided the patent owner has the manufacturing and marketing capabilities, that it would have made the infringer’s sales.”) (citation omitted). Moreover, when awarded, lost profits damages are generally subject to the following test, under which the patentee must establish:

- (1) demand for the patented product;
- (2) absence of acceptable non-infringing substitutes;
- (3) manufacturing and marketing capability to exploit the demand;
- and (4) the amount of the profit it would have made.

Rite-Hite, 56 F.3d at 1545 (citing Panduit Corp. v. Stahl Bros. Fibre Works, Inc., 575 F.2d 1152, 1156 (6th Cir. 1978)).

Here, Esab has failed to establish the second element of the Panduit test. Specifically, Centricut’s Silverline electrode appears to be an “acceptable non-infringing substitute[]” for

Esab's patented electrode. Id. While Esab offered testimony that customers seeking long-life oxygen electrodes were unlikely to purchase Centricut's Silverline electrodes, because they look different from both Esab's patented electrodes and Centricut's infringing electrodes, the fact remains that the Silverline electrode was available in the market and could well have been purchased, instead of Esab's electrodes, had the infringing electrodes not been available for sale. In sum, Esab has failed to prove by a preponderance of the evidence that at the time of Centricut's infringement, there was an absence of acceptable non-infringing substitutes in the market. Accordingly, Esab is not entitled to lost profits damages, under the test set out in Panduit.

Even though Esab is not entitled to lost profits damages, it is entitled to damages adequate to compensate for Centricut's infringement. Because each of the three categories of damages claimed by Esab could, conceivably, factor into the calculation of a reasonable royalty, each category of damages is considered in turn.

A. Centricut's Sales of Infringing Electrodes

As noted, the parties agree upon the number of infringing electrodes Centricut sold; the only question is the amount of damages to award for each sale. Centricut argues for a ten-percent royalty (which works out to \$1.45 per electrode), while Esab contends that it should be awarded the same rate of profit it earned on the electrodes it sold itself (which works out to approximately \$11.90 per electrode). Neither approach is quite right.

Centricut's position - that a reasonable royalty is ten percent of the price it charged its customers for the infringing electrodes - is not well supported in the record. Esab granted Centricut licenses to manufacture and/or sell nitrogen electrodes and nozzles in exchange for a ten-percent royalty, but those license agreements are not the best measure of damage resulting from Centricut's manufacture and sale of the oxygen electrodes at issue here. The record demonstrates that Esab allows several after-market suppliers to sell its oxygen electrodes.<sup>11</sup> Because

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<sup>11</sup> Esab began selling its oxygen electrodes to American Torch Tip ("ATT") under an agreement that resulted from Esab's discovery that ATT had been attempting to market an allegedly infringing electrode. Under that agreement, ATT stopped

those electrodes are identical to those at issue in this case, the royalty Esab negotiated with its licensees provides a more reasonable measure of Esab's damages than the royalty rate specified in the nitrogen electrode licensing agreements between Centricut and Esab.<sup>12</sup> Accordingly, the court rejects Centricut's argument that a ten-percent royalty is adequate to compensate Esab.

While a ten-percent royalty would undercompensate Esab, Esab's calculation of lost profits damages would lead to overcompensation. Specifically, Esab's calculation fails to account for the availability of the Silverline electrode in the market and the likelihood that at least some customers would have

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manufacturing the challenged electrode, and now buys Esab electrodes for resale, paying Esab \$10.50 per electrode. In contrast, Zap Plasmatherm/Thermacut ("ZP/T"), which also resells Esab's oxygen electrodes, initially approached Esab with a request to purchase unbranded Esab electrodes for resale to its customers. ZP/T buys Esab electrodes for \$12 each.

<sup>12</sup> In one of the leading cases on patent infringement damages, the court compiled "[a] comprehensive list of evidentiary facts relevant, in general, to the determination of the amount of a reasonable royalty for a patent license." Georgia-Pacific, 318 F. Supp. at 1120. The first item on that list is "[t]he royalties received by the patentee for the licensing of the patent in suit, proving or tending to prove an established royalty." Id. (emphasis added).

purchased Silverline electrodes rather than Esab electrodes in the absence of the infringing electrodes. Thus, adequate compensation for Centricut's sales of the infringing electrodes falls somewhere between the ten-percent royalty Centricut advocates and the lost profits calculation advanced by Esab.

An award of \$10.50 per infringing electrode, less the cost of manufacture, will provide Esab with full and fair compensation for Centricut's sales of infringing electrodes. Esab agreed, after arm's-length negotiations, to accept \$10.50 for each electrode it sold to American Torch Tip which, like Centricut, is an after-market supplier of torch parts.<sup>13</sup> However, because Esab incurred the cost of manufacturing the electrodes it sold to ATT, but did not incur the cost of manufacturing the infringing electrodes, Esab is not entitled to a full \$10.50 for each infringing electrode Centricut sold. Rather, the royalty must be

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<sup>13</sup> The \$10.50 royalty Esab received from ATT, rather than the \$12 royalty Esab received from ZP/T, is the better measure of damages because Esab gave ATT a lower royalty rate than ZP/T due to ATT's larger volume of sales. On this record, the number of infringing electrodes Centricut sold is greater than the number Esab electrodes ATT sold. Moreover, while the record does not establish how many more Silverline electrodes Centricut would have sold if it had not sold the infringing electrodes, using the lower royalty rate provides some measure of correction for the Silverline factor.

reduced by Esab's manufacturing costs. Accordingly, as a result of Centricut's sales of infringing electrodes, Esab is entitled to damages in the amount of \$1,096,532.24, which represents \$10.50 for each of the 152,707 infringing electrodes, for a total of \$1,603,423.24, less \$506,891.26 in manufacturing costs.

B. Price Erosion

With regard to price-erosion damages, the failure to obtain lost profits damages undermines Esab's price-erosion claim. Indeed, such damages generally have been regarded as a category of lost profits. See, e.g., Vulcan Eng'g Co. v. FATA Alum., Inc., 278 F.3d 1366, 1377 (Fed. Cir. 2002); Lam, 718 F.2d at 1065 ("Lost profits may be in the form of diverted sales, eroded prices, or increased expenses."). As a logical matter, it is difficult to see how downward price pressure on a licensor's patented invention could possibly increase a reasonable royalty, when that term is defined as "the amount that 'a person, desiring to manufacture [, use, or] sell a patented article, as a business proposition, would be willing to pay as a royalty and yet be able to make [, use, or] sell the patented article, in the market, at a reasonable profit.'" Trans-World Mfg. Corp. v. Al Hyman &

Sons, Inc., 750 F.2d 1552, 1568 (Fed. Cir. 1984) (quoting Goodyear Tire & Rubber Co. v. Overman Cushion Tire Co., 95 F.2d 978, 984 (6th Cir. 1938); citing Panduit, 575 F.2d 1152).

But even assuming price-erosion damages to be available in this case, Esab has failed to prove that it is entitled to such damages. Esab's evidence of price erosion is simply too speculative; the record contains evidence of any number of factors other than Centricut's improper competition - such as national economic trends and steel tariffs - that may well have contributed to erosion of the prices Esab was able to charge for its electrodes. Absent testimony from an economics expert, the court simply cannot find, by a preponderance of the evidence, that Centricut's infringement eroded the price that Esab was able to charge for its electrodes. Accordingly, the court declines to award damages based upon price erosion.

C. Lost Sales of Nozzles and other Torch Parts

The evidence of lost nozzle sales is solid enough to support an award of damages, but the evidence pertaining to lost sales of other torch parts is too speculative. As noted above, in

footnote 10, lost sales of unpatented components, accessories, or other items typically sold with patented devices may be considered in the calculation of either lost profits or a reasonable royalty. Thus, absence of a lost profits damage award creates no obstacle to Esab's recovery of damages based upon lost sales of unpatented torch parts.

There are two situations in which patent infringement damages may include a patent owner's lost sales of items other than the patented device. First, under the "entire market value rule," which does not apply here, patent infringement damages may be based upon the value of an entire device, containing both patented and unpatented components, when "the unpatented and patented components together were considered to be components of a single assembly or parts of a complete machine, or they together constituted a functional unit," Rite-Hite, 56 F.3d at 1550 (citing Velo-Bind, Inc. v. Minn. Mining & Mfg. Co., 647 F.2d 965 (9th Cir. 1981)), and when "the patent-related feature is the 'basis for customer demand,'" Rite-Hite, 56 F.3d at 1549 (quoting State Indus., 883 F.2d at 1580; citing TWM Mfg. Co. v. Dura Corp., 789 F.2d 895, 900-01 (Fed. Cir. 1986)).

Second, when an unpatented device is routinely “bundled” for “convoyed sales” along with a patented device, the scope of damages may include lost sales of the unpatented devices. See Interactive Pictures Corp. v. Infinite Pictures, Inc., 274 F.3d 1371, 1385 (Fed. Cir. 2001) (upholding jury award which “rel[ie]d on evidence of bundling and convoyed sales in determining the proper scope of the royalty base”) (citing Deere & Co. v. Int’l Harvester Co., 710 F.2d 1551, 1559 (Fed. Cir. 1983)). As the court in Interactive Pictures noted, “[t]he ‘extent of . . . derivative or convoyed sales’ is one of the often-cited Georgia-Pacific factors relevant to determination of a reasonable royalty rate.” 274 F.3d at 1385 (quoting Georgia-Pacific, 318 F. Supp. at 1120).

In Trans-World Manufacturing, 750 F.2d at 1568, the defendant infringed the plaintiff’s patent on a rack used to display eyeglasses. The district court excluded, as irrelevant to the determination of a reasonable royalty, “evidence of [defendant’s] profits from the sale of [unpatented] displayed eyeglasses.” Id. The court of appeals reversed that ruling, reasoning:

By supplying the patented racks for displaying the eyeglasses, [defendant] Hyman used "the patented [invention] in promoting sales of" the nonpatented eyeglasses. [Plaintiff] Trans-World may be able to prove that Hyman's infringing use of the displays played an important part in the retail sales of Hyman's eyeglasses. Furthermore, the extent of the profits from such sales could be relevant in determining the amount of a reasonable royalty. If, for example, sales were increased because of the infringing use of the displays, that fact could affect the amount of royalties a potential licensee would be willing to pay.

Id. In Kalman, 914 F.2d 1473, the defendant infringed the plaintiff's patent for a filtering device, and the court of appeals affirmed an award of lost profits damages, id. at 1484-85, including "lost profits for the sale of unpatented screens and accessories for the [patented] Autoscreen device, in addition to those lost profits attributable to the Autoscreen body itself," id. at 1477 (citation omitted). The court of appeals noted that "[a]t trial, [plaintiff] Dr. Kalman testified that the screens were usually sold with the Autoscreens." Id. at 1485. Similar reasoning was adopted by the district court in Andrew Corp. v. Gabriel Electronics, Inc., 785 F. Supp. 1041 (D. Me. 1992). In that case, the court ruled that plaintiff's net profits from sales of accessory items normally sold along with the patented horn reflector antenna were an appropriate component

of the plaintiff's damages for patent infringement. Id. at 1051 (citing Paper Converting Mach. Co., 745 F.2d at 23).

Here, Esab offered unchallenged evidence that electrodes and nozzles wear out at approximately the same rate. Thus, both those parts of a plasma arc torch typically need to be replaced at about the same time. The preponderance of the evidence supports a finding that torch operators typically prefer to purchase replacement electrodes and nozzles from the same source, at the same time. Therefore, Esab has proven that purchases of electrodes and nozzles tend to be bundled together or "convoyed." In other words, Esab has proven that Centricut's sales of infringing electrodes deprived Esab of both electrode sales and nozzle sales. Thus, for Esab to obtain damages adequate to compensate for Centricut's infringement, the damage award must include compensation for Esab's lost nozzle sales. The court is persuaded by Esab's proffered estimates, which do not claim that each Centricut electrode sale represented a nozzle sale lost to Esab, but, instead, factor in the availability of Esab electrodes from American Torch tip and Zap Plasmatherm/Thermacut. Esab is

entitled to damages in the amount of \$1,086,440 for lost nozzle sales.

However, Esab has not proven by a preponderance of the evidence that it would have sold retaining caps, swirl baffles, torch bodies, or other torch parts but for Centricut's infringement. By Esab's own concession, those parts wear out much more slowly than either nozzles or electrodes. Because those parts wear out at substantially different rates than do electrodes, it is far less likely that purchases of those parts are typically bundled with purchases of electrodes. Thus, damages based upon lost sales of torch parts other than nozzles are far too speculative, and the court declines to award them.

## II. Increased Damages for Willful Infringement

Esab contends that Centricut's infringement of the '425 patent was willful, and that Centricut's willful infringement provides the basis for an award of enhanced damages. Centricut counters that the record fails to support a finding of willful infringement. The court agrees.

When exercising its statutory discretion to award enhanced damages for patent infringement, the court may consider:

(1) deliberate copying; (2) infringer's investigation and good-faith belief of invalidity or non-infringement; (3) litigation conduct; (4) infringer's size and financial condition; (5) closeness of the case; (6) duration of the misconduct; (7) remedial action by the infringer; (8) infringer's motivation for harm; and (9) concealment.

Transclean, 290 F.3d at 1377-78 (citing Read Corp. v. Portec, Inc., 970 F.2d 816, 827 (Fed. Cir. 1992)). "A finding of willful infringement 'authorizes but does not mandate an award [of] increased damages.'" Transclean, 290 F.3d at 1378 (quoting Modine Mfg. Co. v. Allen Group, Inc., 917 F.2d 538, 543 (Fed. Cir. 1990)). In turn,

[w]illful infringement is a question of fact, American Med. Sys. [v. Med. Eng'g Corp.] 6 F.3d [1523,] 1530-31 [(Fed. Cir. 1993)], and must be established by clear and convincing evidence, for "the boundary between unintentional and culpable acts is not always bright." Pall Corp. v. Micron Separations, Inc., 66 F.3d 1211, 1221 (Fed. Cir. 1995).

SRI Int'l, Inc. v. Advanced Tech. Labs., Inc., 127 F.3d 1462, 1465 (Fed. Cir. 1997) (parallel citations omitted).

Esab has failed to prove willful infringement by clear and convincing evidence. Centricut's "short-sleeve" design, while infringing, plainly demonstrates a good-faith effort to design around the sleeve limitation of the '425 patent. Second, Esab's own inability to provide direct evidence of the work function of Centricut's sleeve material must also count as evidence of both the difficulty Centricut faced in selecting materials from which to manufacture a non-infringing electrode and the strong possibility of failing to do so while nonetheless acting in good faith. Finally, while the legal opinions that Centricut obtained proved incorrect, Centricut suspended production of the infringing electrodes until it had legal advice in hand. That advice was apparently procured in good faith, and gave Centricut a reasonable basis for believing that it had successfully designed around the '425 patent. See id. at 1464-65. Because Esab has not provided clear and convincing evidence of willful infringement, and has not made a sufficient case under any of the other Read factors, an award of enhanced damages is not warranted.

### **Conclusion**

For the reasons given above, Centricut is liable for infringing Claim 1 of the '425 patent, and Esab is entitled to damages in the total amount of \$2,182,972.24. The Clerk of Court shall enter judgment in accordance with this order and close the case.

The foregoing order shall constitute the findings of fact and conclusions of law required by Rule 52 of the Federal Rules of Civil Procedure. The court notes that the parties have submitted numerous requests for findings of fact and rulings of law. It is well settled, however, that the court "does not have to make findings on every proposition put to it by the parties." Applewood Landscape & Nursery Co. v. Hollingsworth, 884 F.2d 1502, 1503 (1st Cir. 1989) (quoting Morgan v. Kerrigan, 509 F.2d 580, 588 n.14 (1st Cir. 1974)). Rather, factual findings are adequate if "sufficient to indicate the factual basis for the ultimate conclusion." Kelley v. Everglades Drainage Dist., 319 U.S. 415, 422 (1943) (per curiam). If either party believes that additional findings of fact or rulings of law are necessary, or even would prove helpful, it may, within fifteen days of the date

of this order, submit a written request for additional findings or rulings, along with a short (but fully explanatory) statement of why each requested finding or ruling is necessary or would be helpful. All requests for findings of fact or rulings of law not expressly or implicitly granted in the body of this opinion are hereby denied.

**SO ORDERED.**

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Steven J. McAuliffe  
United States District Judge

July 9, 2003

cc: Edward A. Haffer, Esq.  
Michael J. Bujold, Esq.  
Neal E. Friedman, Esq.  
John R. Hughes, Jr., Esq.  
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