United States Court of Appeals for the Federal Circuit

SYNQOR, INC.,
Plaintiff-Appellee,
v.

ARTESYN TECHNOLOGIES, INC. AND ASTEC AMERICA, INC.,
Defendants-Appellants,

AND

BEL FUSE, INC.,
Defendant-Appellant,

AND

DELTA ELECTRONICS, INC., DELTA PRODUCTS CORP., AND POWER-ONE, INC.,
Defendants-Appellants,

AND

MURATA ELECTRONICS NORTH AMERICA, INC., MURATA MANUFACTURING CO., LTD., AND MURATA POWER SOLUTIONS, INC.,
Defendants-Appellants,

AND

CHEROKEE INTERNATIONAL CORP. AND LINEAGE POWER CORP.,

Defendants.

2011-1191, -1192, -1194, 2012-1070, -1071, -1072

Appeals from the United States District Court for the Eastern District of Texas in No. 07-CV-0497, Judge T. John Ward.

Decided: March 13, 2013

CARTER G. PHILLIPS, Sidley Austin, of Washington, DC, argued for plaintiff-appellee. On the brief were CONSTANTINE L. TRELA, JR., THOMAS D. REIN, ROBERT N. HOCHMAN, RUSSELL E. CASS and STEPHANIE P. KOH; and MICHAEL D. HATCHER, of Dallas, Texas. Of counsel was THOMAS D. REIN.

DONALD R. DUNNER, Finnegan, Henderson, Farabow, Garrett & Dunner, LLP, of Washington, DC, argued for defendants-appellants Artesyn Technologies, Inc., et al. With him on the brief was JASON W. MELVIN. Of counsel on the brief were ROBERT J. MCAUGHAN, JR., ALBERT B. DEAVER, JR. and JEFFREY A. ANDREWS, Sutton McAughan Deaver PLLC, of Houston, Texas. Of counsel was ERIK R. PUKNEYS, Finnegan, Henderson, Farabow, Garrett & Dunner, LLP, of Palo Alto, California.

ANDREW J. PINCUS, Mayer Brown LLP, of Washington, DC, argued for defendants-appellants, Bel Fuse, Inc. and Delta Electronics, Inc., et al. With him on the brief were GARY M. HNATH, PAUL W. HUGHES and ROBERT E. MCBRIDE. Of counsel were JEFFREY T. LINDGREN and RICHARD C. VASQUEZ.

ALAN D. SMITH, Fish & Richardson P.C., of Boston, Massachusetts, argued for defendants-appellants Murata Electronics North America, Inc., et al. With him on the brief were WHITNEY A. REICHEL and KEVIN SU. Of counsel was STEVEN R. KATZ.

Before RADER, *Chief Judge*, LOURIE, *Circuit Judge*, and DANIEL, *Chief District Judge*.[1]

RADER, *Chief Judge*.

The United States District Court for the Eastern District of Texas granted SynQor, Inc. (SynQor) partial summary judgment of infringement against nine power converter manufacturers (Defendants) on U.S. Patents Nos. 7,072,190 ('190 Patent); 7,272,021 ('021 Patent); 7,564,702 ('702 Patent); 7,558,083 ('083 Patent); and 7,269,034 ('034 Patent). Specifically the District Court determined the "isolation" limitations of the asserted claims of the '190 Patent, '021 Patent, '702 Patent, and '083 Patent appear in Defendants' products. *SynQor, Inc. v. Artesyn Techs., Inc.* (*Claim Construction Order*), No. 07-CV-0497, 2010 U.S. Dist. LEXIS 74808, at *27 (E.D. Tex. July 26, 2010); *SynQor, Inc. v. Artesyn Techs., Inc.* (*Summary Judgment Order*), No. 07-CV-0497 (E.D. Tex. Dec. 12, 2010). The trial court denied Defendants' motions for judgment as a matter of law (JMOL) or new trial after a jury found all asserted claims infringed, not invalid, and awarded lost-profits damages of over $95 million. *SynQor, Inc. v. Artesyn Techs., Inc.*, No. 07-CV-0497 (E.D. Tex. Aug. 17, 2011). The court awarded supplemental and enhanced damages for post-trial infringement.

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[1] The Honorable Wiley Y. Daniel, Chief District Judge, United States District Court for the District of Colorado, sitting by designation.

SynQor, Inc. v. Artesyn Techs., Inc. (*Supplemental Damages Order*), No. 07-CV-0497 (E.D. Tex. July 11, 2011). Based on a review of the record evidence, this court affirms.

I.

This case deals with high-efficiency DC-DC power converter systems used to power circuitry in large computer systems and telecommunication and data communication equipment. Such systems convert direct current (DC) from one voltage level to another. The patents at issue involve converters with separate "isolation" and "regulation" stages.

A converter provides "isolation" if its input and output are not directly connected by wires. The parties dispute whether, in the context of the patents, the term "isolation" requires the absence of a wired connection between any "two points," or only the absence of a wired connection "between an input and an output of a particular stage, component, or circuit." *See* Part IV below.

In an isolated circuit, a transformer conveys current to the load. The mere presence of a transformer does not "isolate" the circuit, however, because a wired connection between the input and output might also defeat the isolation. Isolation serves both as a safety feature and also as a stability guarantor by preventing unwanted "ground current" from flowing through the circuit. Isolated converters are typically larger, more complicated, and less efficient than non-isolated converters.

A converter provides "regulation" by restricting its output to a desired voltage even when the input voltage varies. A "fully regulated" converter monitors the output voltage and modifies the operation of the circuit to maintain a desired output voltage. A "semi-regulated" converter monitors the input voltage to maintain a desired output voltage.

SynQor's asserted patents relate to a multiple-stage distributed power architecture known as an "intermediate bus architecture" (IBA). In an IBA, external power (e.g., 120 volts alternating current (AC)) is first converted to relatively high-voltage DC power (e.g., 48 volts) by a "front end converter." Next, an "intermediate bus converter" steps down the 48 volt DC power to a lower voltage (e.g., 12 volts). The intermediate bus converter provides isolation either with no regulation or with semi-regulation. The final stage uses multiple non-isolating regulators to convert 12 volt DC to proper levels for power logic circuitry (e.g., 5 volts).

IBA improved prior art power converter systems that used integrated converters, each performing both isolation and regulation, to step the 48 volt input down to the voltage levels required to power logic circuitry. Large computer and communication systems use multiple voltage levels for different logic circuitry housed on a single load board, and the prior art systems required a separate isolating/regulating converter for each voltage level. This array took up valuable space on the load board, which could otherwise accommodate more memory and other logic circuitry. IBA saves space by using a single isolation stage with multiple non-isolating regulators. The non-isolating regulators can be smaller, less expensive, and more efficient than integrated isolating/regulating converters.

The '190 Patent, '021 Patent, and the '702 Patent cover power converter systems comprising a "non-regulating isolation stage" and a "plurality of non-isolating regulation stages, each receiving the output of the isolation stage." *See, e.g.*, '190 Patent col. 17 ll. 22–42. The '083 Patent claims a "non-regulating isolating step-down DC-DC power converter," which is the intermediate bus converter component of the power systems claimed in the other patents. '083 Patent col. 16 l. 59–col. 17 l. 29. The

'034 Patent claims a "DC-DC converter system" comprising "isolation/semi-regulation circuitry" and a plurality of non-isolating switching regulators receiving the output of the isolation/semi-regulation circuitry. '034 Patent col. 17 ll. 22–43.

Defendants manufactured and sold intermediate bus converters overseas. SynQor asserted claims for induced and contributory infringement under 35 U.S.C. §§ 271(b) and (c), alleging Defendants sold the power supply components with knowledge that they would be used in, or were especially made to be used in, infringing systems imported into the United States. SynQor also asserted direct infringement under § 271(a) with respect to certain U.S. sales.

II.

This court reviews the grant or denial of a motion for JMOL under the law of the regional circuit, in this case, the United States Court of Appeals for the Fifth Circuit. *Revolution Eyewear, Inc. v. Aspex Eyewear, Inc.*, 563 F.3d 1358, 1370 (Fed. Cir. 2009). The Fifth Circuit reviews without deference the denial of a motion for JMOL. *Cambridge Toxicology Grp., Inc. v. Exnicios*, 495 F.3d 169, 179 (5th Cir. 2007). "Judgment as a matter of law is appropriate only when a 'reasonable jury would not have a legally sufficient evidentiary basis to find for the party on that issue.'" *Id.* (quoting Fed. R. Civ. P. 50(a)(1)).

Anticipation is a question of fact, and this court reviews the jury's findings for substantial evidence. *Minn. Mining & Mfg. Co. v. Chemque, Inc.*, 303 F.3d 1294, 1301 (Fed. Cir. 2002). On the issue of obviousness, this court reviews the jury's determination of underlying facts for substantial evidence, but reviews the ultimate conclusion of obviousness without deference. *W. Union Co. v. MoneyGram Payment Sys., Inc.*, 626 F.3d 1361, 1369 (Fed. Cir. 2010). Compliance with the written description

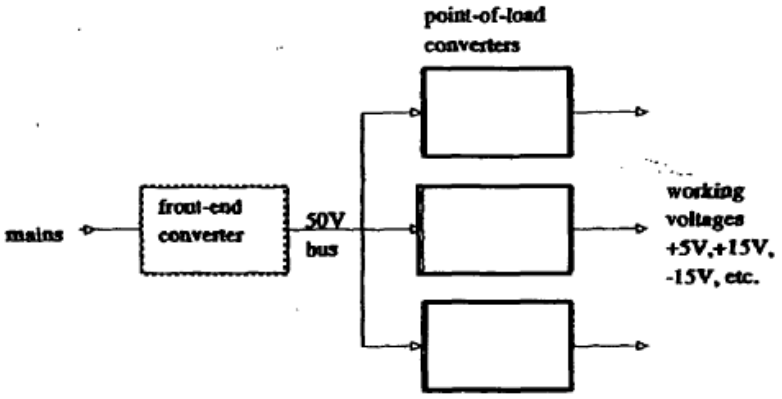
requirement is a question of fact, and this court reviews the jury's findings for substantial evidence. *Centocor Ortho Biotech, Inc. v. Abbott Labs.*, 636 F.3d 1341, 1347 (Fed. Cir. 2011).

A. "A plurality of non-isolating regulation stages"

Defendants assert that the doctoral thesis of Dr. Loveday H. Mweene (Mweene Thesis) anticipates claims 2 and 8 of the '190 Patent, claim 21 of the '021 Patent, claim 56 of the '702 Patent, and claim 1 of the '083 Patent. Similarly, Defendants argue that the Mweene Thesis combined with a paper on distributed power systems written by Bob Mammano would have made obvious claims 10 and 19 of the '190 Patent, claim 30 of the '021 Patent, and claim 71 of the '702 Patent.

Each of the forgoing claims, except claim 1 of the '083 Patent, requires "a plurality of non-isolating regulation stages" that receive the output of a non-regulating isolation stage. This court concludes that the record contains sufficient evidence to support the jury's finding that claims 2, 8, 10, and 19 of the '190 Patent, claims 21 and 30 of the '021 Patent, and claims 56 and 71 of the '702 Patent would not have been anticipated at the time of invention in view of the Mweene Thesis, which lacks a plurality of non-isolating regulation stages.

The Mweene Thesis focuses primarily on the design of a front-end AC-DC converter for converting AC current from the utility to a 50V DC output bus. In its discussion of the stability of the overall distributed power supply system, the thesis also addresses downstream elements, such as the point-of-load converters. The Mweene Thesis discloses a distributed power architecture, including the point-of-load converters, in Figure 1.1:



The front-end converter is a non-regulating isolation stage. Defendants assert that the "point of load converters" are "a plurality of non-isolated regulation stages." As support, Defendants point to Mweene's disclosure of a "buck converter" in Figure 8.3. SynQor admits that the buck converter of Figure 8.3 is a non-isolated regulator. Its experts explained at trial, however, that the Mweene Thesis discloses the buck converter only as a simplified model for purposes of a mathematical stability analysis, not as "something you would really use" as a point-of-load converter in a working system. J.A. at 1547.

SynQor's technical expert, Dr. James Dickens, testified that a person of skill in the art would have understood the point of load convertors in Mweene's system to be isolated. According to Dr. Dickens, the ordinarily-skilled artisan would have considered isolation necessary to account for safety issues and to "help prevent a catastrophic board failure," which could be caused by a fault in the front end converter propagating through to the logic circuitry. *Id.* Inventor Dr. Martin Schlecht similarly testified that if the point of load regulators shown in Figure 1.1 of the Mweene Thesis were not isolated, a voltage drop could result that would cause the logic circuitry to malfunction. Several of Defendants' witnesses and documents confirmed that an isolation stage is re-

quired between a 48 volt input and the logic circuitry. Further, Dr. Mweene acknowledged his thesis "did not in detail describe the design of point-of-load converters," and therefore did not disclose use of a non-isolating switching regulator as a point-of-load regulator. J.A. at 1366.

"Anticipation requires the presence in a single prior art disclosure of all elements of a claimed invention arranged as in the claim." *Connell v. Sears, Roebuck & Co.*, 722 F.2d 1542, 1548 (Fed. Cir. 1983); *see also Therasense, Inc. v. Becton, Dickinson & Co.*, 593 F.3d 1325, 1332 (Fed. Cir. 2010). The Mweene Thesis discloses a distributed power architecture with a non-regulating isolation stage supplying power to a plurality of regulators, and separately discloses a non-isolating regulator in a simplified mathematical analysis. Thus, the record contains sufficient evidence to support the jury's finding that the buck converter discussed by the Mweene Thesis was not disclosed as a point of load converter to be used in an actual system. In other words, even if the Mweene Thesis discloses each discrete element of each claim Defendants assert is anticipated, the thesis does not disclose those elements arranged as required by the claim.

For similar reasons, this court concludes Defendants did not prove any of the asserted claims of the '190 Patent, the '021 Patent, or the '702 Patent would have been obvious at the time of invention in view of the Mweene Thesis in combination with other references. The jury found that the Mweene Thesis does not teach a plurality of non-isolating regulators that receive the output of a non-regulating isolation stage. Defendants did not assert that any other prior art reference provides such a teaching, nor that Mweene alone would have rendered such a system architecture obvious.

Defendants argue only that Mammano supplies a motivation to use the specific voltage ranges recited in

dependent claims. This court need not consider Defendants' arguments that certain dependent claim limitations would have been obvious where the base claim has not been proven invalid. *See Callaway Golf Co. v. Acushnet Co.*, 576 F.3d 1331, 1344 (Fed. Cir. 2009) (holding verdict irreconcilably inconsistent where jury found dependent claim obvious and found independent claim nonobvious).

Because neither the Mweene Thesis alone nor any combination of the asserted prior art teaches or suggests a distributed power architecture having a plurality of non-isolated regulation stages, this court affirms the denial of Defendants' motion for JMOL that claims 2, 8, 10, and 19 of the '190 Patent, claims 21 and 30 of the '021 Patent, and claims 56 and 71 of the '702 Patent would have been invalid as anticipated or obvious.

B. "Uncontrolled rectifiers are both conducting"

Claim 1 of the '083 Patent requires "plural controlled rectifiers," each in parallel with an uncontrolled rectifier. '083 Patent, col. 17 l. 9. When each controlled rectifier is turned off, current flows through its paired uncontrolled rectifier. The claim requires a first and a second controlled rectifier which switch on alternately. *Id.* col. 17 ll. 21–24. Claim 1 further requires "a short time . . . when the first controlled rectifier and the second controlled rectifier are both off and their corresponding uncontrolled rectifiers are *both* conducting." *Id.* col. 17 ll. 25–29 (emphasis added).

The Mweene Thesis describes a circuit with plural controlled rectifiers, each in parallel with an uncontrolled rectifier, and states that "the rectifiers can be turned on late, the current being initially carried by their anti-parallel diodes." J.A. at 5723. Defendants assert this shows that, when the controlled rectifiers are off, their parallel uncontrolled rectifiers are conducting as required by claim 1 of the '083 Patent. SynQor's expert, Dr. Dick-

ens, testified that it is "impossible" for the uncontrolled rectifiers in the Mweene circuit corresponding to those required by claim 1 to be conducting at the same time, because current cannot flow through the necessary paths simultaneously. J.A. at 1549. Dr. Dickens' testimony therefore supplies substantial evidence to support the jury's verdict. In sum, the record contains sufficient evidence to support the jury's finding that Mweene does not anticipate claim 1 of the '083 Patent. This court therefore affirms the denial of Defendants' motion for JMOL.

C. Claim 9 of the '034 Patent

Claim 9 of the '034 Patent covers a DC-DC converter system comprising isolation/semi-regulation circuitry with an output of "about 12 volts," which is connected to "a plurality of non-isolating switching regulators" whose outputs "are of voltage levels to drive logic circuitry." '034 Patent, col. 17 l. 22–col. 18 l. 3. Defendants argue that claim 9 of the '034 would have been anticipated or obvious at the time of invention in view of a 1995 article by Douglas Arduini (Arduini). Alternatively, Defendants assert the '034 Patent is not entitled to a priority date earlier than its filing date, and is therefore anticipated by a 2005 article by Seiya Abe.

Defendants' expert, Dr. Mercer, opined at trial that Arduini anticipated the '034 Patent, but did not offer an opinion as to obviousness. Arduini discloses a "universal DC-DC converter" with a series of interchangeable components that can be put together to build a desired DC-DC converter. J.A. at 6552. Arduini Figure 2 provides a specific exemplary system that teaches a plurality of non-isolating *linear* regulators, rather than the *switching* regulators required by claim 9 of the '034 Patent.

Defendants argue Arduini's own teachings would have rendered obvious the differences between the

claimed system and that shown in Figure 2. Specifically, Defendants argue it would have been obvious to substitute switching regulators for Arduini's linear regulators. Arduini Figure 1 teaches that various different "post regulators" can be used to build a DC-DC converter. The text mentions use of a "simple buck regulator," a type of non-isolated switching regulator. Further, Dr. Schlecht admitted it was known in the art that switching regulators provided the most efficient choice of load regulators.

Nonetheless, SynQor's expert Dr. Dickens explained that Arduini does not teach substitution of switching regulators for linear regulators in the context of a circuit like that shown in Figure 2, and never teaches the use of multiple non-isolated switching regulators. Rather, Dr. Dickens and Defendants' expert Dr. Mercer both testified that Figure 1 of Arduini discloses a vast number of possible combinations with a wide variety of possible options for each component listed. Specifically, Dr. Mercer testified that in the eyes of a person skilled in the art, the box labeled "LDO post regulator" in Figure 1 "explodes dramatically to whatever you want to put for the design." J.A. at 1483. Defendants presented no evidence of a reason to combine the elements of Arduini in the manner required by claim 9, other than Dr. Mercer's statement that Arduini teaches "putting those building blocks together" in any manner the circuit designer desires. J.A. at 1479.

Moreover, SynQor introduced extensive objective evidence of nonobviousness at trial, including commercial success, industry recognition, initial (pre-invention) skepticism of experts, unexpected results, and copying by competitors. The record links this convincing evidence to the claimed invention thus supplying a nexus to the claimed intermediate bus architecture. For example, the record shows that even Defendants' engineers were highly skeptical of the claimed invention, at one point describing

it as a "whopper in terms of technical challenge." Another engineer stated "that separating isolation from regulation . . . almost surely would cost more in dollars, efficiency, and board space." Further, Defendants' expert McAlexander admitted that "there is certainly an element of commercial success [to SynQor's] architecture," and SynQor's expert, Dr. Leeb, testified that "there were significant efforts [by Defendants] to copy . . . SynQor's products."

The jury found claim 9 of the '034 Patent not invalid as anticipated or obvious. In doing so, the jury implicitly resolved underlying factual issues—including the presence of objective indicia of nonobviousness and whether there was a reason to combine the various elements taught by Arduini in the manner claimed—in favor of SynQor. *See Agrizap, Inc. v. Woodstream Corp.*, 520 F.3d 1337, 1343 (Fed. Cir. 2008) (holding the court will "presume all factual disputes were resolved in favor of the verdict"). The record contains substantial evidence to support the jury's findings. Accordingly, this court affirms the denial of Defendants' motion for JMOL that claim 9 of the '034 Patent is invalid for obviousness.

Defendants also did not prove claim 9 of the '034 Patent lacks entitlement to priority based on SynQor's original 1998 patent applications. A claim is entitled to the filing date of an earlier application if "the disclosure of the application relied upon reasonably conveys to those skilled in the art that the inventor had possession of the claimed subject matter as of the filing date." *Ariad Pharms., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010) (en banc).

The specification of the '190 Patent, to which the '034 Patent claims priority, states:

> *When the regulation stage precedes the isolation stage*, it is not necessary to sense the iso-

> lated output voltage to control the regulation. An alternative approach is to sense the voltage on the primary side of the isolation stage, which may eliminate the need for secondary side circuitry and the need to bridge the feedback control signal across the isolation barrier.

'190 Patent, col. 14 l. 64–col. 15 l. 3 (emphasis added). The second quoted sentence undisputedly describes semi-regulation. Defendants argue that the specification is limited to semi-regulation *preceding* the isolation stage, whereas claim 9 of the '034 Patent requires regulation *following* an isolation/semi-regulation stage.

Dr. Dickens and Dr. Schlecht testified that a person of ordinary skill in the art would understand that the '190 specification taught use of semi-regulation in the isolation stage, and that such a semi-regulated isolation stage could precede several DC-DC switching or linear regulators. Additionally, the specification states that "DC-DC switching regulators can be used on the secondary side to achieve the *additional* regulation desired." '190 Patent, col. 14 ll. 36–39 (emphasis added).

The jury made a factual finding that the parent specification adequately supports claim 9 of the '034 Patent. The record supplies sufficient evidence to support that factual finding. This court therefore affirms the denial of JMOL that the '034 Patent is not entitled to the 1998 priority date.

III.

This court reviews the district court's claim construction and grant of partial summary judgment without deference. *Metropolitan Life Ins. Co. v. Bancorp Servs.*, 527 F.3d 1330, 1335 (Fed. Cir. 2008). Summary judgment is appropriate when "the pleadings, depositions, answers to interrogatories, and admissions on file, together with

the affidavits, if any, show that there is no genuine issue as to any material fact and that the moving party is entitled to a judgment as a matter of law." Fed. R. Civ. P. 56.

The district court construed the terms "isolation," "isolating," and "isolated," to mean "*the absence of an electric path permitting the flow of DC current (other than a de minimus amount)* ***between an input and an output of a particular stage, component, or circuit***." *Claim Construction Order*, 2010 U.S. Dist. LEXIS 74808, at *27 (bold emphasis added). Defendants argue the construction should require isolation "between two points" rather than "between an input and an output of a particular stage, component, or circuit." Defendants assert that consumers connect the input and output of the claimed system to a common ground such that the system is not isolated.

"[T]he words of a claim 'are generally given their ordinary and customary meaning' . . . that [they] would have to a person of ordinary skill in the art in question at the time of the invention." *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–13 (Fed. Cir. 2005) (en banc) (quoting *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996)). In this case, the customary meaning of the contested terms, construed within their proper context in the claim, verifies the trial court's construction. The term "isolation" is used as an adjective describing a stage or converter within the power converter system. For example, claim 1 of the '190 Patent claims "a power converter system comprising: a DC power source; a non-regulating *isolation stage* . . .; and a plurality of *non-isolating regulation stages* . . . ." '190 Patent col. 17 ll. 22–42 (emphasis added); *see also* '702 Patent col. 22 l. 22 (claiming a system comprising an "isolating step-down *converter*" and "plural non-isolating . . . *regulators*"). The claim language thus only requires isolation within a

particular stage. Requiring "isolation" between every two points in the system would read the terms "stage" or "converter" out of the claims.

The figures in the specification further support the district court's construction. *See, e.g.*, '190 Patent Figs. 2 & 3. The figures show an isolation stage that has no electrical connection between its input and output. The figures do not depict the entire power converter system, and are therefore silent as to whether the input and output grounds of the entire system could be connected to one another.

Moreover, Defendants' expert admitted that construing the claims such that "employ[ing] the common technique of grounding the system" would cause the converter to be considered non-isolated would prevent the claims from encompassing the preferred embodiment. J.A. at 45070–71. A claim construction that "excludes the preferred embodiment is rarely, if ever, correct and would require highly persuasive evidentiary support." *Adams Respiratory Therapeutics, Inc. v. Perrigo Co.*, 616 F.3d 1283, 1290 (Fed. Cir. 2010). In this case, the specification, including the claims, supports a reading that encompasses the preferred embodiment.

Thus, this court holds that the district court correctly construed "isolation" to require the absence of an electrical path "between the input and output of a particular stage, component, or circuit." The record indicates that the Defendants put forth no reason that the accused systems avoid infringement under the district court's construction. Thus, this court affirms the grant of partial summary judgment of infringement on this limitation.

IV.

Liability for induced or contributory infringement under § 271(b) or (c) requires "knowledge that the induced acts constitute patent infringement." *Global-Tech Appli-*

ances, Inc. v. SEB S.A., 131 S. Ct. 2060, 2068 (2011). This includes, in part, actual "knowledge of the existence of the patent that is infringed." *Id.*

Defendants argue the jury was incorrectly instructed as to the knowledge requirement for induced infringement. Defendants also assert the record contains insufficient evidence to support the jury's finding that they had actual knowledge of the '190 Patent—a finding necessary to support the award of pre-suit damages for induced infringement. Finally, Defendants argue the district court erred in excluding evidence of pending reexaminations of the patents in suit.

A. Jury Instruction on Requisite Knowledge

"This court reviews the legal sufficiency of jury instructions on an issue of patent law without deference to the district court. This court reviews jury instructions in their entirety and only orders a new trial when errors in the instructions as a whole clearly mislead the jury." *DSU Med. Corp. v. JMS Co.*, 471 F.3d 1293, 1304 (Fed. Cir. 2006) (en banc in relevant part) (internal citations and quotations omitted). "In reviewing jury instructions, the full trial record and the jury instructions in their entirety must be examined because instructions take on meaning from the context of what happened at trial, including how the parties tried the case and their arguments to the jury." *Therasense*, 593 F.3d at 1331.

The district court instructed the jury:

> The Plaintiff must show that the Defendants actually intended to cause the acts that constitute direct infringement and that the Defendants *knew or should have known* that its actions would induce actual infringement. A Defendant *also* cannot be liable for inducing infringement if it had *no reason to be aware of the existence of the patent*.

J.A. at 390 (emphases added).

Defendants argue this instruction allowed the jury to find inducement if Defendants lacked actual knowledge of the patents and only "had reason to be aware of" their existence.

While this instruction might be erroneous if considered in isolation, this court finds that the instructions as a whole in the context of the trial informed the jury that actual knowledge was required. SynQor premised its theory at trial on actual knowledge of the patents, and told the jury during closing that "to determine when the clock starts for damages, you need to know when Defendants knew of SynQor's '190 Patent." J.A. at 1584.

Additionally, the record shows that the jury instructions on contributory infringement required actual knowledge of the patent. J.A. at 390. The jury found each Defendant liable for contributory infringement, and awarded pre-suit damages from the date the '190 Patent issued. J.A. at 408–25. Thus, the jury, by following this instruction, in fact found each Defendant had actual knowledge of the '190 Patent when it issued.

In this context, the jury instructions as a whole did not clearly mislead the jury. Rather, the jury's finding of liability for contributory infringement demonstrates the jury found each Defendant had actual knowledge of the '190 Patent prior to suit.

B. Actual Knowledge Evidence

The record contained sufficient evidence to support the jury's conclusion that each Defendant had actual knowledge of the '190 Patent when it issued. SynQor did not present direct evidence that any Defendant possessed the '190 Patent on the date it issued, nor did any Defendant admit it had actual knowledge of the '190 Patent. Such direct evidence of knowledge is not required to

support a finding of inducement. *Broadcom Corp. v. Qualcomm, Inc.*, 543 F.3d 683, 700 (Fed. Cir. 2008).

SynQor presented specific evidence for each Defendant that allowed the jury to infer actual pre-suit knowledge of the '190 Patent. The district court recounted this evidence in detail and found it sufficient to support the jury's verdict. *SynQor, Inc. v. Artesyn Techs., Inc.*, No. 07-CV-0497, 2011 U.S. Dist. LEXIS 91668, at *11–35 (E.D. Tex. Aug. 17, 2011). Among other evidence, SynQor showed that each of the Defendants possessed SynQor datasheets or products marked with SynQor's earlier patents, including U.S. Patent No. 5,999,417, to which the patents in suit claim priority. SynQor's expert, Dr. Leeb, gave his opinion that "there was a significant effort by the Defendants in this case to cross/imitate SynQor's products," and that those efforts would have exposed Defendants to SynQor's patents. *Id.* at *12–13. Further, some Defendants admitted to monitoring SynQor's patents and one was shown to have possessed the '190 Patent prior to the time this suit was filed.

After examining the record, this court concludes that it contains sufficient evidence from which a reasonable jury could infer that each Defendant had actual knowledge of the patents in suit during the relevant time period. Accordingly, this court affirms the denial of JMOL of noninfringement under § 271(b).

C. Reexamination Evidence

This court applies regional circuit law to evidentiary issues. The Fifth Circuit reviews a district court's evidentiary rulings for abuse of discretion. *Seatrax, Inc. v. Sonbeck Int'l, Inc.*, 200 F.3d 358, 371 (5th Cir. 2000).

The district court excluded evidence that, prior to trial, the United States Patent & Trademark Office had granted reexamination requests for the patents-in-suit and had issued first rejections of the asserted claims of

the '190 and '021 Patents. The reexaminations were not final at the time of the trial, and the district court determined they would have been confusing and more prejudicial than probative. *SynQor, Inc. v. Artesyn Techs., Inc.* (*Denial of New Trial*), No. 07-CV-0497, 2011 U.S. Dist. LEXIS 91693, at *38 (E.D. Tex. Aug. 17, 2011). This court detects no abuse of discretion in the trial court's ruling.

V.

The jury adopted the damages model put forth by SynQor's expert, Mr. Brett Reed. This model included both lost-profits damages and a reasonable royalty component. For both components, the jury awarded damages based on the price SynQor asserts it would have been able to charge but for the price erosion caused by Defendants' infringement. Those "but for" prices are roughly two to three times the prices actually charged by Defendants.

Defendants seek JMOL or a new trial based on numerous alleged errors in the damages portion of the trial. Defendants argue the record evidence does not support SynQor's price erosion theory and reasonably royalty rates. Defendants also argue the district court erred in its jury instructions and exclusion of evidence relating to noninfringing alternatives. Finally, Defendants argue SynQor improperly introduced evidence of the entire market value of customer end products containing the patented components.

A. Price Erosion & Reasonable Royalty Evidence

"An award of damages by a jury is upheld on appellate review unless it is clearly not supported by evidence, grossly excessive, or based only on speculation and guesswork." *Interactive Pictures Corp. v. Infinite Pictures, Inc.*, 274 F.3d 1371, 1376 (Fed. Cir. 2001).

To establish entitlement to price erosion damages, SynQor had the "burden . . . to show that 'but for' in-

fringement, it would have sold its product at higher prices." *Crystal Semiconductor Corp. v. Tritech Microelectronics Int'l, Inc.*, 246 F.3d 1336, 1357 (Fed. 2001). A credible but-for analysis must account for the "effect of [a] higher price on demand for the product." *Id.* Further, because "a rational would-be infringer is likely to offer an acceptable noninfringing alternative, if available, to compete with the patent owner rather than leave the market altogether," the analysis must consider the impact of such alternate technologies on the market as a whole. *Grain Processing Corp. v. Am. Maize-Prods. Co.*, 185 F.3d 1341, 1350–51 (Fed. Cir. 1999).

Defendants argue the jury's damages award is excessive because SynQor's price erosion theory is unsupported by the evidence. To the contrary, the jury heard evidence that SynQor sold its bus converters for prices "in the 60s to as high as $110" per unit when it first entered the market, J.A. at 1068, and made sales to Hewlett-Packard and Sun for $84 per unit in 2002, J.A. at 1289. Additionally, SynQor sold about 18,500 converters to Cisco in 2010 at $70 and $81 per unit during a market shortage.

While Defendants' expert opined that SynQor could not have charged the 2010 prices over the long term, and a Cisco representative testified that his company would not have paid that price over the four-year period of infringement, SynQor offered contrary testimony. Specifically, SynQor countered Defendants' suggestion that the industry would have moved to noninfringing fully-regulated converters rather than pay SynQor's higher prices for the patented converters. Dr. Leeb, SynQor's expert, testified that the power handling capability, efficiency, and stability of fully-regulated converters was inferior to that of the patented technology. Dr. Schlecht and Dr. Leeb testified that, in late 2010, new fully-regulated converters were just beginning to compete in performance with the earliest unregulated bus converters.

In sum, the jury reasonably could have concluded that testimony from some of Defendants' witnesses indicated customers would not have switched to noninfringing alternatives in response to SynQor's higher prices. Cisco's representative admitted his company would have had to incur significant costs to redesign its end products to use any noninfringing power converter that was not a "drop-in replacement," and that drop-in replacements did not exist as of August 2010. Similarly, a defense witness testified he was not aware of any customers that had actually switched from unregulated intermediate bus converters to any noninfringing alternative for the same application.

Upon review of the entire record, this court detects sufficient evidence for the jury to have accepted Mr. Reed's "but for" pricing. As such, both the lost-profits and reasonable royalty damages are supported by substantial evidence and not excessive or based only on speculation and guesswork. Accordingly, this court affirms the denial of Defendants' motion for JMOL or a new trial.

B. "Cisco Awards" Evidence

Defendants argue that the district court abused its discretion in not admitting evidence that Cisco had awarded certain Defendants the right to develop fully-regulated converters as "drop in replacements" for the accused products (Cisco Awards). On the eve of trial, in December 2010, Defendants produced preliminary technical specifications and data sheets on products in development. Defendants assert that these fully-regulated drop-in converters developed under the "Cisco Awards" qualify as available noninfringing alternatives because Defendants would have made such products but for their infringement. This court finds no abuse of discretion in the exclusion of the Cisco Awards evidence.

First, the district court reasonably excluded the evidence under Federal Rule of Civil Procedure 37 as having

been produced too late. *Denial of New Trial*, 2011 U.S. Dist. LEXIS 91693, at *35–36. The court found SynQor would have been prejudiced by allowing evidence of the Cisco Awards at trial because there was insufficient time for SynQor's experts to test the availability or performance characteristics of the alleged substitutes. *Id.*

Second, the district court properly found the Cisco Awards not probative of the availability of noninfringing alternatives during the damages period. *Id.* at *36. Where, as here, an alleged substitute was not on the market during the damages period, the accused infringer has the burden to overcome the inference that the substitute was not "available." *Grain Processing*, 185 F.3d at 1353. Factors to consider include the ease with which a substitute was eventually made available, the state of the technology, and the availability of input products and equipment. *See id.* at 1354; *see also Micro Chemical, Inc. v. Lextron*, 318 F.3d 1119, 1123 (Fed. Cir. 2003) (finding an alternative product not available where new product required 984 hours to design and another 330 hours to test).

As the district court noted, "uncontroverted" evidence demonstrated that significant improvements in fully-regulated converter performance characteristics had just been made in 2010. *Denial of New Trial*, 2011 U.S. Dist. LEXIS 91693, at *36. As such, the input components necessary to develop the replacement converters were not readily available during the infringement period, and there is "no basis to conclude that the high performing fully regulated converters that Defendants were working on in late 2010 could have been developed any earlier." *Id.* Moreover, the record shows that, even with the benefit of recent component improvements, it took Defendants nearly a year, if not longer, to make the replacement converters available for commercial use. J.A. at 60781.

Accordingly, the district court did not abuse its discre-

tion by excluding evidence of the Cisco Awards.

C. Jury Instruction on Noninfringing Alternatives

Defendants argue the jury received an erroneous instruction on noninfringing alternatives suggesting that they must be actually sold on the market during the period of infringement. The district court instructed the jury:

> If the realities of the marketplace are such that acceptable non-infringing substitutes *were available from suppliers* who would have made some but not all of the sales that were made by the Defendants, then the Plaintiff may be entitled to lost profits on a portion of the infringing sale.

J.A. at 394 (emphasis added). The jury instruction does not require the product to be "on the market." Further, the charge explained SynQor had the burden to show that it "would have made additional profits if the Defendants had not infringed." J.A. at 1613. Both sides' presentations made it clear that the jury could consider the impact of products not on the market if they would have been available but for infringement.

The district court's jury instruction was not erroneous or misleading in the context of the trial. *See Therasense*, 593 F.3d at 1331. Accordingly, this court affirms the denial of Defendants' motion for a new trial.

D. Entire Market Value Evidence

This court's standard of review a district court's decision on a motion for new trial is governed by regional circuit law. *Uniloc USA, Inc. v. Microsoft Corp.*, 632 F.3d 1292, 1309 (Fed. Cir. 2011). In the Fifth Circuit, a court may grant a new trial if it finds the trial was unfair or prejudicial error was committed. *Smith v. Transworld Drilling Co.*, 773 F.2d 610, 612–13 (5th Cir. 1985). "The

decision to grant or deny a motion for a new trial is within the discretion of the trial court and will not be disturbed absent an abuse of discretion or a misapprehension of the law." *Prytania Park Hotel, Ltd. v. Gen. Star Indem. Co.*, 179 F.3d 169, 173 (5th Cir. 1999).

Defendants argue a new trial on damages is warranted because SynQor's revelation of $20 billion customer end-product sales "skew[ed] the damages horizon for the jury." *Uniloc*, 632 F.3d at 1320. A patentee may "assess damages based on the entire market value of the accused product only where the patented feature creates the 'basis for customer demand' or 'substantially create[s] the value of the component parts.'" *Id.* at 1318 (quoting *Lucent Techs., Inc. v. Gateway, Inc.*, 580 F.3d 1301, 1336 (Fed. Cir. 2009)).

Here, SynQor never sought to justify its damages figure based on the price of the customer end products. *Denial of New Trial*, 2011 U.S. Dist. LEXIS 91693, at *85. SynQor's damages calculations were based on the "but for" sales price of the intermediate bus converters. SynQor used the end-product value only to argue that the price elasticity of demand for the intermediate bus converters would be high because they enable space saving and efficiency while representing a small fraction of the end price. *Id.* at *86.

The district court found SynQor's discussion of end-product sales in this case was not unfair or prejudicial. This court finds no abuse of discretion and affirms the denial of Defendants' motion for a new trial.

VI.

After trial, the district court issued a permanent injunction beginning January 24, 2011, which was partially stayed by this court until September 30, 2011. *Supplemental Damages Order*, slip op. at 4; *see SynQor, Inc. v. Artesyn Techs., Inc.*, 417 F. App'x 976 (Fed. Cir. 2011). On

June 15, 2011, the district court held a full evidentiary hearing on the issue of supplemental damages for the post-trial period. *Supplemental Damages Order*, slip op. at 5. The court found each Defendant actively induced or contributed to infringement after the verdict by continuing to sell the accused products overseas with knowledge that they would be imported into the United States. *Id.* at 17–27. The court awarded supplemental damages using the methodology adopted by the jury. *Id.* at 17. Further, the court enhanced post-verdict damages by 1.75 times based on the "egregiousness" of Defendants' conduct in continuing to sell the accused products after the jury found infringement. *Id.* at 28.

A. Supplemental Damages

Defendants argue they have a right to a jury trial with respect to new factual issues raised by SynQor's claim for supplemental damages. This court has held, however, that the amount of supplemental damages following a jury verdict "is a matter committed to the sound discretion of the district court." *Amado v. Microsoft Corp.*, 517 F.3d 1353, 1362 n.2 (Fed. Cir. 2008).

In *Amado*, this court required the district court to take into account new factual circumstances, including the change in the parties' bargaining positions and the infringer's ability to immediately comply with the injunction, "as well as the evidence and arguments found material to the granting of the injunction and the stay." *Id.* at 1362. Thus, a jury right is not implicated every time the district court is required to determine factual matters before awarding supplemental damages to compensate the patentee for post-verdict infringement. *See Finjan, Inc. v. Secure Computing Corp.*, 626 F.3d 1197, 1212–13 (Fed. Cir. 2010) (noting a patentee is not "fully compensated" unless the damages award includes sales following the verdict, and that 35 U.S.C. § 284 requires the court to assess damages when they are not found by a jury).

Defendants also argue the district court erred in finding Defendants Artesyn Technologies, Inc. and Astec America, Inc. (collectively, Astec) and Bel Fuse, Inc. (Bel Fuse) induced infringement following the verdict. The record shows that the underlying direct infringement took place, because Defendants' largest customer admitted it continued shipping products that incorporate Defendants' bus converters into the U.S. following the infringement verdict. *Supplemental Damages Order*, slip op. at 18. Astec and Bel Fuse argue they lacked the requisite intent to induce infringement, however, based on agreements they entered with their U.S. customers following the verdict.

Astec issued a stop order on all shipments, regardless of destination, effective two days after the verdict. Some customers then informed Astec that they required further supply to meet sales obligations in the United States. In response, Astec entered into indemnification agreements with those customers. The district court found, and this court agrees, that the indemnification agreements show Astec knew its customers would import end-products into the United States and merely shifted financial responsibility for any damages onto the customers. *Id.* at 22.

Similarly, following the verdict Bel Fuse entered into an indemnification agreement with its sole customer as to which the district court awarded supplemental damages. Bel Fuse characterizes the agreement as a "non-importation agreement" that prevented Bel Fuse converters from being incorporated into products shipped to the United States. The terms of the agreement reveal, however, that the parties understood U.S. imports would continue until a permanent injunction became effective. J.A. at 69573–74. This court therefore agrees with the district court's finding that "Bel Fuse knew that direct infringement would occur and planned for the liability that it would incur by inducing the direct infringement."

Supplemental Damages Order, slip op. at 24–25.

Thus, while a true non-importation agreement with which a Defendant complies may prevent a post-verdict finding of intent to induce infringement, the district court correctly determined the Astec and Bel Fuse agreements at issue here did not demonstrate a lack of intent to induce infringement. Instead, the agreements contemplated continued U.S. sales and merely provided for a shift of liability.

B. Enhanced Damages

The court enhanced the damages award for Defendants' post-verdict sales by 1.75 times, citing its authority to do so under 35 U.S.C. § 284. *Id.* at 27. Defendants argue the award of enhanced damages was improper because the court did not expressly find willful infringement and because SynQor did not pursue a willfulness claim at trial. *See Spectralytics, Inc. v. Cordis Corp.*, 649 F.3d 1336, 1348 (Fed. Cir. 2011) (holding "a finding of willfulness is a prerequisite for enhancing damages under § 284").

The district court found Defendants' conduct "egregious[]" in continuing, and even increasing, sales in the face of an infringement verdict. *Supplemental Damages Order*, slip op. at 28. The district court made the appropriate determination for an award of enhanced damages. *Spectralytics*, 649 F.3d at 1349 (holding that, while a finding of willfulness is a "prerequisite" to the award of enhanced damages, the "'paramount determination in deciding to grant enhancement and the amount thereof is the egregiousness of the defendant's conduct based on all the facts and circumstances.'" (quoting *Read Corp. v. Portec, Inc.*, 970 F.2d 816, 826 (Fed. Cir. 1992))).

The court's enhancement of damages was squarely based on a recognition of Defendants' willful infringement and the enhancement therefore was proper under § 284.

This court also sees no reason why SynQor's decision not to argue *pre-verdict* willful infringement at trial should preclude the district court from finding willful infringement for *post-verdict* sales. Defendants' cursory claim of entitlement to a jury trial on the issue of enhancement, noted in a single sentence of the opening brief, is unpersuasive and insufficient to raise the issue on appeal. *See Murata Opening Br.* 79. In sum, the district court did not abuse its discretion by awarding enhanced damages for Defendants' post-verdict infringement.

C. Supplemental Damages & Sanctions Against Delta

This court applies regional circuit law to sanctions rulings. *Transclean Corp. v. Bridgewood Servs., Inc.*, 290 F.3d 1364, 1370 (Fed. Cir. 2002). The Fifth Circuit reviews the imposition of sanctions for abuse of discretion. *United States v. Garrett*, 238 F.3d 293, 297 (5th Cir. 2000). A district court considering "sanctions for discovery violations should consider the following factors: 1) the reasons why disclosure was not made; 2) the amount of prejudice to the opposing party; 3) the feasibility of curing such prejudice with a continuance of the trial; and 4) any other relevant circumstances." *Id.* at 298.

The district court awarded $507,779 in supplemental damages for pre-verdict sales of 17,000 converters that Delta did not disclose to SynQor or to the court until April 2011. *SynQor, Inc. v. Artesyn Techs., Inc.* (*Sanctions Order*), 07-CV-0497, 2011 U.S. Dist. LEXIS 74337 (E.D. Tex. July 11, 2011). Delta disputes the award because it had a non-importation agreement in place with Cisco, its sole customer for those sales. Specifically, Cisco agreed that for orders "shipped by Delta after June 21, 2010 ('Affected Products'), Cisco will not ship or have shipped on its behalf Affected Products or systems containing Affected Products into the United States." J.A. at 70024. There is no evidence that either Cisco or Delta failed to comply with their non-importation agreement.

Thus, Delta argues the undisclosed sales were non-infringing and not subject to damages. The district court awarded damages based on the sales, however, because Delta withheld them from discovery in violation of the district court's orders. *Sanctions Order*, 2011 U.S. Dist. LEXIS 74337, slip op. at *9–11.

The district court found Delta unilaterally made a "conscious and willful decision to withhold this relevant sales data from production." *Id.* at *17. SynQor was "severely prejudiced" by the non-disclosure because its damages model was based on each Defendant's worldwide sales, multiplied by an importation rate. *Id.* at *23. The district court recognized that if SynQor had been informed of the 17,000 sales by Delta, those sales would have been included in Mr. Reed's damages model—either as additional sales by Delta or by adjusting the importation rate for other Defendants whose products made up for the lost U.S. sales volume. *Id.* at *21–22. Federal Rule of Civil Procedure 37(b)(2) permits courts to direct that "facts be taken as established" where a party fails to comply with a discovery order. The court properly awarded damages to SynQor for the undisclosed sales made by Delta because they would otherwise have been accounted for at trial. *Id.* at *23.

The district court also ordered Delta to pay $500,000 in civil contempt sanctions plus attorneys' fees and costs. *Id.* at *25 (citing Fed. R. Civ. Proc. 37(b)(2)). The sanction was "to compensate SynQor for losses sustained due to Delta's discovery violations, including prejudgment interest," and to deter other litigants from engaging in similar discovery abuses. *Id.* at *24–25. As the district court noted, "[n]o court can function if its discovery rules are disregarded." *Id.* at *18. The sanctions awarded bear a "reasonable relationship" to the harm that occurred, and serve as a deterrent against similar discovery violations by future litigants. *See BMW of N. Am. v. Gore*, 517 U.S.

599, 580–81 (1996). This court finds the sanctions imposed against Delta do not constitute an abuse of discretion.

VII.

For the foregoing reasons, this court affirms the judgment of the district court.

AFFIRMED