

**United States Court of Appeals
for the Federal Circuit**

VICOR CORPORATION,
Appellant

v.

SYNQOR, INC.,
Appellee

2016-2283

Appeal from the United States Patent and Trademark
Office, Patent Trial and Appeal Board in No. 95/001,861.

SYNQOR, INC.,
Appellant

v.

VICOR CORPORATION,
Appellee

2016-2288

Appeal from the United States Patent and Trademark
Office, Patent Trial and Appeal Board in No. 95/001,637.

Decided: August 30, 2017

MATTHEW A. SMITH, Smith Baluch LLP, Washington, DC, argued for Vicor Corporation. Also represented by ANDREW T. D'AMICO, JR., Vicor Corporation, Andover, MA; LAWRENCE K. KOLODNEY, Fish & Richardson, PC, Boston, MA.

THOMAS D. REIN, Sidley Austin LLP, Chicago, IL, argued for SynQor, Inc. Also represented by CONSTANTINE L. TRELA, JR., BRYAN C. MULDER.

Before LOURIE, TARANTO, and CHEN, *Circuit Judges*.

CHEN, *Circuit Judge*.

SynQor, Inc. (SynQor) owns several patents directed to a particular architecture for direct current-to-direct current (DC-DC) power converters, including U.S. Patent Nos. 8,023,290 (the '290 patent) and 7,272,021 (the '021 patent) (hereinafter, we refer to the '290 and '021 patents collectively as the SynQor Patents). Vicor Corporation (Vicor) requested, and the Patent and Trademark Office (PTO) granted, *inter partes* reexaminations of the SynQor Patents. The reexaminations were ultimately decided by the Patent Trial and Appeal Board (Board), which was confronted with many proposed rejections and highly technical competing arguments. Vicor appeals the Board's decision in the '290 patent's reexamination holding that certain claims are patentable over prior art combinations proposed by Vicor. SynQor, for its part, appeals the Board's decision in the '021 patent's reexamination holding that certain claims in that patent are unpatentable as anticipated or obvious.

We address these two appeals in a single opinion because the two patents claim very similar inventions, and their respective reexaminations share common patentability issues. Both reexaminations were decided by the same panel of administrative patent judges. The panel's decision in the '290's reexamination issued on the same date as the panel's decision on rehearing in the '021's reexamination. Despite sharing a common panel and having opinions issued on the same date, the decisions in the respective reexaminations contain inconsistent findings on identical issues and on essentially the same record. We *affirm in part, vacate in part, and remand* the Board's decisions in both reexaminations.¹

BACKGROUND

I. DC-DC Power Converters

The SynQor Patents claim systems and methods for DC-DC power conversion. *See generally* '290 patent col. 17 l. 9–col. 18 l. 35; '021 patent col. 6 l. 21–col. 8 l. 60. Direct current (DC) flows in only one direction, whereas alternating current (AC) periodically reverses direction. AC power supplied from a utility is converted to DC by a “front end converter.” A DC-DC converter receives the DC output of a front end converter and transforms it into one or more lower DC voltages.

The DC-DC converters at issue in this appeal are designed to drive logic circuitry in large computer and telecommunications systems that typically require a number of different power voltages. The claimed converters perform two general operations in sequence: “isolation” and “regulation.” Isolation converts a DC input into

¹ Related appeal no. 2016-2282, which involves the reexamination of another SynQor patent (U.S. Patent No. 7,564,702), presents unique issues addressed in a separate opinion issued today.

AC, reduces the AC voltage using a transformer, and converts AC back to DC at a voltage level lower than the DC input. Regulation then restricts that isolated output down to a DC voltage appropriate for driving logic circuitry.

A. Isolation

Isolation enhances safety and prevents unwanted noise by using a transformer to lower voltage without using wires connecting inputs and outputs. A transformer comprises “primary” and “secondary” windings, such as coiled wires. The transformer’s input is connected to the primary winding, which transfers electrical energy to the secondary winding via magnetic fields. The transformer’s output from the secondary winding is a fraction, or multiple, of the transformer’s input determined by the ratio of turns in the respective primary and secondary windings. For example, a transformer with a primary winding that has twice as many turns as the secondary winding will have an output voltage that is half of its input.

Isolation circuitry converts the secondary winding’s AC output to DC using rectifiers. The SynQor Patents’ claims all require use of “controlled” rectifiers, which use control signals and circuitry to reverse or prevent the flow of current in one direction. Embodiments of the SynQor Patents’ inventions use a particular type of pre-existing controlled rectifier known as a “synchronous” rectifier, which uses a waveform of current flow across one of the transformer’s windings to control switching circuitry that generates a DC output.

B. Regulation

Regulation circuitry receives an isolated DC output and regulates it down to appropriate voltage(s) to drive logic circuitry. Regulation was known to be implemented using at least two types of regulators: “switching” regulators and “linear” regulators. Switching regulators include

a transistor-implemented switch, which turns on and off in response to one or more parameters sensed in the circuit to maintain output voltage at a predefined value. Linear regulators regulate an output by varying the resistance of the regulator.

C. Prior Art DC-DC Power Converters

Prior art power architectures for large computer and telecommunications systems used DC-DC power converters that integrated isolation and regulation circuitry in each individual converter. The presence of isolation circuitry in every converter took up valuable space on circuit boards where the converters were located, which could have been used for additional microprocessors, memory, or logic circuitry.

II. SynQor's Patents

A. SynQor's Asserted Improvement over the Prior Art

The SynQor Patents claim to improve prior art systems by separating the isolation and regulation functionality of DC-DC converters into two steps and using a single isolation stage to drive multiple regulation stages. *See* '290 patent Fig. 1, col. 4 ll. 40–54; '021 patent Fig. 5, col. 5 ll. 6–12. The single isolation stage drives an “intermediate bus” that is fed to multiple on-board regulator components. *See* -2288 J.A. 1117–19.² The regulators can be smaller, less expensive, and more efficient compared to regulators used in on-board, integrated isolating/regulating converters. SynQor portrays this separation of isolation and regulation stages as the key invention of the SynQor Patents and “a revolutionary new power architecture” developed by SynQor's CEO—Dr. Martin Schlecht—who is the sole named inventor on the

² Filings from the respective appeals are identified by “-2283” and “-2288.”

SynQor Patents. -2288 Open. Br. at 2. According to SynQor, the new two-stage architecture, which became known as “Intermediate Bus Architecture” (IBA), was “hailed in the field, copied by SynQor’s competitors, and widely adopted by the industry.” *Id.*

B. Disputed Claims of the SynQor Patents

The SynQor Patents’ claims tailor their coverage of IBA’s general schema by including limitations that require specific circuit features. First, all of the claims require separate isolation and regulation stages comprising (1) a “non-regulating” isolation stage and (2) a plurality of “non-isolating” regulation stages. *See generally* ’290 patent col. 17 l. 9–col. 18 l. 35; ’021 patent col. 6 l. 21–col. 8 l. 60.

Second, all claims of the ’290 patent and claims 49–50 of the ’021 patent require the regulation to be done by switching regulators. *See generally* ’290 patent col. 17 l. 9–col. 18 l. 35; -2288 J.A. 115 (reciting claims 49–50 of the ’021 patent, added during reexamination). SynQor argues that switching regulators provide more efficient regulation than linear regulators used in prior art converters.

Third, for the non-regulating isolation stage, all claims of the ’021 patent require “substantially uninterrupted flow of power” through a transformer’s “primary and secondary winding circuits.” *See generally* ’021 patent col. 6 l. 21–col. 8 l. 60. The ’021 patent’s specification describes circuitry that regulates the flow of power across the primary and secondary windings by setting a “duty cycle” for periodically reversing the directional flow of current across the primary winding. *See id.* col. 3 l. 62–col. 4 l. 18. The ’021 patent explains that power is always flowing through the isolation stage, except during “brief switch transitions.” ’021 patent col. 4 ll. 8–11.

Finally, both patents include dependent claims that limit input and output voltages to ranges appropriate for

converters that receive DC power from a front end converter and output DC power to drive logic circuitry. *See, e.g.*, '290 patent col. 18 ll. 7–9 (claim 7); '021 patent col. 7 ll. 40–42 (claim 25). SynQor argues that restricting circuit operation to these voltage ranges distinguishes prior art power systems that were not designed for powering telecommunications or computer systems.

The sole independent claim of the '290 patent, claim 1, covers an IBA converter implemented with switching regulators:

A DC-DC power converter system providing plural regulated DC outputs, each having a regulated voltage, comprising:

a DC input;

a non-regulating isolating converter comprising:

a primary transformer winding circuit having at least one primary winding that receives power from the DC input; and

a secondary transformer winding circuit having at least one secondary winding coupled to the at least one primary winding and having plural controlled rectifiers, each having a parallel uncontrolled rectifier and each in circuit with a secondary winding, each controlled rectifier being turned on and off in synchronization with a voltage waveform of the at least one primary winding to provide a non-regulated, isolated DC output; and

plural non-isolating ***switching regulators***, each receiving power from the non-regulated, isolated DC output of the non-regulating isolating converter and each providing one of the regulated DC outputs having a regulated voltage.

'290 patent col. 17 ll. 9–30 (emphasis added).

Claim 7 of the '290 patent is exemplary of the dependent claims in the SynQor Patents that specify input/output voltage ranges for telecommunications or computer systems:

A power converter system as claimed in claim 1 wherein ***each regulated voltage of each of the regulated DC outputs is of a voltage level to drive logic circuitry.***

'290 patent col. 18 ll. 7–9 (emphasis added).

Claim 1 of the '021 patent is very similar to claim 1 of the '290 patent, but includes the “substantially uninterrupted flow of power” limitation present in all claims of the '021 patent:

A power converter system comprising:

a normally non-regulating isolation stage comprising:

a primary winding circuit;

a secondary winding circuit coupled to the primary winding circuit, the secondary winding circuit comprising a secondary transformer winding in series with a controlled rectifier having a parallel uncontrolled rectifier, the secondary winding circuit providing a

normally non-regulated output of the isolation stage; and

a control circuit which controls duty cycle of the primary winding circuit, the duty cycle causing substantially uninterrupted flow of power through the primary and secondary winding circuits during normal operation; and

a plurality of non-isolating regulation stages, each receiving the non-regulated output of the isolation stage and regulating a regulation stage output.

'021 patent col. 6 ll. 22–39 (emphasis added).

III. Prior Proceedings Involving SynQor's Patents

A. SynQor's 2007 Lawsuit

In 2007, SynQor sued certain of its major competitors—but not Vicor—for infringing five of its patents, including the '021 patent and a related patent, U.S. Patent No. 7,072,190 (the '190 patent).³ All of the asserted patents involved IBA, with its separate isolation and regulation stages. In 2010, a jury found all asserted claims not invalid and infringed. The defendants appealed, arguing that, *inter alia*, there was no substantial evidence to support the jury's nonobviousness verdict. *SynQor, Inc. v. Artesyn Techs., Inc.*, 709 F.3d 1365, 1372, 1374 (Fed. Cir. 2013) (*SynQor I*). We rejected defendants' arguments and affirmed because, *inter alia*, SynQor had “introduced extensive objective evidence of nonobviousness at trial, including commercial success, industry recognition, initial (pre-invention) skepticism of experts,

³ The SynQor Patents trace priority back to the '190 patent.

unexpected results, and copying by competitors.” *Id.* at 1377.⁴ In so holding, we linked this evidence to the IBA two-stage architecture as claimed in the patents:

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.”

Id.

B. Murata’s Reexamination of the ’190 Patent

In August 2009, one of the defendants in *SynQor I*, Murata Manufacturing Co., Ltd., requested *inter partes* reexamination of SynQor’s ’190 patent. *See Murata Mfg.*

⁴ Our discussion of the objective evidence appeared in connection with analysis of U.S. Patent No. 7,269,034 (the ’034 patent). The ’034 patent is a grandparent of the ’290 patent and, like the ’021 patent, claims priority to the ’190 patent. While the claims of the ’034 patent cover a ***semi-regulated*** isolation stage, they still cover IBA’s general design of separating isolation and final regulation stages. ’034 patent col. 17 l. 21–col. 20 l. 17. Indeed, all of SynQor’s patents discussed in this opinion cover IBA, which was the focus of our objective evidence analysis in *SynQor I*.

Co. v. SynQor, Inc., Reexamination Control No. 95/001,207, 2013 WL 4427009, at *1 (P.T.A.B. Aug. 16, 2013) (*Murata*). The PTO granted the request and initiated reexamination. The examiner rejected certain claims, and SynQor appealed to the Board. SynQor presented the same objective evidence of secondary considerations discussed in *SynQor I* to the Board in support of its nonobviousness arguments. The Board found a nexus between SynQor's evidence and the disputed claims and reversed all examiner rejections, holding that the challenged claims were patentable over the prior art combinations proposed by Murata.

C. Vicor's Reexamination of the '190 Patent

In September 2011, Vicor requested *inter partes* reexamination of the '190 patent. The PTO granted the reexamination request and chose to keep Vicor's reexamination of the '190 patent separate from Murata's reexamination. Vicor cited four prior art references in its request for reexamination: Steigerwald '090,⁵ Steigerwald '539⁶ (collectively, Steigerwald), Cobos,⁷ and Pressman.⁸ Steigerwald '090 incorporates Steigerwald '539 by reference. The examiner rejected certain claims as anticipated by Steigerwald. The examiner also rejected claims as obvious over combinations of the four references. SynQor appealed to the Board, and the Board sided with SynQor, reversing all rejections. Vicor appealed.

⁵ U.S. Patent No. 5,377,090.

⁶ U.S. Patent No. 5,274,539.

⁷ J.A. Cobos & J. Uceda, Low Output Voltage DC/DC Conversion, IEEE 20th Int'l Conf. on Indus. Elecs., Control and Instrumentation, at 1676–81 (September 5–9, 1994).

⁸ Abraham I. Pressman, *Switching and Linear Power Supply, Power Converter Design* (1977).

We reversed in part, vacated in part, and remanded. *Vicor Corp. v. SynQor, Inc.*, 603 F. App'x 969, 970 (Fed. Cir. 2015) (*SynQor II*). Steigerwald '090, we held, incorporates Steigerwald '539 by reference, and the combined reference discloses an alternative embodiment of a power converting system having a non-regulating isolation stage and a plurality of non-isolating regulation stages, in which the uncontrolled rectifiers in Steigerwald '090 are replaced with controlled rectifiers from Steigerwald '539.⁹ *Id.* at 974–75. We concluded that “[t]he combined reference teaches a single embodiment that anticipates all elements of representative claim 20” of the '190 patent, that is, a two-stage DC-DC power converter system having a non-regulating isolation stage and a plurality of non-isolating regulation stages. *Id.* We also vacated the Board’s nonobviousness determinations of the remaining claims, which relied in part on the same objective evidence of nonobviousness discussed in *SynQor I* and submitted to the Board in *Murata*, and remanded for further consideration in light of our anticipation decision. *Id.* Regarding the objective evidence of nonobviousness, we instructed the Board to reconsider whether a nexus exists between the proffered secondary considerations evidence and the merits of the claimed invention in light of our conclusion that representative claim 20 is anticipated:

[T]he teachings of the combined Steigerwald reference may be relevant to any objective evidence of nonobviousness. For example, commercial success is evidence of obviousness only when there is a “nexus . . . between the merits of the claimed invention and evidence of commercial success.” *Iron*

⁹ We refer to “Steigerwald” hereinafter as this alternative embodiment incorporating Steigerwald '539’s controlled rectifiers into Steigerwald '090’s DC-DC power converter circuit.

Grip Barbell Co. v. USA Sports, Inc., 392 F.3d 1317, 1324 (Fed. Cir. 2004). Vicor should have the opportunity to argue that SynQor's evidence of commercial success is attributable not to the claimed invention, but to the prior art converter taught by the combined Steigerwald references.

SynQor II, 603 F. App'x at 975–76.¹⁰

Representative claim 20 of the '190 patent, which we held was anticipated in *SynQor II*, covers a very similar invention to those of the currently disputed claims of the SynQor Patents in the present appeals. Claim 20 recites:

A power converter system comprising:

a DC power source;

a non-regulating isolation stage comprising:

a primary transformer winding circuit having at least one primary winding connected to the source;
and

a secondary transformer winding circuit having at least one secondary winding coupled to the at least

¹⁰ On remand from our decision in *SynQor II*, the Board issued a decision—on the same date that it issued a decision in the '290's reexamination and a decision on rehearing in the '021's reexamination—holding that all challenged claims of the '190 patent were unpatentable. The Board held that the objective indicia evidence was insufficient to overcome the examiner's other cited evidence of obviousness, despite finding a nexus between the objective indicia evidence and the claims of the '190 patent.

one primary winding and having plural controlled rectifiers, each having a parallel uncontrolled rectifier and each connected to a secondary winding, each controlled rectifier being turned on and off in synchronization with the voltage waveform across a primary winding to provide an output; and

a plurality of non-isolating regulation stages, each receiving the output of the isolation stage and regulating a regulation stage output.

'190 patent col. 18 ll. 29–44. The disputed claims of the SynQor Patents cover the same two-stage power converter system, with the addition of limitations directed to, for example, (1) switching regulators in all claims of the '290 patent and claims 49–50 of the '021 patent, (2) substantially continuous power flow across transformer windings in all claims of the '021 patent (which replaces language in claim 20 of the '190 patent reciting “being turned on and off in synchronization with the voltage waveform across a primary winding”), and (3) input/output voltage range limitations in various dependent claims of both patents.

IV. Vicor's Reexaminations of the '290 and '021 Patents (the Present Appeals)

A. Reexamination of the '290 Patent

Vicor requested reexamination of the '290 patent in December 2011. The PTO granted the request and adopted Vicor's proposed grounds for rejection. Rejections I–II held that claims 1–15 were obvious over Steigerwald '090, Cobos, and Pressman. Rejections III–IV held that the

same claims were obvious over JP '446,¹¹ Steigerwald '539, and Kassakian.¹² Rejections V–VI held that the same claims were obvious over Steigerwald and Pressman. After the Board issued its *Murata* decision on the '190 patent, the examiner withdrew all rejections and adopted the *Murata* Board's positions that (1) Steigerwald '090 and Cobos could not be combined for rejections I–II because of frequency incompatibility between the references' circuits, (2) a person of ordinary skill in the art would not have been motivated to combine Steigerwald and Pressman for rejections V–VI because Steigerwald taught away from incorporating Pressman's switching regulators, and (3) all challenged claims were “not obvious based on objective indicia of non-obviousness.” See -2283 J.A. 417-18 (citing *Murata*, -2283 J.A. 1709-45). With respect to rejections III–IV, the examiner relied exclusively on evidence of secondary considerations in withdrawing the rejections involving Vicor's proposed combination of JP '446, Steigerwald '539, and Kassakian, without addressing the remaining three factors set forth in *Graham v. John Deere Co. of Kansas City*: (1) “the scope and content of the prior art,” (2) “differences between the prior art and the claims at issue,” and (3) “the level of ordinary skill in the pertinent art.” 383 U.S. 1, 17 (1966). Vicor appealed to the Board.

The Board affirmed the examiner. Regarding proposed rejections I–II, the Board held that a person skilled in the art would not have been motivated to combine Cobos's controlled rectifiers with Steigerwald '090's circuit because of frequency incompatibilities between the references' circuits, crediting Dr. Schlecht's testimony on this

¹¹ Japanese Patent App. Pub. No. H05-64446.

¹² John G. Kassakian & Martin F. Schlecht, *High-Frequency High-Density Converters for Distributed Power Supply Systems*, 76 Proc. IEEE 362 (Apr. 1988).

issue.¹³ As to proposed rejections III–IV, the Board affirmed the examiner’s decision to withdraw the rejections based solely on the objective evidence. For proposed rejections V and VI, the Board adopted the *Murata* Board’s determination that there was no motivation to combine Steigerwald and Pressman because Pressman’s switching regulators would introduce inductance into the conductive path of Steigerwald’s output, in contravention of statements in the Steigerwald patents’ prosecution history discouraging inclusion of inductance in the output’s path.

During Vicor’s reexamination of the ’290 patent, SynQor presented much of the same objective evidence of nonobviousness that it had presented in *SynQor I*, in the *Murata* reexamination, and in *SynQor II*. The Board found SynQor’s arguments regarding the objective evidence to be persuasive and adopted the analysis of secondary considerations set out in *Murata*. Although the Board acknowledged our decision in *SynQor II*, the Board did not address *SynQor II*’s finding that the basic IBA architecture recited in the claims was already known in the art. The Board concluded that all disputed claims of the ’290 patent were patentable over the prior art presented by Vicor.

B. Reexamination of the ’021 Patent

Vicor requested reexamination of the ’021 patent in May 2011. The PTO granted the request and adopted Vicor’s proposed rejections. SynQor added new claims 49–50 during the reexamination, which required use of switching regulators. Rejection I held that claims 1, 9, 15, 21, 24, 26, 31, 39, 45, and 47 were anticipated by Steigerwald. Rejection II held that claims 22, 23, 25, and 27–

¹³ Proposed rejections I–II did not rely on Steigerwald or Pressman for disclosure of controlled rectifiers.

30 were obvious over Steigerwald in view of the knowledge of a person skilled in the art. Rejection III held that claim 49 was obvious over Steigerwald and Pressman. Rejection IV held that claim 50 was obvious over Steigerwald, Pressman, and admitted prior art. The examiner maintained all rejections and issued a right of appeal notice. SynQor appealed.

In this reexamination, the Board affirmed all rejections. Regarding rejection I, the Board affirmed anticipation by Steigerwald, finding, *inter alia*, that substantially uninterrupted power flowed through the windings of Steigerwald '090's transformer. For rejection II, the Board affirmed the examiner's finding that the claimed input and output voltage ranges would have been obvious design choices for a person skilled in the art. The Board also considered SynQor's objective evidence of nonobviousness in connection with rejection II and held that, although "substantial evidence" of secondary considerations existed in the record, the evidence "principally" related to "features of the independent claims" that were held to be anticipated in *SynQor II* and therefore did not outweigh evidence of obviousness. -2288 J.A. 31-32. Although that ruling is not consistent with the Board's evaluation of the same secondary consideration evidence in the '290's reexamination (*see* § IV.A., *supra*), the Board did not explain in either decision why it weighed the same evidence differently and reached different outcomes in its decisions for the two related patents. Regarding rejections III-IV, the Board held that a person skilled in the art would have been motivated to combine Steigerwald and Pressman, ruling oppositely on the same issue presented in the '290's reexamination. Specifically, the Board held that it *would* have been obvious to insert Pressman's switching regulators into Steigerwald '090's circuit, despite statements discouraging this combination in the prosecution history of Steigerwald '090.

SynQor requested rehearing of the Board's decision. On rehearing, the Board confirmed its prior holdings. Regarding rejection I, the Board stated that Steigerwald's input is "always connected to the output of the secondary winding circuit" and, therefore, that there is "continuous power flow" through Steigerwald's windings. *Id.* at 9. On rejections III–IV, the Board more specifically identified a motivation to combine Steigerwald and Pressman by citing Pressman's teaching that switching regulators could improve the efficiency of circuit regulation. The Board also reconsidered the objective evidence and held that, while the evidence did "tend to somewhat support a case of nonobviousness," there was nevertheless strong evidence of obviousness that outweighed such evidence. *Id.* at 18. Thus, the Board appeared to arrive at different conclusions in the '290 and '021's respective reexaminations as to the persuasiveness of the objective evidence presented in both reexaminations. The Board concluded that all disputed claims of the '021 patent were unpatentable.

Vicor and SynQor timely appealed the Board's respective decisions. We have jurisdiction under 28 U.S.C. § 1295(a)(4)(A).

DISCUSSION

We review decisions by the Board under the standards set forth in the Administrative Procedure Act (APA), 5 U.S.C. § 706. *Pride Mobility Prods. Corp. v. Permobil, Inc.*, 818 F.3d 1307, 1313 (Fed. Cir. 2016). We set aside the Board's actions if they are "arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law" or "unsupported by substantial evidence." 5 U.S.C. § 706(2). The Board's legal determinations are reviewed *de novo* and its factual findings for substantial evidence. *ACCO Brands Corp. v. Fellowes, Inc.*, 813 F.3d 1361, 1365 (Fed. Cir. 2016). "A finding is supported by substantial evidence if a reasonable mind might accept the evidence

to support the finding.” *K/S Himpp v. Hear-Wear Techs., LLC*, 751 F.3d 1362, 1364 (Fed. Cir. 2014) (citation omitted).

Obviousness “is a question of law based on underlying findings of fact.” *In re Gartside*, 203 F.3d 1305, 1316 (Fed. Cir. 2000) (citation omitted). The factual analysis of an obviousness determination is framed by the factors set out in *Graham*: (1) “the scope and content of the prior art,” (2) “differences between the prior art and the claims at issue,” (3) “the level of ordinary skill in the pertinent art,” and (4) “secondary considerations” such as “commercial success, long felt but unsolved needs,” and “failure of others.” 383 U.S. at 17.

Anticipation is a question of fact reviewed for substantial evidence. *Eli Lilly & Co. v. Bd. of Regents of Univ. of Wash.*, 334 F.3d 1264, 1267 (Fed. Cir. 2003).

I. The '290 Patent's Reexamination

A. Proposed Rejections I–II: Obviousness over Steigerwald '090, Cobos, and Pressman

The Board found that a person skilled in the art would not have been motivated to combine Steigerwald '090 and Cobos because of operating frequency incompatibilities between the references' circuits. Cobos states that its circuit must operate at frequencies lower than 1 MHz. Steigerwald '090 does not explicitly recite an operating frequency range. However, the Board relied on testimony by SynQor's expert, Dr. Schlecht, in finding that Steigerwald '090's circuit would be functionally constrained to operate at frequencies above 3.6 MHz. Dr. Schlecht's testimony was based in part on teachings in publications that antedated the '290's priority date.

Vicor argues Dr. Schlecht's testimony is biased and that substantial evidence does not support the Board's decision on these proposed rejections. We disagree. The Board relied on testimony from Dr. Schlecht that refers to

and is supported by teachings in an article and paper published before the priority date of the '290 patent, which indicate that the particular circuit topology used in Steigerwald '090 was designed to operate at frequencies of 3.6 MHz and higher. In this instance, Dr. Schlecht's testimony and the references referred to therein are substantial evidence that a skilled artisan would not have been motivated to combine Cobos with Steigerwald '090, despite Dr. Schlecht's interest in the outcome of this litigation.

Because Cobos is the only reference relied on in these proposed rejections to supply the controlled rectifiers required in all claims of the '290 patent,¹⁴ and in view of the foregoing, we *affirm* the Board's decision not to adopt proposed rejections I–II.

B. Proposed Rejections III–IV: Obviousness over JP '446, Steigerwald '539, and Kassakian

The Board affirmed the examiner's decision to withdraw proposed rejections III–IV based solely on SynQor's proffered objective evidence of nonobviousness. The objective evidence consisted of evidence submitted to the jury in *SynQor I*, including evidence of commercial success of infringing products, long-felt need for an improved power architecture for large computer and telecommunications systems, failure of others to create an improved power architecture, and praise of SynQor's IBA solution. The Board held that the '290 patent's claims covered the same IBA design covered by the patents asserted in *SynQor I* and that there was a nexus between the objective evidence and the disputed claims of the '290 patent. The Board and the examiner made no assessment of

¹⁴ Pressman was relied on solely for its disclosure of switching regulators in this combination.

Vicor's proposed combination of JP '446, Steigerwald '539, and Kassakian under the first three *Graham* factors.

The Board's decision on these proposed rejections was erroneous and must be vacated for two reasons. First, the Board improperly analyzed Vicor's obviousness arguments under only one of the four *Graham* factors when it looked exclusively at the objective evidence, without considering the remaining factors and the relative strength of the factors. Second, the Board reached inconsistent conclusions as to the evidentiary weight to be given to the secondary considerations evidence presented in the respective reexaminations of the '290 and '021 patents, without any explanation to justify such inconsistency.

The Board's legal error is underscored by its opinion issued on the same day in the related reexamination of the '021 patent. In that decision, the Board applied all four *Graham* factors in the '021's reexamination and stated that "[t]he Federal Circuit has determined that only after considering the four *Graham* criteria together can the decision maker make the legal determination of whether the invention is nonobvious." -2288 J.A. 14 (citing *Panduit v. Dennison Mfg. Co.*, 810 F.2d 1561, 1570 (Fed. Cir. 1987)). The Supreme Court instructed that, in performing an obviousness inquiry, "the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved. Against this background, the obviousness or nonobviousness of the subject matter is determined." *Graham*, 383 U.S. at 17. We have interpreted this mandate to require that "evidence relating to all four *Graham* factors—including objective evidence of secondary considerations—**must be considered** before determining whether the claimed invention would have been obvious to one of skill in the art at the time of invention." *Apple Inc. v. Int'l Trade Comm'n*, 725 F.3d 1356, 1365 (Fed. Cir.

2013) (emphasis added). The Board was clearly aware of these requirements but nevertheless chose to affirm the examiner rather than send the issue back with instructions to consider Vicor's obviousness arguments. This was error.

The Board's decision is also erroneous because the Board reached inconsistent conclusions regarding the weight to be accorded the objective indicia evidence presented in both reexaminations of the SynQor Patents. In the '290's reexamination, the Board found the objective evidence to be so persuasive that it approved of the examiner's decision to withdraw rejections without analyzing the remaining *Graham* factors and without considering our holding in *SynQor II* that claims covering IBA's basic concept were anticipated by Steigerwald. In the '021's reexamination, however, the Board determined that the objective evidence principally related to features of the claims that were found to be anticipated in *SynQor II* and, therefore, found that there was no nexus between the objective evidence and the claims of the '021 patent. The Board's decisions do not evince any explanation or justification for these inconsistent findings, given the similarity between the claims at issue in the respective reexaminations. While not every instance of an agency reaching inconsistent outcomes in similar, related cases will necessarily be erroneous, under the circumstances here, where a panel simultaneously issues opinions on the same technical issue between the same parties on the same record, and reaches opposite results without explanation, we think the best course is to vacate and remand these findings for further consideration. *See Local 814, Int'l Bhd. of Teamsters v. N.L.R.B.*, 512 F.2d 564, 567 (D.C. Cir. 1975) (remanding two decisions of the National Labor Relations Board that were "factually similar and ostensibly inconsistent" because the Board "ha[d] not explained its reasons for reaching different results").

In *SynQor II*, we vacated the Board's nonobviousness determinations for certain claims in light of our finding that Steigerwald anticipated other claims of the '190 patent that covered IBA's basic arrangement. *SynQor II*, 603 F. App'x at 975. As already discussed above, representative claim 20 of the '190 patent, which we held was anticipated in *SynQor II*, is substantively identical to the claims of the SynQor Patents, with the exception of limitations relating to, for example, switching regulators, continuous power flow through transformer windings, and input/output voltage ranges. Moreover, SynQor has admitted in statements to the Board that the claims of the '290 patent cover IBA in the same way as the claims of the '190 patent. The parties were not given an opportunity to submit briefing on the impact of our *SynQor II* opinion before the Board, because the *SynQor II* decision issued after briefing had been completed in both reexaminations.¹⁵ Although the obviousness arguments in *SynQor II* related to different, but anticipating, prior art references than those at issue here, the parties should be given an opportunity on remand to present argument on whether SynQor's objective evidence is attributable to IBA—as anticipated in *SynQor II*—or to other features in the SynQor Patents' claims. Our holding in *SynQor II* may be particularly relevant for the proposed rejections at issue here, given SynQor's almost singular focus on IBA as a general concept in its prior arguments before the Board on the objective evidence.

¹⁵ The parties raise arguments in their briefing in the instant appeals as to the import of *SynQor II* and whether a nexus may be found between the objective evidence and features of the claims that were not found to be anticipated in *SynQor II*. These arguments were not raised before the Board, and we decline to consider them in the first instance.

For the foregoing reasons, we *vacate* the Board's decision on these proposed rejections and *remand* for further proceedings consistent with this opinion.¹⁶

C. Proposed Rejections V–VI: Obviousness over Steigerwald and Pressman

In the '290's reexamination, the Board held that it would not have been obvious to use Pressman's switching regulators for Steigerwald's regulation stage. Yet on the same day, the Board reached the opposite conclusion on this issue in the '021's reexamination on essentially the same record.¹⁷ Because the Board did not provide any reasoned explanation for the inconsistent result across the two reexaminations, we *vacate* and *remand* the Board's decision on proposed rejections V–VI in the '290's reexamination and rejections III–IV in the '021's reexamination. *See Local 814*, 512 F.2d at 567.

In declining to adopt proposed rejections V–VI in the '290's reexamination, the Board relied on disclosures in Steigerwald and testimony by Dr. Robert Steigerwald,

¹⁶ In *SynQor I*, we discussed the objective evidence as part of the substantial evidence that supported the jury's nonobviousness verdict. 709 F.3d at 1377. These observations were made on a different record with respect to different prior art references and were made before we found that at least one implementation of IBA was anticipated in *SynQor II*. Given these circumstances, the Board should not give our discussion in *SynQor I* undue weight on the secondary considerations issue.

¹⁷ The parties acknowledged that, although there were "minor differences" between the records in the reexaminations, the Board made inconsistent holdings on essentially the same record. *See* -2283 Oral Argument at 3:17–3:26, 13:54–14:18, *available at* <http://oralarguments.cafc.uscourts.gov/default.aspx?fl=2016-2283.mp3>.

sole inventor of the Steigerwald patents, to hold that a skilled artisan would not have been motivated to combine Pressman's switching regulators with Steigerwald because Steigerwald was "principally directed to pulsed loads." -2283 J.A. 21–22. A "load" is a circuit component that consumes power supplied by a DC-DC power converter. A "pulsed" load is simply a load that requires intermittent pulses of power rather than a constant level of power. The Board adopted SynQor's position that a skilled artisan would not have been motivated to alter Steigerwald to include switching regulators because a switching regulator on Steigerwald's pulsed load wire would have introduced inductance on the wire and, as a result, would have inhibited delivery of pulsed power.

In the '021's reexamination, however, the Board held that a skilled artisan would have been motivated to incorporate Pressman's switching regulators into Steigerwald because "[t]he express teaching in Pressman of enhanced efficiency, in [the Board's] view, outweigh[ed] the undesirability of additional inductance, when considered in view of the Steigerwald alternative embodiment." -2288 J.A. 11–12.

We find that the direct conflict between the Board's fact findings in the reexaminations before us is unsupported by any rational explanation in either of the Board's decisions. See *Gartside*, 203 F.3d at 1312 (citing *Hyundai Elecs. Indus. Co. v. ITC*, 899 F.2d 1204, 1209 (Fed. Cir. 1990), which noted that the "touchstone" of the "arbitrary, capricious" standard is "rationality"). "[A]n agency's [fact] finding may be supported by substantial evidence," yet "nonetheless reflect arbitrary and capricious action." *Bowman Transp., Inc. v. Arkansas–Best Freight Sys., Inc.*, 419 U.S. 281, 284 (1974). Moreover, "this is not a case where a more reasoned explanation than that provided by the Board can be gleaned from the record." *Arendi S.A.R.L. v. Apple Inc.*, 832 F.3d 1355, 1366 (Fed. Cir. 2016). As explained above in § I.B., our opinion today

should not be read to suggest agency error whenever an agency reaches inconsistent outcomes in similar, related cases. But given the circumstances here, we think the best course is to vacate and remand for further consideration. On remand, the Board must at least provide some reasoned basis for its opposite holdings, if it chooses to maintain those same, opposing results.

Vicor presents an additional basis for vacating the Board's decision declining to adopt Vicor's proposed rejections (in the '290's reexamination). Vicor argues that the Board's decision is contrary to law because the Board failed to consider two of Vicor's arguments raised in its request for reexamination. The two allegedly overlooked arguments are: (1) it would have been obvious to use Pressman's switching regulators exclusively on Steigerwald's non-pulsed loads because a skilled artisan would have looked to Steigerwald for all that it teaches and not just focus on pulsed loads, and (2) it would have been obvious to convert all of Steigerwald's loads into non-pulsed loads and add switching regulators.

While the Board may have indirectly acknowledged these arguments in part by finding that Steigerwald was "principally directed to pulsed loads," we cannot conclude with any confidence that it met its requirement to address all grounds for proposed rejection under the APA. See *SEC v. Chenery Corp.*, 318 U.S. 80, 88 (1943) ("The grounds upon which an administrative order must be judged are those upon which the record discloses that its action was based."). On remand, the Board must address Vicor's two arguments regarding Steigerwald's non-pulsed loads. If the Board finds that there would have been no motivation to combine Steigerwald and Pressman because of what Steigerwald is principally directed to, it must expressly say so with an adequate explanation. See *WBIP, LLC v. Kohler Co.*, 829 F.3d 1317, 1337 (Fed. Cir. 2016) ("Whether a skilled artisan would be motivated to make a combination includes whether he would select

particular references in order to combine their elements. This is part of the fact question . . .”).

As discussed in § I.B., *supra*, the Board must reconsider the weight to be accorded SynQor’s proffered secondary considerations evidence in the SynQor Patents’ respective reexaminations. This reconsideration should include analysis of whether there is a nexus between the secondary considerations evidence and the switching regulators at issue here for proposed rejections V–VI.

II. The ’021 Patent’s Reexamination

Having addressed Vicor’s appeal of the Board’s decision in the ’290’s reexamination, we next turn to SynQor’s appeal of the Board’s decision in the ’021’s reexamination, in which the Board affirmed all of the rejections.

A. Rejection I: Anticipation by Steigerwald

SynQor raises two arguments challenging the Board’s decision that Steigerwald anticipates certain claims of the ’021 patent. First, SynQor argues that the Board improperly relied on a new—and erroneous—ground of rejection on rehearing. -2288 Open. Br. at 26 (citing -2288 J.A. 7). Second, SynQor argues that the Board erred by “failing to consider SynQor’s argument that Steigerwald does not teach ‘substantially uninterrupted’ power flow in the alternative synchronous rectifier embodiment” due to timing of the synchronous rectifiers. *Id.* Both arguments are unpersuasive, and we therefore *affirm* the Board’s holding of anticipation by Steigerwald.

First, SynQor argues that the Board erred by finding, for the first time on rehearing as a new ground for rejection, that average current in Figure 2a of Steigerwald ’539 “showed that power was constantly flowing in the secondary winding circuit of the Steigerwald converters.” *Id.* at 27. In SynQor’s view, the Board relied on this finding to conclude that Steigerwald ’539 discloses the “substantially uninterrupted flow of power” limitation in the claims.

SynQor also contends that this finding is erroneous and unsupported by substantial evidence. *Id.* at 35. Vicor responds that the “thrust of the rejection” on this issue “has not changed since the initial request for reexamination” and that the Board was merely responding to an argument raised by SynQor for the first time in its request for rehearing. -2288 Resp. Br. at 9. In addition, Vicor argues that the Board’s average-current finding on rehearing was irrelevant because the Board’s initial decision fully and independently addressed the rejection as initially presented, and the Board did not alter its original decision on rehearing. -2288 Oral Argument at 20:42–21:16, *available* [at http://oralarguments.cafc.uscourts.gov/default.aspx?fl=2016-2288.mp3](http://oralarguments.cafc.uscourts.gov/default.aspx?fl=2016-2288.mp3). We agree with Vicor on this latter point.

In this case, it was not enough for SynQor to “show the existence of error.” *In re Watts*, 354 F.3d 1362, 1369 (Fed. Cir. 2004). SynQor was also required to “show that the error was in fact harmful because it affected the decision below.” *Id.*; 5 U.S.C. § 706 (“[In reviewing the Agency decision] the court shall review the whole record or those parts of it cited by a party, and due account shall be taken of the rule of prejudicial error.”); *see also Munoz v. Strahm Farms, Inc.*, 69 F.3d 501, 504 (Fed. Cir. 1995) (“The correction of an error must yield a different result in order for that error to have been harmful and thus prejudice a substantial right of a party.”); *Palmer v. Hoffman*, 318 U.S. 109, 116 (1943) (“He who seeks to have a judgment set aside because of an erroneous ruling carries the burden of showing that prejudice resulted.”). SynQor failed to show prejudicial error in this instance because, as explained below, the Board also adopted the Examiner’s original findings, which are supported by substantial evidence as an independent basis to support the conclusion that Steigerwald discloses substantially uninterrupted power flow through its windings. *See* -2288 J.A. 25.

Second, SynQor argues that the Board erred by failing to consider its argument that Steigerwald lacks substantially uninterrupted power flow due to switching delays of Steigerwald's synchronous rectifiers. The allegedly overlooked argument posits that, even if power flow is uninterrupted in the uncontrolled-rectifier embodiment of Steigerwald '090, incorporating Steigerwald '539's synchronous rectifiers into the circuit would create interruptions in power flow due to short delays in activating transistor gate terminals of the synchronous rectifiers. SynQor identifies Figure 10e from Steigerwald '539 as depicting these short "off periods." Vicor responds that, "even if interruptions were to occur because of the waveform in Fig. 10e, the claims do not require absence of any interruption. Rather, the claims require the duty cycle to cause 'substantially uninterrupted' power flow in normal operation." -2288 Resp. Br. at 31 (emphasis omitted). We agree with Vicor.

The Board expressly acknowledged SynQor's allegedly overlooked argument in its opinion. *See* -2288 J.A. 5. While the Board's opinion is not crystal clear in explaining the bases for its decision, the Board's opinion sufficiently addressed SynQor's argument by adopting the examiner's observation that Steigerwald meets the uninterrupted power flow limitation because "[t]he [Steigerwald] isolation stage includes two transformers that operate in opposite phase, each at a complementary 50% duty cycle. 'As a consequence, the energy storage capacitor C_e is always transformer coupled to the dc output.'" -2288 J.A. 25 (quoting Steigerwald '539, J.A. 626, 3:33–38). This finding is supported by the disclosures of Steigerwald '539 and is, therefore, supported by substantial evidence. The '021 patent expressly contemplates interruptions in power flow like those depicted in Steigerwald '539's Figure 10e. '021 patent col. 4 ll. 8–11 ("[D]uring normal operation[,] the isolation stage is operated at a fixed duty cycle in which power is always flow-

ing from input to output (*except during the brief switch transitions*)." (emphasis added)).

B. Rejection II: Obviousness over Steigerwald in View of Person of Ordinary Skill's Knowledge

The Board held that claims 23, 25, and 27–30 of the '021 patent, which include voltage-range limitations, would have been obvious because a skilled artisan "would have implemented those voltages as the result of routine design choice for a circuit for use in particular operating environments." -2288 J.A. 30. SynQor argues that this decision was erroneous because Steigerwald teaches away from implementing its circuit in computer or telecommunications applications by requiring use of relatively small capacitors and larger voltages than those recited in the claims. Vicor counters that the Board's decision is supported by substantial evidence in the form of expert testimony, which averred that a person skilled in the art would have understood Steigerwald's circuit to be implementable in computer and telecommunications applications using the claimed voltages. We agree with Vicor that the Board's decision on these claims is supported by the substantial evidence cited by Vicor. *See* -2288 J.A. 30 (Board discussing expert testimony). In addition, regarding the secondary considerations evidence that SynQor presented in connection with these claims, the Board's finding that such evidence was "principally" directed to "features of the [anticipated] independent claims," and is therefore of lesser probative value, is supported by substantial evidence. *See, e.g.*, J.A. 13–18, 30–32 (Board discussing secondary considerations evidence). Therefore, we *affirm* the Board's decision on rejection II.

C. Rejection III: Obviousness over Steigerwald and Pressman

For the reasons already discussed, we *vacate* and *re-mand* the Board's decision on this rejection for reconsideration of whether it would have been obvious to

incorporate Pressman's switching regulators into Steigerwald's circuit. As discussed in § I.B., *supra*, the Board must reconsider the weight to be accorded SynQor's proffered secondary considerations evidence in the SynQor Patents' respective reexaminations. This reconsideration should include analysis of whether there is a nexus between the secondary considerations evidence and the switching regulators at issue here for rejection III.

D. Rejection IV: Obviousness over Steigerwald, Pressman, and Admitted Prior Art

Rejection IV addressed claim 50 of the '021 patent, which combines the switching regulator limitation in claim 49 with voltage range limitations addressed above with respect to rejection II. For the reasons above, we *vacate* and *remand* the Board's decision on this rejection for reconsideration of whether it would have been obvious to incorporate Pressman's switching regulators into Steigerwald's circuit. The Board's findings related to the voltage range limitations of claim 50 are supported by substantial evidence, for the reasons given above in connection with rejection II. Again, as noted above, we *vacate* and *remand* the Board's secondary considerations decision for this rejection. *See* § I.B., *supra*.

CONCLUSION

The decisions of the Board are *affirmed in part, vacated in part*, and *remanded* for further proceedings consistent with this opinion.

**AFFIRMED-IN-PART, VACATED-IN-PART, AND
REMANDED**

COSTS

No costs.