

No. 17-

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IN THE  
**Supreme Court of the United States**

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NIDEC MOTOR CORPORATION,

*Petitioner,*

*v.*

ZHONGSHAN BROAD OCEAN MOTOR CO., LTD.,  
BROAD OCEAN MOTOR, LLC, AND BROAD OCEAN  
TECHNOLOGIES, LLC,

*Respondents.*

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ON PETITION FOR A WRIT OF CERTIORARI TO THE UNITED  
STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

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**PETITION FOR A WRIT OF CERTIORARI**

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## **QUESTIONS PRESENTED**

1. Whether the Federal Circuit has erred in holding that, for the purposes of an obviousness determination under 35 U.S.C. § 103(a), a reference “teaches away” from a proposed combination only if it expressly “criticize[s], discredit[s], or otherwise discourage[s]” the proposed combination.

2. Whether *inter partes* review—an adversarial process used by the Patent and Trademark Office to analyze the validity of existing patents—violates the Constitution by extinguishing private party rights through a non-Article III forum without a jury.

## **PARTIES TO THE PROCEEDING**

All parties to the proceeding are identified in the caption except the Director of the United States Patent and Trademark Office, who intervened at the Federal Circuit to address a question not at issue in this petition.

## **RULE 29.6 STATEMENT**

Nidec Motor Corporation is a wholly owned subsidiary of Nidec Americas Holding Corporation. Nidec Corporation owns 10% or more of the stock of Nidec Americas Holding Corporation.

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## **OPINIONS BELOW**

The Federal Circuit's opinion is reported at 868 F.3d 1013 and is reproduced in the Appendix ("App.") at 1a-17a. The Final Written Decision of the Patent Trial and Appeal Board is unreported and is reproduced at App. 18a-49a.

## **JURISDICTION**

The Federal Circuit entered its opinion on August 22, 2017. App. 1a-2a. No petition for rehearing was filed. This Court has jurisdiction under 28 U.S.C. § 1254(1).

## **RELEVANT CONSTITUTIONAL AND STATUTORY PROVISIONS**

35 U.S.C. § 103(a) codifies the nonobviousness requirement of patentability, providing that:

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

The Seventh Amendment of the United States Constitution provides:

In suits at common law, where the value in controversy shall exceed twenty dollars, the right of trial by jury shall be preserved, and no fact tried by a jury, shall be otherwise reexamined in any court of the United States, than according to the rules of the common law.

### **STATEMENT OF THE CASE**

This case presents a question that affects nearly every patent application under examination at the Patent Office and nearly every issued patent whose validity is ultimately challenged: What is the proper scope of the prior art at the time of invention, against which all obviousness determinations are made?

Over the past century and a half, this Court has repeatedly stressed that courts should take an expansive and flexible approach to patentability determinations. This is done by first resolving the entire state of the art at the time of the purported invention, and then asking whether a hypothetical person having ordinary skill in the art would have found it obvious to make the leap to the claimed invention in light of the art. If yes, the Court has explained, the purported invention is merely the work of a skilled mechanic, and thus not patentable. But if no, the purported invention is innovative, entitling the inventor to a patent.

The Federal Circuit, however, has not taken such an expansive and flexible view of the prior art.

Instead, it shuts its eyes to important and relevant teachings available to a skilled artisan—namely, the teachings that would naturally discourage the artisan from arriving at the purported invention. Rather than take an expansive and flexible approach to so-called “teaching-away” arguments, the Federal Circuit requires a party to satisfy a burdensome test before the court will consider them. Under the Federal Circuit’s test, an applied reference must expressly address, and then disparage, the proposed combination before it will be deemed to have taught away from the proposed combination. The Patent Office has in turn incorporated the Federal Circuit’s onerous test into its examination procedures, and applies the test in essentially an outcome-determinative manner, wholly foreclosing any meaningful review of applicants’ teaching-away arguments.

As a result, the full scope of the prior art is not considered and applied—either when examining patent applications or when reviewing the validity of duly issued patents. This current state of affairs finds no basis in the Patent Act or in this Court’s jurisprudence. Accordingly, this Court should intervene to restore the expansive and flexible patentability inquiry required by over 160 years of this Court’s precedents, and this case presents an ideal vehicle for the Court to do so.

Finally, this case also presents the fundamental question regarding whether *inter partes* review (IPR) proceedings—which are adversarial proceedings used by the Patent and Trademark Office (“Patent Office”) to analyze the validity of existing patents—violate the Constitution by extinguishing private-property rights

through a non-Article III forum without a jury. On November 27, 2017, this Court will hear oral argument in *Oil States Energy Services, LLC v. Greene's Energy Group, LLC*, No. 16-712 (U.S. filed Nov. 23, 2016), to consider the issue. Because this is an appeal from an *inter partes* review (IPR) in which the Patent Office held Petitioner's patent invalid, the Court should at a minimum hold this petition pending the outcome of *Oil States*. If the Court ultimately determines in *Oil States* that IPR proceedings are unconstitutional, the Court should grant this petition, vacate the Federal Circuit's decision, and remand for further proceedings.

### **I. The Advent of the “Teaching-Away” View of Patentability, and the Federal Circuit’s Erroneous Formulation Thereof**

In *KSR International Co. v. Teleflex Inc.*, 550 U.S. 398 (2007), this Court laid out the proper patentability analysis for purposes of 35 U.S.C. § 103, explaining that its precedents required an “expansive and flexible approach” to obviousness determinations. 550 U.S. at 416. In so holding, the Court expressly acknowledged a “corollary principle” to the principles provided in that decision: “when the prior art teaches away from combining certain known elements, discovery of a successful means of combining them is more likely to be nonobvious.” *Id.*

But the Federal Circuit has reduced this “corollary principle” to essentially a non-factor during patentability determinations, routinely dismissing so-called “teaching-away” arguments unless the prior art *expressly* “criticize[s], discredit[s], or otherwise discourage[s]” the combination of known elements.

*See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017-18 (Fed. Cir. 2017) (App. 9a-10a) (alterations in original) (quoting *Meiresonne v. Google, Inc.*, 849 F.3d 1379, 1382 (Fed. Cir. 2017)). This case presents the important and timely question: Can the Federal Circuit’s formulaic “criticize, discredit, or otherwise discourage” teaching-away test be squared with the “expansive and flexible approach” to obviousness analyses mandated by *KSR*?

This Court’s precedents show that no, it cannot. This Court established an expansive and flexible patentability inquiry as early as 1851 in *Hotchkiss v. Greenwood*, 52 U.S. (11 How.) 248 (1851). There, in examining a purported invention for a clay doorknob that varied only slightly from the wooden door knobs well-known in the prior art, the Court explained that before a patent may issue, the minimum skill and ingenuity necessary to arrive at the claimed invention must be more than that possessed by a skilled artisan. 52 U.S. at 267. Otherwise, the Court explained, “the improvement is the work of the skillful mechanic, not that of the inventor.” *Id.*

More than a century later, Congress codified the Court’s patentability standard at 35 U.S.C. § 103. *See Graham v. John Deere Co. of Kan. City*, 383 U.S. 1, 3-4 (1966). Section 103, when read in conjunction with its novelty counterpart, 35 U.S.C. § 102, provides that a “person shall be entitled to a patent” for a new idea unless “the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.” §§ 102, 103. But despite § 103’s textual

“emphasis on an inquiry into obviousness,” this Court has explained that the patentability requirement under § 103 remains the same as the one established by *Hotchkiss*. See *Graham*, 383 U.S. at 3-4.

*Hotchkiss* and its progeny—and ultimately § 103—thus establish an objective and expansive test for patentability, one that views the body of prior art available at the time of the invention through the lens of a hypothetical person having ordinary skill in the art. Indeed, shortly after § 103 was enacted, this Court formalized such an objective and expansive approach in *Graham*. There, the Court explained that a proper § 103 analysis requires that “the scope and content of the prior art . . . be determined; differences between the prior art and the claims at issue . . . be ascertained; and the level of ordinary skill in the pertinent art resolved.” 383 U.S. at 17-18. “Against this background,” the Court continued, “the obviousness or nonobviousness of the subject matter is determined.” *Id.*

In a companion case to *Graham* issued the same day, *United States v. Adams*, 383 U.S. 39 (1966), the Court demonstrated how to apply this objective approach in light of prior-art references that, in combination, include all of the claimed features, but that also teach away from their proposed combination. The technology at issue in *Adams* was a wet battery comprising a magnesium anode and a cuprous chloride cathode. 383 U.S. at 42. The United States challenged the validity of the patent, arguing that (1) wet batteries comprising a zinc anode and silver chloride cathode were well known in the art, and (2) the prior art showed magnesium could be substituted for zinc and cuprous chloride could be

substituted for silver chloride. *Id.* at 48. In light of these teachings, the Government argued, Adams' invention was obvious. *Id.*

This Court disagreed, concluding that Adams' battery was nonobvious and thus patentable. The Court explained that,

[d]espite the fact that each of the elements of the Adams battery was well known in the prior art, to combine them as did Adams required that a person reasonably skilled in the prior art must ignore that (1) batteries which continued to operate on an open circuit and which heated in normal use were not practical; and (2) water-activated batteries were successful only when combined with electrolytes detrimental to the use of magnesium. *These long-accepted factors, when taken together, would, we believe, deter any investigation into such a combination as is used by Adams.* This is not to say that one who merely finds new uses for old inventions by shutting his eyes to their prior disadvantages thereby discovers a patentable innovation. We do say, however, that *known disadvantages in old devices which would naturally discourage the search for new inventions may be taken into account in determining obviousness.*

*Id.* at 51-52 (emphasis added).



*Adams* established what has since become known as the “teaching-away” view of a patentability analysis: “when the prior art teaches away from combining certain known elements, discovery of a successful means of combining them is more likely to be nonobvious.” *KSR*, 550 U.S. at 416.

Following *Adams*’ lead, the Courts of Appeals routinely considered the prior art’s “known disadvantages” that would “naturally discourage the search for new inventions” as part of an objective and expansive patentability analysis, upholding the subject patents when such teachings would lead a skilled artisan away from the proposed combination. *See, e.g., John Zink Co. v. Nat’l Airoil Burner Co.*, 613 F.2d 547, 554 (5th Cir. 1980) (“Long-accepted factors which discourage investigation into a combination of designs may be taken into account when determining obviousness.”); *CMI Corp. v. Metro. Enters., Inc.*, 534 F.2d 874, 880 (10th Cir. 1976) (“When teachings in a prior art patent must be ignored in order to reach a desired result, they become less pertinent to the determination of obviousness.”); *Shaw v. E.B. & A.C. Whiting Co.*, 417 F.2d 1097, 1104 (2d Cir. 1969) (“Rather than serving to point the way to innovation, therefore, Brubaker’s teachings would tend to discourage one skilled in the art from investigating the methods ultimately used by Shaw to achieve production of an improved polymer filament.”); *see also Santa Fe-Pomeroy, Inc. v. P & Z Co.*, 569 F.2d 1084, 1094 (9th Cir. 1978); *Gettelman Mfg. Inc. v. Lawn ‘N’ Sport Power Mower Sales & Serv., Inc.*, 517 F.2d 1194, 1199 (7th Cir. 1975); *Charvat v. Comm’r of Patents*, 503 F.2d 138, 140 (D.C. Cir. 1974); *Nat’l Connector Corp. v. Malco Mfg. Co.*, 392 F.2d 766, 770 (8th Cir. 1968).

After the Federal Circuit absorbed all appellate jurisdiction of patent-related cases in 1982, it appeared the court would follow the regional circuits' lead. For example, in an early and oft-cited formulation of the "teaching-away" standard, the Federal Circuit opined in *In re Gurley*, 27 F.3d 551 (Fed. Cir. 1994), that "[a] reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant." 27 F.3d at 553. *Gurley's* formulation of the teaching-away standard arguably stayed true to the principles laid out in *Adams* and those previously employed by the regional circuits.

But in the years since *Gurley*, the Federal Circuit's application of the teaching-away standard has calcified into a rigid, onerous test bearing no resemblance to the principles laid out in *Adams* (or to the standard espoused by the Federal Circuit in *Gurley*, for that matter). This test derives from the Federal Circuit's decision in *In re Fulton*, 391 F.3d 1195 (Fed. Cir. 2004). There, the court considered whether a reference that disclosed alternatives to the claimed elements could be regarded as teaching away from the claimed combination because, as the applicant argued, "[c]hoosing one alternative necessarily means rejecting the other, i.e., following a path that is 'in a divergent direction from the path taken by the applicant.'" 391 F.3d at 1201 (quoting *Gurley*, 27 F.3d at 553). The court concluded that no, such a disclosure does not teach away from the purported combination. *Id.* But the Federal Circuit went further and held, without any supporting authority, that "because such disclosure does not

*criticize, discredit, or otherwise discourage* the solution claimed in the” subject application, it does not teach away from the purported combination. *Id.* (emphasis added).

That lone, unsupported sentence from *Fulton* spawned a barrage of Federal Circuit decisions (not to mention numerous district-court, Patent Office, and ITC decisions) that cited the newly created “criticize, discredit, or otherwise discourage” test to summarily deny a party’s teaching-away argument. The hallmark of these decisions is that the Federal Circuit first looks to whether the principal prior-art reference expressly mentions an element that is missing from the embodiment described therein. If the reference does not expressly mention the missing element, that is the end of the inquiry because under the court’s test the prior art cannot be said to “criticize, discredit, or otherwise discourage” a combination with a missing element of which it does not even speak. *See, e.g.,* Shashank Upadhye, *Generic Pharmaceutical Patent and FDA Law* § 3:24 (2016 ed.) (suggesting that in order to advance a teaching-away argument, one must first be able to point to a “teaching away’ statement” in the principal reference).

If the reference does expressly mention the missing element, however, the court then looks to whether the reference disparages its use in the prior-art embodiment. Then, and only then, will the prior art be deemed to have taught a person having ordinary skill in the art away from the proposed combination. *See id.* (noting that the “supposed ‘teaching away’ statement should be fairly analyzed for what it actually says” because, “[f]or teaching away to apply, [the statement] *must actually criticize,*

*discredit, or otherwise affirmatively discourage* investigation towards the claimed invention” (emphasis added); Jean F. Rydstrom, Comment Note, *Application and Effect of 35 U.S.C.A. § 103, Requiring Nonobvious Subject Matter, In Determining Validity of Patents*, 23 A.L.R. Fed. 326 (2017) (“[T]o ‘teach away,’ the reference must criticize, discredit, or otherwise discourage the solution reached by the proposed invention.”).

Numerous Federal Circuit decisions illustrate the point. *See, e.g., Nidec Motor Corp.*, 868 F.3d at 1017 (App. 9a-10a) (“There is nothing in Bessler that ‘criticize[s], discredit[s], or otherwise discourage[s]’ the use of sinewave commutation in HVAC systems” because “Bessler does not even mention sinewave commutation.” (alterations in original) (citation omitted)); *In re Hubbell Inc.*, 644 F. App’x 1004, 1009 (Fed. Cir. 2016) (“Hubbell does not identify any passage in Hayduke that explicitly discredits or discourages direct access to the outlet box, and the cited statement does no more than articulate a preference for an adapter plate that prevents direct access.”); *ABT Sys., LLC v. Emerson Elec. Co.*, 797 F.3d 1350, 1360 n.2 (Fed. Cir. 2015) (“The cited references do not ‘teach away,’ as ABT argues, because it is clear that none come near to “criticiz[ing], discredit[ing], or otherwise discourag[ing]” investigation into the invention claimed.” (alterations in original) (citation omitted)); *Gator Tail, LLC v. Mud Buddy LLC*, 618 F. App’x 992, 999 (Fed. Cir. 2015) (“The Saito Patent does not teach away from the use of horizontal motors” because “[n]owhere does Saito suggest that using a horizontal engine would render the motor inoperable.”); *In re Mouttet*, 686 F.3d 1322, 1334 (Fed. Cir. 2012) (“Nor do we recognize in Falk

any teaching—sufficient to overturn the contrary determination of the Board—that a crossbar arithmetic processor ‘should not’ or ‘cannot’ be implemented with electrical circuitry, or that ‘criticize[s], discredit[s], or otherwise discourage[s]’ a device like Mouttet’s.” (alterations in original) (citation omitted); *see also Meiresonne*, 849 F.3d at 1382; *In re Chuang*, 603 F. App’x 941, 945 (Fed. Cir. 2015); *Galderma Labs., L.P. v. Tolmar, Inc.*, 737 F.3d 731, 738-39 (Fed. Cir. 2013); *In re Haase*, 542 F. App’x 962, 971 (Fed. Cir. 2013); *Norgren Inc. v. ITC*, 699 F.3d 1317, 1326 (Fed. Cir. 2012); *In re PepperBall Techs., Inc.*, 469 F. App’x 878, 882 (Fed. Cir. 2012); *Ricoh Co. v. Quanta Comput. Inc.*, 550 F.3d 1325, 1332 (Fed. Cir. 2008).

The Federal Circuit’s approach not only is incompatible with *Graham* and *Adams*, but also flies in the face of this Court’s latest word on § 103. In 2007, the Court in *KSR* eschewed a similar formulaic approach to obviousness determinations. There, the Court held that the Federal Circuit’s rigid requirement that an invention was obvious in view of a combination of two or more references only if there was some express “teaching, suggestion, or motivation” to combine the references (i.e., the TSM test) was inconsistent with the proper inquiry laid out in *Graham*, *Adams*, and others. *See* 550 U.S. at 407. Instead, the Court explained that its precedents require an “expansive and flexible approach” to obviousness determinations, which should not “become rigid and mandatory formulas” or “confined by formalistic conception[s].” *Id.* at 406, 419.

Nonetheless, the Federal Circuit has recently recognized that a showing that a prior-art reference

meets *Fulton*'s "criticize, discredit, or otherwise discourage" test is "*required* for teaching away." *Norgren*, 699 F.3d at 1326 (emphasis added). The Federal Circuit's reliance on this artificial construct cannot be squared with *KSR*, *Graham*, *Adams*, or § 103. More particularly, "when a court transforms the [*Graham* analysis] into a rigid rule that limits the obviousness inquiry . . . it errs." *KSR*, 550 U.S. at 419.

The decision below shows how the Federal Circuit's "criticize, discredit, or otherwise discourage" test has rendered the "teaching-away" analysis unrecognizable and incompatible with the expansive and flexible patentability determinations this Court's precedents require.

## **II. The Federal Circuit's Application of its Erroneous Teaching-Away Test in the Below Appeal**

### **A. The Technology at Issue**

The below appeal to the Federal Circuit came after the Patent Trial and Appeal Board ("Board") entered a final decision in an *inter partes* review (IPR) initiated by Respondents. App. 2a. The IPR challenged eight claims of the Petitioner's U.S. Patent No. 7,626,349 ("the '349 patent"). App. 2a. The '349 patent relates to improvements in controlling a permanent magnet (PM) motor used in a heating, ventilating, and air conditioning (HVAC) system.

A0051 Col. 1:38-44.<sup>1</sup> The '349 patent explains that PM motors generally include a stationary component (stator) and a rotating component (rotor). A0052 Col. 3:14-16. The rotor includes a permanent magnet and the stator includes multiple phase windings that, when electrically charged, form electromagnets. A0052 Col. 3:17-22. A controller thus commutates—i.e., energizes in a particular sequence—currents among the phase windings to create a rotating magnetic field, which causes the PM rotor to rotate. A0051 Col. 1:37-47.

Prior to the '349 patent's invention, HVAC systems employed square-wave, or "6-step," commutation to energize the phase windings. A0051 Col. 1:30-33. In 6-step commutation, a motor controller applies a positive voltage to one of three phase windings, applies a negative voltage to a second, and leaves the third unenergized. A0051 Col. 1:37-43. The motor controller then sequentially (and abruptly) rotates the positive and negative voltages among the phase windings to create the rotating magnetic field that causes the PM rotor to rotate and drive an air-moving component. A0051 Col. 1:43-47. This abrupt switching results in discontinuous phase currents, high torque cogging and torque ripple, and vibrations that are amplified through the duct system. A0051 Col. 1:51-61. These prior-art HVAC systems thus required mechanical dampers to address the unwanted vibrations and noise. A0051 Col. 1:64-67.

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<sup>1</sup> For convenience, "A\_\_\_\_" citations are provided for material contained in the Joint Appendix at the Federal Circuit.

The '349 patent's invention, in contrast, uses sophisticated sinewave-commutation techniques such that the motor operates with reduced torque cogging and torque ripple, resulting in quieter operation and eliminating the need for mechanical dampers. *See* A0053. Sinewave commutation as implemented in the '349 patent uses a principle known as vector control to produce continuous phase currents in the windings of the stator such that there are no abrupt changes in the voltages among the phase windings, thus reducing unwanted torque ripple and torque cogging. *See* A0052 Col. 4:3-29. But motors implementing sinewave commutation and vector-control techniques employ math-intensive calculations that require complex hardware, such as a digital signal processor (DSP), to continually commutate the winding currents as the rotor turns so that a magnetic field formed by the stators remains orthogonal to the magnetic field formed by the PM rotor. A0744 Col. 1:51-56. Thus, the HVAC systems of the '349 patent's invention necessitated higher functioning controllers and other hardware components compared to its prior-art counterparts. A0744 Col. 1:41-56.

## **B. The Prior Art**

None of the prior art asserted under § 103 in the IPR teaches or suggests the use of sinewave commutation or vector-control techniques in an HVAC system. Nonetheless, Respondents contended that the claims were obvious in view of the combination of a prior-art patent (U.S. Patent No. 5,410,230) issued to Bessler, and a doctoral thesis canvassing control schemes used for brushless motors authored by Kocybik. A0115. Bessler describes an HVAC control scheme making no mention of sinewave commutation;



quite the opposite, as Bessler stated that its principal aim was to create a simple and low-cost HVAC system directly responsive to a cyclic on/off temperature signal provided by a thermostat. A0222 Cols. 1:15 to 2:15. In this regard, Bessler provided that certain components from prior-art HVAC control systems, including a system controller, should be *eliminated*. A0222 Col. 2:3-10. Notably, all eight challenged claims of the '349 patent expressly recite a system controller. A0053. Moreover, in order to employ sinewave commutation in Bessler's system, a skilled artisan would have had to completely ignore Bessler's express teaching of simplifying an HVAC system by eliminating such a controller, and instead outfit Bessler with more powerful hardware and controllers such as a DSP or the like capable of performing sinewave commutation and vector-control techniques. *Compare* A0222 Cols. 1:15 to 2:15, *with* A0744 Col. 1:41-56.

For its part, Kocybik demonstrates that at the time of the '349 patent's invention those skilled in the art would not have looked to sinewave commutation as a viable control scheme for HVAC applications. Kocybik compares the use of rectangular current pulses (i.e., 6-step commutation) in "brushless dc motors," with sinewave commutation in "brushless ac motors." A0262-63. Notably, Kocybik never mentions the use of sinewave commutation in connection with an HVAC system or similar applications. Instead, due to the "high bandwidth current control" necessary to implement sinewave commutation, Kocybik explains that sinewave commutation is best suited for high-precision control tasks. A0263. No one disputes that HVAC control is not a high-precision control task. Instead, the examples provided by Kocybik include

high-accuracy machine tools, robotic arms, aerospace applications, and hybrid cars. A0249, A0265-66. Indeed, Respondents' own expert suggested the inventors of the '349 patent had elected to "kill a fly with a sledge hammer" when employing vector-control techniques with HVAC systems, suggesting to this day their invention is against the common understanding of one of ordinary, or even extraordinary, skill in the art. A0633-34.

Petitioner cited to another contemporaneous reference, U.S. Patent No. 6,498,449 to Chen, as evidence of the common wisdom teaching away from using vector control and sinewave commutation because of the hardware requirements. Namely, Chen notes that vector-control techniques (such as claimed in the '349 patent) require "a complex controller for digital implementation" and thus "a high speed processor such as a digital signal processor (DSP) ha[d] to be used" to implement such techniques. A0744, Col. 1:38-56. Chen went on to stress the desirability of eliminating such vector-control calculations in order to "reduce[] the software computation needs" so that a "low cost microprocessor may be used . . . instead of the DSPs of the prior art." A0744, Col. 2:2-8. Thus, Chen evinced and confirmed an understanding in the prior art that simplifying control schemes and reducing hardware complexity away from vector-control sinewave commutation was preferable.

### **C. The Federal Circuit's Decision**

Respondents nevertheless contended before the Board, and then on appeal at the Federal Circuit, that it would have been obvious to not only ignore Bessler's

teaching to eliminate a system controller and/or other microcontrollers from its control system, but then in turn to outfit Bessler with an even more sophisticated controller and hardware such that it could implement the exotic sinewave-commutation techniques described in Kocybik to arrive at the claimed invention.

Petitioner countered that the prior art teaches away from the purported combination because one of Bessler's principal aims was "to provide a central heating, air conditioning and ventilating system *which does not require a system controller*," and because Bessler repeatedly emphasized the desire to *simplify* HVAC control systems. A0222 Cols. 1:15 to 2:15 (emphasis added). Kocybik further evidenced that one skilled in the art would not look to sinewave commutation for HVAC applications, but instead that skilled artisans reserved such bandwidth-intensive control schemes for high-precision control tasks. A0249, A0262-63, A0265-66. And Chen confirmed the common wisdom that vector-control techniques should be avoided in order to eliminate high-speed processors such as DSPs, which are otherwise necessary to implement sinewave commutation. A0744, Cols. 1:38-56, 2:2-8.

But the Federal Circuit sided with Respondents, agreeing that in light of its "criticize, discredit, or otherwise discourage" test, Bessler does not teach away from incorporating the sophisticated control techniques of Kocybik into its HVAC control system. App. 9a-10a. The Federal Circuit's application of that test below is emblematic of the court's rigid and formulaic application of the teaching-away analysis:

There is nothing in Bessler that “criticize[s], discredit[s], or otherwise discourage[s]” the use of sinewave commutation in HVAC systems. As Nidec has conceded, *Bessler does not even mention sinewave commutation*. Instead, Bessler states only that “[i]t is an object of this invention to provide a central [HVAC] system which does not require a system controller.” This statement does not teach away from sinewave commutation.

App. 9a-10a (alterations in original) (emphasis added) (citations omitted).

Thus, the Federal Circuit was presented with a proposed combination with the primary reference evidencing the industry trend to simplify HVAC systems by eliminating components such as system controllers or microcontrollers previously used to produce control signals, and with the secondary reference evidencing that bandwidth-intensive, sinewave-commutation control schemes were best suited for exotic precision control tasks such as high-accuracy machine tools, robotic arms, aerospace applications, and hybrid cars. *See* A0222, A0249, A0265-66. Furthermore, the Federal Circuit had the Chen reference confirming that avoiding vector control sinewave commutation leads to simplification of algorithms and hardware. A0744, Cols. 1:38-56, 2:2-8. Nonetheless, handcuffed by its onerous “criticize, discredit, or otherwise discourage” test, the Federal Circuit’s blinkered approach prevented the panel from considering the full scope of and natural conclusion of these combined teachings and found the references

combinable simply because Bessler “d[id] not even mention sinewave commutation” and thus did not teach away from the use thereof. App. 9a-10a. By any reasonable application of this Court’s precedents, the Federal Circuit erred, and will continue to do so as long as the “criticize, discredit, or otherwise discourage” standard prevails.

### **REASONS FOR GRANTING THE PETITION**

The Federal Circuit’s summary dismissal of a patentee’s teaching-away argument under the rationale that such teachings do not expressly “criticize, discredit, or otherwise discourage” the proposed combination is in conflict with this Court’s and the other Courts of Appeals’ precedent, and cannot be squared with § 103. Although the Court has instructed the Federal Circuit to engage in *expansive and flexible* obviousness determinations, the Federal Circuit has contracted and rigidified the “teaching-away” analysis by creating and then mechanically applying the “criticize, discredit, or otherwise discourage” test, thus ignoring the full scope of the prior art. Unless this Court intervenes, the Federal Circuit will not fully engage in expansive and flexible obviousness determinations that stay true to the principles laid out in *KSR*, *Adams*, and *Graham*, and this case is a good vehicle for the Court to do so.

#### **I. The Federal Circuit’s “Criticize, Discredit, or Otherwise Discourage” Test Conflicts with this Court’s Precedent**

The petition should be granted because the Federal Circuit’s teaching-away test applied below conflicts with the Court’s principles laid out in

*Graham, Adams, and KSR*. First, in *Graham* the Court established the baseline obviousness inquiry:

Under § 103, 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. Such secondary considerations as commercial success, long felt but unsolved needs, failure of others, etc., might be utilized to give light to the circumstances surrounding the origin of the subject matter sought to be patented. As indicia of obviousness or nonobviousness, these inquiries may have relevancy.

383 U.S. at 17-18.

On the same day, the Court in *Adams* described how courts should apply these principles in light of prior-art references that lead a person having ordinary skill in the art away from a purported combination, explaining that “*known* disadvantages in old devices which would *naturally* discourage the search for new inventions may be taken into account in determining obviousness.” 383 U.S. at 52 (emphasis added).

Notably, nothing in *Graham* and *Adams* advocated for a rigid teaching-away inquiry, one that requires the prior-art reference to *expressly* discuss and disparage a claimed feature before it can be said

to teach away from the purported combination. Indeed, a teaching that “naturally” follows from what is known by definition does not require an express statement. *See id.* Instead, *Graham* and *Adams* stand for the fundamental principle that in determining whether an inventor has made the necessary step entitling her to a patent, courts must consider the state of the art at the time of the invention, which necessarily includes “disadvantages in old devices” that may discourage a person having ordinary skill in the art from making the relevant discovery.

In contrast, in *Fulton* and its progeny, the Federal Circuit closes its eyes to any teachings of the prior art that naturally lead away from the purported combination unless the prior-art reference specifically mentions the element in question and then disparages the combination therewith. The Federal Circuit thus trips out of the gate, failing to hold true to even *Graham*’s first mandate to determine the full “scope and content of the prior art.” 383 U.S. at 17. By ignoring whole portions of the prior art—i.e., its negative teachings that fail to meet the onerous “criticize, discredit, or otherwise discourage” test—the Federal Circuit forecloses a meaningful review of the body of art available to a person of ordinary skill at the time of invention.

The patentability analysis in *Adams* shows just how far the Federal Circuit has strayed from the expansive and flexible path the Court charted. There, the prior art suggested that a person of ordinary skill would have thought the inventor’s wet battery “w[as] not practical” and would not be “successful.” 383 U.S. at 52. Thus, the Court found the claims patentable, even though the elements needed to arrive at the

battery in question were otherwise well-known. *Id.* The Court did not point to a teaching-away statement in any of the relied-on references, but instead noted that the “long-accepted factors” in the art would “deter investigation into such a combination as is used by Adams.” *Id.* Had the Court adopted the “criticize, discredit, or otherwise discourage” test, the invention in *Adams* never could have satisfied it.

More recently, this Court in *KSR* cited *Graham* and *Adams* in eschewing any rigid and formulaic obviousness analyses, and the Federal Circuit’s teaching-away test further conflicts with that holding. In *KSR*, the Federal Circuit upheld the validity of a patent directed to an adjustable automobile pedal with an electronic throttle control, even though the prior art included both those components, albeit not in combination. 550 U.S. at 406-09. The combination would not have been obvious, the Federal Circuit explained, in light of its oft-applied TSM test: namely, “a patent claim is only proved obvious if ‘some motivation or suggestion to combine the prior art teachings’ can be found in the prior art, the nature of the problem, or the knowledge of a person having ordinary skill in the art.” *Id.* at 407 (quoting *Al-Site Corp. v. VSI Int’l, Inc.*, 174 F.3d 1308, 1323-24 (Fed. Cir. 1999)). And because there was no express teaching, suggestion, or motivation in the prior art for making the proposed combination, the Federal Circuit concluded that such a combination would not have been obvious. *Id.*

This Court granted certiorari and reversed, holding that the TSM test was contrary to § 103 and the Court’s precedents. *Id.* The Court began by explaining that the TSM test resulted in too rigid an



inquiry, noting that “[t]hroughout this Court’s engagement with the question of obviousness, our cases have set forth an expansive and flexible approach inconsistent with the way the Court of Appeals applied its TSM test here.” *Id.* at 415. *Graham*, the Court continued, “set forth a broad inquiry, and invited courts, where appropriate, to look at any secondary considerations that would prove instructive.” *Id.* at 416.

The Court then pointed to *Adams* as one case “illustrat[ing] the application of [*Graham*’s] doctrine”:

The Court [in *Adams*] recognized that when a patent claims a structure already known in the prior art that is altered by the mere substitution of one element for another known in the field, the combination must do more than yield a predictable result. It nevertheless rejected the Government’s claim that *Adams*’ battery was obvious. The Court relied upon the corollary principle that when the prior art teaches away from combining certain known elements, discovery of a successful means of combining them is more likely to be nonobvious.

*Id.*

The Court ultimately concluded that although the TSM test may have been a “helpful insight” when originally established, it was incompatible with § 103:

Helpful insights, however, need not become rigid and mandatory formulas; and when it is so applied, the TSM test is incompatible with our precedents. The obviousness analysis cannot be confined by a formalistic conception of the words teaching, suggestion, and motivation, or by overemphasis on the importance of published articles and the explicit content of issued patents.

*Id.* at 419.

The Federal Circuit’s “criticize, discredit, or otherwise discourage” test has traveled a similar path from helpful insight to rigid, mandatory formula. Accordingly, it cannot be squared with *KSR*. First, by reducing the teaching-away inquiry to a formal test that is nearly impossible to satisfy, the Federal Circuit is ignoring the “corollary principle” laid down in *Adams* and recognized in *KSR*—i.e., “when the prior art teaches away from combining certain known elements, discovery of a successful means of combining them is more likely to be nonobvious.” *See id.* at 416. Second, just as the TSM test did in *KSR*, the Federal Circuit’s “rigid and mandatory” formula that requires some teaching-away statement—i.e., some express disparagement of a proposed combination before the court will consider a teaching-away argument—places an “overemphasis on the importance of published articles and the explicit content of issued patents.” *See id.* at 419. Instead, the court should more broadly be focusing on the known disadvantages in the prior art that may otherwise lead a skilled artisan away from the proposed combination. Thus, by failing to consider the entire

state of the art as known to a person having ordinary skill in the art at the time of an invention, including the prevailing notions leading one away from a purported invention, the Federal Circuit is not holding true to this Court's § 103 precedents.

## **II. The Federal Circuit's "Criticize, Discredit, or Otherwise Discourage" Test Conflicts with the Decisions of the Other Courts of Appeals**

Moreover, the Federal Circuit's test conflicts with the principles laid out by the other Courts of Appeals. Following *Adams*, the Courts of Appeals routinely considered the teachings of the prior art that would lead a person having ordinary skill in the art away from the purported combination when conducting an expansive § 103 inquiry. Under those circuits' jurisprudence, Petitioner's teaching-away argument would be both relevant and cogent.

Three exemplary decisions illustrate the conflict between the Federal Circuit's approach and that taken by the other Courts of Appeals. First, in *Shaw v. E.B. & A.C. Whiting Co.*, the Second Circuit reviewed a district court decision that invalidated as obvious a patent directed to an artificial filament. 417 F.2d at 1099. The patent-in-issue comprised a linearly oriented filament with a uniform, cruciform-shaped cross-section along its length. *Id.* The prior art included (1) references describing linearly oriented filaments with rounded or oval cross-sections, and (2) references disclosing that filaments could be given various cross-sections such as star shapes by passing the filament through a die, but which did not indicate that such filaments could be linearly oriented. *Id.* at

1100-01. Nevertheless, the district court found the patent obvious in light of a combination of the several references. *Id.* at 1098.

The Second Circuit reversed after concluding that the district court failed to resolve the factual inquiries required by *Graham*. *Id.* at 1103. Namely, the prior-art reference in question explained that its use of a die to impart a desired cross-section (e.g., star shape) on a filament resulted in limited distortion, such that the filament could only approach being the desired shape. *Id.* at 1104. The Second Circuit explained that the reference therefore taught away from its use to form a filament with a uniform, cruciform-shaped cross-section. *Id.* Citing to *Adams*, the court concluded that the patent was not obvious, because “[r]ather than serving to point the way to innovation, therefore, [the prior arts’] teachings would tend to discourage one skilled in the art from investigating the methods ultimately used by Shaw to achieve production of an improved polymer filament.” *Id.* Notably, the prior art did not mention a cruciform-shaped filament, or expressly disparage the use thereof.

Similarly, here Bessler “would tend to discourage one skilled in the art from investigating the methods ultimately used by [the ’349 patent] to achieve” HVAC control, because Bessler repeatedly stressed reducing the complexity of HVAC control systems and eliminating certain components such as a system controller. *See id.* Chen only confirms that one of skill would know vector control sinewave commutation increases complexity and cost in control systems, the opposite of Bessler’s goal for HVAC control. Kocybik would further lead a skilled artisan astray because it discussed the use of sinewave commutation only in

connection with high-bandwidth applications requiring precision control. The Federal Circuit's refusal to consider such teachings simply because Bessler "did not even mention sinewave commutation" conflicts with the teaching-away principles employed at the Second Circuit. *See* App. 9a-10a.

In *CMI Corp. v. Metropolitan Enterprises, Inc.*, the Tenth Circuit reviewed the validity of a patent directed to a process for loading granular material varying in particle size into bins in the form of slugs so that larger particles were not segregated from smaller ones. 534 F.2d at 875. An accused infringer asserted the patent was obvious and thus invalid in light of a prior-art patent that generally described the concept of intermediate feeding of asphalt hotmix to inhibit segregation, albeit by using a falling stream rather than a slug formation. *Id.* at 878-79.

The Tenth Circuit concluded that the prior-art patent did not render the claimed invention obvious. Although the claimed process "d[id] not appear complex," the Tenth Circuit explained that the process was nonetheless inventive in light of the conventional beliefs at the time of the invention. *Id.* at 880. Notably, the prior art did not discuss or disparage the use of a slug as claimed in the patent. Nonetheless, the Tenth Circuit explained that the prior art "as a whole contain[ed] teachings that [were] opposed to the principles employed in the [claimed] process," and thus the claims were not obvious. *Id.* "When teachings in a prior art patent must be ignored in order to reach a desired result," the court explained, "they become less pertinent to the determination of obviousness." *Id.*

Similarly, although Bessler did not discuss sinewave commutation at all (just as the prior-art patent in *CMI* did not discuss slugs), the prior art “as a whole,” including, Bessler, Chen, and Kocybik, “contain[ed] teachings that [were] opposed to the principles employed in the [claimed] process” because the art advocated for reducing the complexity of HVAC control systems, including by eliminating system controllers or microprocessors necessary to generate control signals. *See id.* Only by “ignor[ing]” such teachings could one arrive at the invention claimed in the ’349 patent, compelling the conclusion that Bessler does not render the claims obviousness. *See id.*

In *Santa Fe-Pomeroy, Inc. v. P & Z Co.*, the Ninth Circuit considered an obviousness challenge to a patent claiming a process for constructing a watertight, subterranean foundation wall. 569 F.2d at 1087. The claimed process used a series of rectilinear slabs formed of tremie poured concrete interlocked with a series of steel H beams. *Id.* at 1088-89. The pertinent prior art included (1) a patent directed to a subterranean wall that differed from the claimed invention only in that it used conventionally poured concrete, rather than tremie poured concrete, (2) a patent directed to a process that used overlapping, circular concrete columns rather than rectilinear slabs, and (3) a patent directed to a cut-off wall that used rectilinear slabs of concrete interlocked with a series of circular concrete pilings. *Id.* at 1089-90.

Although the Ninth Circuit “noted that subterranean wall construction methods constitute a well developed field of art” and that “[t]he basic elements have been ‘combined in almost every

conceivable manner,” the court nonetheless concluded that the claimed process was nonobvious. *Id.* at 1094 (citation omitted). Citing to *Adams*, the court explained that the prior art would have led a skilled artisan away from the claimed invention because the state of the art demonstrated that a skilled artisan would have expressed “conservative hesitancy about the practicality of” using steel and concrete in combination, and thus “[t]he known disadvantages of such a combination would discourage a person with ordinary skill in the art from searching into solutions involving it.” *Id.* at 1097.

So too here, the known disadvantages of using complex hardware and controllers for HVAC control would have discouraged a person having ordinary skill in the art “from searching into solutions involving” even more complex control schemes—namely, sinewave commutation using vector-control techniques. *See id.* In addition to Bessler’s express instruction to eliminate a system controller and/or other microcontrollers, Chen expressly stressed the desirability of eliminating such vector-control calculations so that a “low cost microprocessor may be used . . . instead of the DSPs of the prior art.” A0744, Col. 2:2-8. Nonetheless, the Federal Circuit refused to consider such “known disadvantages,” simply because Bessler did not expressly mention, and thus disparage, sinewave commutation.

In sum, the other Courts of Appeals did not require some express disparagement of the purported combination before they considered a teaching-away argument as part of their robust patentability determinations. Instead, and staying true to *Adams*, the Courts of Appeals broadly considered where the

prior art would have led a person having ordinary skill in the art at the time of the invention, including the negative teachings thereof. These decisions emphasize that the body of art available to a person having ordinary skill in the art at the time of the invention must be considered as a whole—including any teachings that “would tend to discourage one skilled in the art from investigating the methods” claimed, *Shaw*, 417 F.2d at 1104, or that “must be ignored in order to reach a desired result,” *CMI*, 534 F.2d at 880, or that would “discourage a person with ordinary skill in the art from searching into solutions involving” the claimed combination, *Santa Fe-Pomeroy*, 569 F.2d at 1097. The Federal Circuit’s “criticize, discredit, or otherwise discourage” test, in contrast, which as demonstrated in the below decision forecloses any consideration of the negative teachings of the prior art unless a reference expressly “mention[s]” and in turn disparages the missing element, departs from the expansive and flexible approach taken by the other Courts of Appeals in light of *Adams*. See App. 9a-10a.

### **III. The Patent Office Has Adopted the Federal Circuit’s Test, and Thus Every Patent Application is Potentially Subject to this Erroneous Standard**

The Federal Circuit’s erroneous test affects not just those patents whose validity is ultimately challenged, but also potentially every patent application as it progresses through examination. Because the Federal Circuit has exclusive jurisdiction over patent appeals and thus represents the last word on most substantive patent issues, it is almost always Federal Circuit law that governs examination of



patent applications. It is no surprise, then, that the Federal Circuit’s “criticize, discredit, or otherwise discourage” test is now memorialized in the Patent Office’s Manual of Patent Examining Procedure (MPEP) as the test that should govern teaching-away arguments advanced during examination.

In section 2141, titled “Examination Guidelines for Determining Obviousness Under 35 U.S.C. 103,” the MPEP expressly recognizes that examiners must consider the prior art in its entirety, including disclosures that teach away from the claimed subject matter. MPEP § 2141.02(VI). The MPEP then quotes the Federal Circuit’s onerous test, explaining that “the prior art’s mere disclosure of more than one alternative does not constitute a teaching away from any of these alternatives because such disclosure does not criticize, discredit, or otherwise discourage the solution claimed.” *Id.* (quoting *Fulton*, 391 F.3d at 1201). As a result, the Federal Circuit’s erroneous test has become the benchmark applied by examiners during patent prosecution.

And, as at least one commentator has recognized, the Patent Office’s application of this test is essentially outcome determinative. Namely, an author of a 2017 article in the *Journal of the Patent and Trademark Office Society* presented his findings regarding the success of what he labeled “anti-obviousness” arguments at the Patent Office, which includes teaching-away arguments. See Tom Brody, *Rebutting Obviousness Rejections By Way of Anti-Obviousness Case Law*, 99 J. Pat. & Trademark Off. Soc’y 192 (2017). As part of his study, the author reviewed Board decisions that (1) referenced both teaching away and *In re Sponnoble*, 405 F.2d 578

(C.C.P.A. 1969)—a Court of Customs and Patent Appeals case that generally acknowledged the teaching-away principle but that did not otherwise put forth a rigid teaching-away test—or that (2) referenced both teaching away and *Depuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 567 F.3d 1314 (Fed. Cir. 2009)—a Federal Circuit case that cites to and applies *Fulton*’s “criticize, discredit, or otherwise discourage” language.<sup>2</sup> See Brody, *supra*, at 198 n.47.

After his review, the author concluded that when the Board cited to *Sponnoble*, it often credited the applicant’s teaching-away argument, and when the Board cited to *Depuy* and its recitation of the “criticize, discredit, or otherwise discourage,” it often rejected the applicant’s teaching-away argument. *Id.* at 198. Thus, not only has the Patent Office expressly adopted “criticize, discredit, or otherwise discourage” as the test to be applied during examination, but the Board also applies the test in an essentially outcome-determinative manner. *See id.* Without this Court’s intervention, patents for otherwise inventive concepts will continue to be denied at the Patent Office in light of this nearly impossible-to-satisfy teaching-away standard.

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<sup>2</sup> Perhaps because the lone sentence in *Fulton* does not cite any authority in support of the assertion that the prior art must “criticize, discredit, or otherwise discourage” the proposed combination in order to teach away, *Depuy*—which in turn relies on *Fulton*—is instead often cited in the Board’s and courts’ decisions that quote the test. Presumably, this is why the author chose *Depuy*, rather than *Fulton*, for his search string.

#### **IV. This Case is a Good Vehicle to Review the Federal Circuit’s Onerous “Criticize, Discredit, or Otherwise Discourage” Test**

The body of prior art before the Federal Circuit below provides clear teachings that would lead a person having ordinary skill in the art away from the purported combination. Yet even here the Petitioner’s arguments were ignored in light of the Federal Circuit’s test.

Bessler could not be clearer: “It is an object of this invention to provide a central heating, air conditioning and ventilating system which does not require a system controller.” A0222 Col. 2:3-5. In contrast, all the challenged claims in the IPR below expressly require a system controller. A0053. Bessler continues: “It is still another object of this invention to provide a central heating, air conditioning and ventilating system which is responsive to a cyclic parameter of a temperature signal generated by a conventional thermostat.” A0222 Col. 2:6-10. An HVAC system employing sinewave commutation, on the other hand, could not be simply responsive to “a cyclic parameter of a temperature signal,” but instead requires high-functioning hardware necessary to implement vector-control techniques and generate the corresponding complex control signals. *See* A0744 Col. 1:51-56. Chen’s teachings emphasize the algorithmic and hardware complexity introduced by vector control sinewave commutation. A0744, Cols. 1:38-56, 2:2-8. Kocybik confirms that such bandwidth-intensive control schemes are thus best suited for high-precision control tasks including high-accuracy machine tools, robotic arms, aerospace applications, and hybrid cars. A0249, A0262-63, A0265-66. The court below

determined Kocybik does not “limit” sinewave commutation to “high precision control tasks,” again seeking an express statement of discouragement and ignoring the natural import of its teaching that such control schemes be reserved for high precision control tasks. *See* App. 8a. In its opinion, the court below wholly failed to address Chen, which confirmed the teaching of the art to simplify hardware and software complexity and avoid vector-control sinewave commutation. *See* A0744, Cols. 1:38-56, 2:2-8. Thus, the Federal Circuit failed to consider the full “scope and content of the prior art” as this Court mandates. *See Graham*, 383 U.S. at 17-18.

If, as the court below held, the teachings of the art here cannot satisfy the Federal Circuit’s teaching-away standards simply because the principal reference “does not even mention sinewave commutation,” it is clear that the Federal Circuit has abandoned the inquiry mandated by this Court seeking to determine whether the prior art naturally discourages the claimed invention. *See* App. 9a-10a. The issue is ripe for this Court to consider, and this case thus presents an ideal vehicle for doing so.

**V. If the Court in *Oil States* Ultimately Concludes that IPR Proceedings Are Unconstitutional, the Court Should Grant this Petition and Remand**

Finally, in its forthcoming *Oil States* decision, the Court will address whether IPR proceedings, such as the one used to invalidate the ’349 patent, violate the Seventh Amendment of the U.S. Constitution because such proceedings extinguish private property rights through a non-Article III forum without a jury. *See*

U.S. Const. amend. VII (“In suits at common law, where the value in controversy shall exceed twenty dollars, the right of trial by jury shall be preserved, and no fact tried by a jury, shall be otherwise reexamined in any court of the United States, than according to the rules of the common law.”). Thus, Petitioner respectfully requests that the Court, at a minimum, hold this petition until *Oil States* is decided. If the Court in *Oil States* ultimately concludes that IPR proceedings are unconstitutional, the petition should be granted on that basis alone, with the Federal Circuit’s decision vacated accordingly and the case remanded for further proceedings.

### CONCLUSION

For the foregoing reasons, the petition for a writ of certiorari should be granted.

Respectfully submitted,

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## **APPENDIX**

1a

**APPENDIX A — OPINION OF THE UNITED  
STATES COURT OF APPEALS FOR THE  
FEDERAL CIRCUIT, FILED AUGUST 22, 2017**

UNITED STATES COURT OF APPEALS  
FOR THE FEDERAL CIRCUIT

2016-2321

NIDEC MOTOR CORPORATION,

*Appellant,*

v.

ZHONGSHAN BROAD OCEAN MOTOR CO. LTD.,  
BROAD OCEAN MOTOR LLC, BROAD OCEAN  
TECHNOLOGIES LLC,

*Appellees,*

JOSEPH MATAL, PERFORMING THE  
FUNCTIONS AND DUTIES OF THE  
UNDER SECRETARY OF COMMERCE FOR  
INTELLECTUAL PROPERTY AND DIRECTOR,  
U.S. PATENT AND TRADEMARK OFFICE,

*Intervenor*

Appeal from the United States Patent and Trademark  
Office, Patent Trial and Appeal Board in Nos. IPR2014-  
01121, IPR2015-00762.

*Appendix A*

Decided: August 22, 2017

Before DYK, REYNA, and WALLACH, *Circuit Judges*.

Opinion for the court filed PER CURIAM.

Concurring opinion filed by *Circuit Judge* DYK,  
in which *Circuit Judge* WALLACH joins.

PER CURIAM.

Nidec Motor Corporation (“Nidec”) appeals a final written decision of the Patent Trial and Appeal Board (“Board”) in an *inter partes* review (“IPR”). The Board determined that claims 1-3, 8, 9, 12, 16, and 19 of U.S. Patent No. 7,626,349 (the “’394 Patent”) are invalid as anticipated or obvious. We affirm.

BACKGROUND

Appellant Nidec owns the ’394 patent, which is directed to low-noise heating, ventilating, and air conditioning (“HVAC”) systems. The patented HVAC system includes a permanent magnet electric motor that turns a fan in order to move air through ductwork. As compared to conventional HVAC systems, the invention achieves quieter operation of the motor due to improvements in the motor controller. Specifically, the improved motor controller performs sinewave commutation instead of more conventional square-wave commutation. Commutation refers generally to the repeated sequencing of electrical currents applied to windings within the permanent



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magnet motor that causes the motor to rotate. Square-wave commutation involves abrupt changes in the voltage applied to a given winding as the sequence progresses, similar to repeatedly flipping a switch between three voltage states: positive, zero, and negative. Sinewave commutation, by contrast, involves more gradual and continuous oscillations in applied voltage, similar to sliding a dimmer switch between those states. As compared to square-wave commutation, sinewave commutation results in less vibration and noise generated from the electric motor.

Appellees Zhongshan Broad Ocean Motor Co., Ltd.; Broad Ocean Motor LLC; and Broad Ocean Technologies, LLC (collectively, “Broad Ocean”) filed an IPR petition challenging claims 1-3, 8, 9, 12, 16, and 19 of the ’394 patent (the “challenged claims”). In a revised petition (“First Petition”), Broad Ocean asserted that the challenged claims are invalid as obvious over the combination of U.S. Patent No. 5,410,230 (“Bessler”) and a published doctoral thesis by Peter Franz Kocybik (“Kocybik”). Broad Ocean also asserted that the challenged claims are invalid as anticipated by Japanese Patent Publication JP 2003-348885 (“Hideji”).

On January 21, 2015, the Board instituted review on the ground of obviousness over Bessler and Kocybik. The Board declined to institute review on the ground of anticipation by Hideji, however, because Broad Ocean had failed to provide an affidavit attesting to the accuracy of the submitted translation of Hideji as required by 37 C.F.R. § 42.63(b).

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About a month later, Broad Ocean filed a second petition for IPR (“Second Petition”), again asserting that the challenged claims are anticipated by Hideji. This time, Broad Ocean included the required affidavit. At the same time, Broad Ocean requested that the Board join the Second Petition with Broad Ocean’s already-instituted IPR involving the First Petition pursuant to 35 U.S.C. § 315(c) (allowing for joinder in an IPR at the discretion of the Director of the United States Patent and Trademark Office (“Director”)).

On July 20, 2015, a panel of three Administrative Patent Judges again declined to institute review on the ground that Hideji anticipates. The panel majority determined that Broad Ocean had been served with a complaint alleging infringement of the ’394 patent on September 25, 2013—more than one year before Broad Ocean filed the Second Petition—and, therefore, the Second Petition was time barred under 35 U.S.C. § 315(b). The majority further held that the exception to the time bar for requests for joinder under 35 U.S.C. § 315(b), (c), did not apply here because, according to the majority’s interpretation, the joinder provision does not permit a party to join issues to a proceeding to which it is already a party.

Broad Ocean requested a rehearing of the panel’s decision, which was granted by an expanded panel of five Administrative Patent Judges. The expanded administrative panel set aside the original panel’s decision and concluded that

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§ 315(c) permits the joinder of any person who properly files a petition under § 311, including a petitioner who is already a party to the earlier instituted [IPR]. We also conclude that § 315(c) en-compasses both party joinder and issue joinder, and, as such, permits joinder of issues, including new grounds of unpatentability, presented in the petition that accompanies the request for joinder.

J.A. 936 (citations omitted). Having determined that the joinder provision is broad enough to permit joinder with respect to the Second Petition, the expanded panel instituted review of the Second Petition and granted Broad Ocean's request to join the proceeding with the earlier-instituted IPR.

On May 9, 2016, the Board, consisting of the expanded panel, issued a Final Written Decision in the joined proceedings. The Board determined that all of the challenged claims are unpatentable under 35 U.S.C. § 103 as obvious over Bessler and Kocybik and that all of the challenged claims are unpatentable under 35 U.S.C. § 102 as anticipated by Hideji.

Nidec appealed the Board's joinder decision as well as the Board's conclusions as to obviousness and anticipation. Broad Ocean responded, and the Director intervened to support the Board's joinder decision. We have jurisdiction pursuant to 28 U.S.C. § 1295(a)(4)(A).

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## DISCUSSION

We review the Board's legal conclusions de novo and its factual findings for substantial evidence. *In re Affinity Labs of Tex., LLC*, 856 F.3d 883, 889 (Fed. Cir. 2017).

## I

Both Broad Ocean and the Director argue that the Board properly applied the joinder and time bar statutes to allow joinder and institution in this case. Nidec disagrees. We need not resolve this dispute. Nor need we address the Director's and Broad Ocean's arguments that the Board's joinder determination is non-appealable in light of 35 U.S.C. § 314(d)'s bar of judicial review for institution decisions or Nidec's argument that the Board's practice of expanding panels violates due process. For the reasons set forth below, we affirm the Board's conclusion that all of the challenged claims are unpatentable as obvious over Bessler and Kocybik. Because there is no dispute that Broad Ocean timely filed the First Petition (containing the obviousness ground), the issues on appeal relating only to the Board's joinder determination as to anticipation ultimately do not affect the outcome of this case. Both parties agree that, if we affirm as to obviousness, we need not address Nidec's argument that various procedural aspects of the Board's joinder decision require reversal of its holding concerning anticipation by Hideji. *See* Oral Arg. at 1:28-2:33 (June 8, 2017), *available at* <http://oralarguments.cafc.uscourts.gov/default.aspx?fl=2016-2321.mp3> (Nidec agreeing that we need not address the anticipation ground based on Hideji in any respect if we

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determine that the Board was correct in its obviousness determination under Bessler and Kocybik).

## II

Nidec argues that the Board erred in concluding that the challenged claims would have been obvious to a person of ordinary skill in the art based on the combination of Bessler and Kocybik. Obviousness is a question of law based on underlying questions of fact. *Belden Inc. v. Berk-Tek LLC*, 805 F.3d 1064, 1073 (Fed. Cir. 2015).

Nidec submits that claim 1 is representative of the independent claims at issue, and Nidec does not raise patentability arguments that are specific to any dependent claims. Claim 1 is reproduced below:

1. A heating, ventilating and/or air conditioning (HVAC) system comprising a system controller, a motor controller, an air-moving component, and a permanent magnet motor having a stationary assembly, a rotatable assembly in magnetic coupling relation to the stationary assembly, and a shaft coupled to the air-moving component, wherein the motor controller is configured for performing sinewave commutation, using independent values of Q and d axis currents, in response to one or more control signals received from the system controller to produce continuous phase currents in the permanent magnet motor for driving the air-moving component.

'394 Patent, col. 5 ll. 34-45.

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Nidec does not appear to dispute that the claimed elements are described in the prior art. In general, Bessler describes an HVAC system that includes a thermostat, a motor controller (or microprocessor), and an electronically commutated motor that turns a fan (or a “blower ECM motor”). *See, e.g.*, J.A. 223, col. 4 ll. 35-68 (thermostat); *id.* col. 5 ll. 45-48 (microprocessor); *id.* col. 5 l. 23 (blower ECM motor). Bessler does not describe the claimed sinewave commutation or the use of independent Q and d axis currents. However, the Board determined—and Nidec does not dispute—that Kocybik describes sinewave commutation as well as the use of independent Q and d axis currents in electric motors, although Kocybik does not mention HVAC systems. And Kocybik does not limit the application of such commutation to “high precision control tasks,” as Nidec contends. Nidec Reply Br. 7.

The Board determined that “a person of ordinary skill in the art would have effected the combination proposed”—“configuring the system of Bessler to perform sinewave commutation in the manner described in Kocybik.” J.A. 29. The Board concluded that “the use of sinewave commutation and independent Q and d axis currents would have provided predictable results to address known problems associated with other types of motors.” J.A. 29. Nidec asks us to reweigh the evidence the Board used to make its determination, which we may not do. *See In re Warsaw Orthopedic, Inc.*, 832 F.3d 1327, 1334 (Fed. Cir. 2016).

Nidec makes two arguments as to why the Board’s conclusion was erroneous. First, Nidec argues that the

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Board wrongly construed the term “HVAC system” in the claim preambles to be non-limiting. J.A. 21. Whether or not Nidec is correct, the result does not change. The Board specifically addressed the issue by stating, “[o]ur conclusion would be unaffected by a determination that the preambles of the claims reciting an HVAC system are limiting. Although Kocybik is not directed specifically to HVAC systems, Petitioner relies on Bessler for such a teaching.” J.A. 34 n.10. There is no dispute that Bessler teaches an HVAC system as recited in the claims. Because we need only construe terms “that are in controversy, and only to the extent necessary to resolve the controversy,” *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999), we need not construe the claim preambles here where the construction is not “material to the [obviousness] dispute,” *id.* We see no error in the Board’s decision in this regard.

Second, Nidec argues that Bessler teaches away from the asserted combination. Nidec argues that the purpose of Bessler is to reduce the complexity of HVAC systems by eliminating the need for a conventional system controller. According to Nidec, incorporating sinewave commutation into an HVAC system only increases complexity, which is contrary to the fundamental goal of Bessler. Thus, Nidec urges that a person of ordinary skill in the art would not have combined the teachings of Bessler and Kocybik. We disagree.

There is nothing in Bessler that “criticize[s], discredit[s], or otherwise discourage[s]” the use of sinewave commutation in HVAC systems. *Meiresonne v.*

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*Google, Inc.*, 849 F.3d 1379, 1382 (Fed. Cir. 2017) (quoting *Galderma Labs., L.P. v. Tolmar, Inc.*, 737 F.3d 731, 738 (Fed. Cir. 2013)). As Nidec has conceded, Bessler does not even mention sinewave commutation. Oral Arg. at 13:32-13:47. Instead, Bessler states only that “[i]t is an object of this invention to provide a central [HVAC] system which does not require a system controller.” J.A. 222, col. 2 ll. 3-5. This statement does not teach away from sinewave commutation.

For support, Nidec points out that each challenged claim requires a “system controller” and that Bessler teaches away from the use of a system controller that is separate from a motor controller and that receives and processes system demand signals. But this argument has limited relevance to sinewave commutation. In fact, the challenged claims make clear that it is the “motor controller” (not the system controller eliminated in Bessler) that performs sinewave commutation. *See, e.g.*, ’394 Patent, col. 5 ll. 39-41 (claim 1 reciting “wherein the motor controller is configured for performing sinewave commutation”). Nidec does not dispute that Bessler teaches a motor controller.<sup>1</sup>

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1. Nidec argues that a motor controller capable of achieving sinewave commutation requires an advanced microprocessor, such as a “digital signal processor” (DSP), and that Bessler teaches away from the use of such hard-ware. In fact, however, Bessler does not limit or suggest limiting the types of microprocessors that might be used, and Kocybik teaches the use of DSPs with permanent magnet motors. Kocybik explains that “[m]ass production [of DSPs] has [led] to a decrease in prices; leading to a whole range of reasonably priced and well-tested devices available to implement digital control strategies.” J.A. 267.



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And the '394 Patent specification uses the term “system controller” in a different sense than in Bessler. The '394 Patent states that “the system controller . . . may be a thermostat.” *Id.* col. 4 ll. 35-36. There is no dispute that Bessler teaches the use of a thermostat in an HVAC system as opposed to the eliminated system controller which receives and processes signals from a thermostat. *See* J.A. 223, col. 4 ll. 31-68 (Bessler describing the functions of a “conventional thermostat” in a preferred embodiment).

However, Nidec argues that Bessler’s thermostat is too primitive to qualify as the system controller required by the '394 Patent claims. Specifically, the claimed system controller must be capable of sending “one or more control signals” to the claimed motor controller. *E.g.*, '394 Patent, col. 5 l. 42 (claim 1); *see also id.* col. 6 l. 50 (claim 19 reciting “at least one control signal from a system controller”). Nidec points to a portion of the '394 Patent specification that explains, “[s]uch control signals may represent, for example, a desired torque or speed of the motor 406. Alternatively, the control signals may represent a desired airflow to be produced by the air-moving component 410.” *Id.* col. 3 l. 66-col. 4 l. 2. By contrast, Bessler’s thermostat only “generat[es] a two state (on/off) signal.” J.A. 223, col. 4 ll. 42-43. Thus, Nidec argues, Bessler’s thermostat is incapable of generating the “control signals” required by the claims of the '394 Patent.

Nidec too narrowly construes the “control signals” limitation. In an IPR involving an unexpired patent, the “broadest reasonable construction” standard governs.

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*Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2144-45, 195 L. Ed. 2d 423 (2016); 37 C.F.R. § 42.100(b). The '394 Patent specification explains that “torque,” “speed,” and “airflow” are provided only as examples of the types of control signals that might be used; it is not an exhaustive list. See '394 Patent, col. 3 l. 66-col. 4 l. 2. (“*for example*, a desired torque or speed” and “[a] *lternatively*, the control signals *may* represent a desired airflow” (emphases added)). Moreover, analysis of the dependent claims supports a broader construction than that advanced by Nidec. For instance, dependent claim 20 provides in relevant part, “wherein receiving includes receiving at least one control signal representing a *desired airflow* for the blower, a *desired torque* of the permanent magnet motor, *or* a *desired speed* of the permanent magnet motor.” *Id.* col. 6 ll. 57-60 (emphases added). This limitation confirms that the “control signals” limitation recited in the independent claims encompasses other signals in addition to “torque,” “speed,” and “airflow.” An on/off signal amounts to a control signal because a motor controller cannot carry out its claimed function of “performing sinewave commutation . . . in response to one or more control signals” if it does not receive at least an “on” signal from the thermostat. '394 Patent, col. 5 ll. 40-42. Indeed, Nidec concedes that “Bessler . . . describes . . . a motor controller that is directly responsive to a two-state (on/off) temperature signal provided by a thermostat.” Nidec Opening Br. 12.

We conclude that the Bessler thermostat is a “system controller” and that the on/off signals it generates are “control signals” encompassed by the '394 Patent’s claims.

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The Board did not err in concluding that the challenged claims would have been obvious over the combination of Bessler and Kocybik.<sup>2</sup>

## CONCLUSION

In summary, we conclude that the Board correctly determined that challenged claims 1-3, 8, 9, 12, 16, and 19 of the '394 Patent are invalid under § 103 as obvious over the combination of Bessler and Kocybik. We reach no conclusion as to the Board's determinations involving the anticipation ground based on Hideji.

**AFFIRMED**

## COSTS

Costs to appellee.

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2. Although the Board invalidated dependent claim 12, it is not clear from Nidec's briefs whether claim 12 is at issue on appeal. *See, e.g.*, Nidec Opening Br. 23 (omitting reference to claim 12); *id.* at 10-11 (omitting summary of claim 12 and identification of claim 12 as one of the claims-at-issue); *but see id.* at 19, 20, 69, Nidec Reply Br. 31 (arguing that the Board erred in invalidating, inter alia, claim 12). In any event, both at the Board level and on appeal, claim 12 was not separately argued.

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DYK *Circuit Judge*, joined by *Circuit Judge* WALLACH, concurring.

Although we join the per curiam decision in full, we write separately to express our concerns as to the United States Patent and Trademark Office’s (“PTO”) position on joinder and expanded panels since those issues are likely to recur. Although we do not decide the issues here, we have serious questions as to the Board’s (and the Director’s) interpretation of the relevant statutes and current practices.

First, the IPR joinder statute provides:

**(c) Joinder.**—If the Director institutes an inter partes review, the Director, in his or her discretion, may join as a party to that inter partes review any person who properly files a petition under section 311 that the Director, after receiving a preliminary response under section 313 or the expiration of the time for filing such a response, determines warrants the institution of an inter partes review under section 314.

35 U.S.C. § 315(c). Thus, joinder is only permissible if the Director determines that a petition “warrants the institution of an inter partes review.” *Id.*

The IPR time-bar statute provides,

**(b) Patent owner’s action.**—An inter partes review may not be instituted if the petition

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requesting the proceeding is filed more than 1 year after the date on which the petitioner, real party in interest, or privy of the petitioner is served with a complaint alleging infringement of the patent. *The time limitation set forth in the preceding sentence shall not apply to a request for joinder under subsection (c).*

35 U.S.C. § 315(b) (emphasis added). Particularly relevant to this appeal is the second sentence, which provides an exception to the 1-year time limit for “a request for joinder under subsection (c).” *Id.*

The joinder dispute in this case turns on the relationship between the joinder provision of § 315(c) and the exception to the time bar in § 315(b). Section 315(b) ordinarily bars a petitioner from proceeding on a petition if it is filed more than one year after the petitioner is sued for patent infringement. *Id.* Without the exception to that rule described in the second sentence of § 315(b), an untimely petition would still be barred even if it raised the same issues as those involved in an existing proceeding that had been timely initiated by a different petitioner. But the exception makes clear that the time bar “shall not apply to a request for joinder under subsection (c).” Thus, the exception to the time bar for “request[s] for joinder” was plainly designed to apply where time-barred Party A seeks to join an existing IPR timely commenced by Party B when this would not introduce any new patentability issues. This is supported by the legislative history for the joinder provision, § 315(c). *See* H.R. Rep. No. 112-98, pt. 1, at 76 (2011) (explaining that under § 315(c), “[t]he Director may allow other petitioners to join an [IPR]”).

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The issue in this case is whether the time bar provision allows a time-barred petitioner to add new issues, rather than simply belatedly joining a proceeding as a new party, to an otherwise timely proceeding. Section 315(e) does not explicitly allow this practice. We think it unlikely that Congress intended that petitioners could employ the joinder provision to circumvent the time bar by adding time-barred issues to an otherwise timely proceeding, whether the petitioner seeking to add new issues is the same party that brought the timely proceeding, as in this case, or the petitioner is a new party.

Second, we are also concerned about the PTO's practice of expanding administrative panels to decide requests for rehearing in order to "secure and maintain uniformity of the Board's decisions." Director Br. 27. Here, after a three-member panel of administrative judges denied petitioner Broad Ocean's request for joinder, Broad Ocean requested rehearing and requested that the rehearing be decided by an expanded panel. Subsequently, "[t]he Acting Chief Judge, acting on behalf of the Director," J.A. 933 n.1, expanded the panel from three to five members, and the reconstituted panel set aside the earlier decision.

Nidec alleges that the two administrative judges added to the panel were chosen with some expectation that they would vote to set aside the earlier panel decision. The Director represents that the PTO "is not directing individual judges to decide cases in a certain way." Director Br. 21 (quotation marks omitted). While we recognize the importance of achieving uniformity in PTO decisions, we question whether the practice of

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expanding panels where the PTO is dissatisfied with a panel's earlier decision is the appropriate mechanism of achieving the desired uniformity. But, as with the joinder issue, we need not resolve this issue here. Nor need we address the predicate issue of appealability.

**APPENDIX B — FINAL WRITTEN DECISION  
OF THE UNITED STATES PATENT AND  
TRADEMARK OFFICE, PATENT TRIAL AND  
APPEAL BOARD, DATED MAY 9, 2016**

UNITED STATES PATENT  
AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL  
AND APPEAL BOARD

ZHONGSHAN BROAD OCEAN MOTOR CO., LTD.,  
BROAD OCEAN MOTOR LLC, AND BROAD  
OCEAN TECHNOLOGIES, LLC,

*Petitioner,*

v.

NIDEC MOTOR CORPORATION,

*Patent Owner.*

Case IPR2014-01121<sup>1</sup>  
Patent 7,626,349 B2

Before SALLY C. MEDLEY, JUSTIN T. ARBES,  
BENJAMIN D. M. WOOD, JAMES A. TARTAL, and  
PATRICK M. BOUCHER, *Administrative Patent Judges.*

BOUCHER, *Administrative Patent Judge.*

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1. Case IPR2015-00762 has been joined with this proceeding.



*Appendix B***FINAL WRITTEN DECISION**  
*35 U.S.C. § 318(a) and 37 C.F.R. § 42.73*

## I. INTRODUCTION

## A. Background

The trial in this proceeding resulted from the filing of two petitions by Zhongshan Broad Ocean Motor Co., Ltd., Broad Ocean Motor LLC, and Broad Ocean Technologies, LLC (collectively, “Petitioner”). First, in response to a corrected petition (Paper 7<sup>2</sup>, “Pet. 1121”) filed in IPR2014-01121, the Board instituted trial with respect to the following ground of unpatentability: claims 1–3, 8, 9, 12, 16, and 19 as unpatentable under 35 U.S.C. § 103(a) over U.S. Patent No. 5,410,230 (Ex. 1006, “Bessler”) and Peter Franz Kocybik, *Electronic Control of Torque Ripple in Brushless Motors* (University of Plymouth, July 2000) (Ex. 1007, “Kocybik”). Paper 20, 17. Second, in response to the concurrent filing in IPR2015-00762 of a petition (IPR2015-00762, Paper 3, “Pet. 762”) and a Motion for Joinder (IPR2015-00762, Paper 4), the Board instituted trial with respect to the following ground of unpatentability, and joined IPR2015-00762 with IPR2014-01121: claims 1–3, 8, 9, 12, 16, and 19 as anticipated under 35 U.S.C. § 102(b) by JP 2003-348885 (Ex. 1003<sup>3</sup>, “Hideji”).

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2. Unless otherwise indicated, citations are to IPR2014-01121. In some instances, the parties filed papers under seal with concurrently filed public redacted versions; unless otherwise indicated, citations are to public versions of the papers.

3. An unattested English translation of Hideji was filed as Ex. 1005 in IPR2014-01121. An attested English translation of Hideji

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Paper 67, 9–10. Patent Owner timely filed Patent Owner Responses. Papers 30, 72. Petitioner timely filed Replies to the Patent Owner Responses. Papers 36, 78. An oral hearing was held on February 23, 2016. Paper 85 (“Tr.”).

We have jurisdiction under 35 U.S.C. § 6(c). This Decision is a Final Written Decision under 35 U.S.C. § 318(a) as to the patentability of the claims on which we instituted trial. Based on the record before us, Petitioner has shown, by a preponderance of the evidence, that claims 1–3, 8, 9, 12, 16, and 19 are unpatentable.<sup>4</sup>

#### B. The ’349 Patent (Ex. 1001)

The ’349 patent relates to heating, ventilating, and/or air conditioning (“HVAC”) systems that use air-moving components, such as a blower. Ex. 1001, col. 1, ll. 8–11. Figure 4 of the ’349 patent is reproduced below.

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was filed as Ex. 1005 in IPR2015-00762. Except for the attestation, the translations are identical. Accordingly, to simplify citation to the record, we subsequently cite to Ex. 1005 of IPR2014-01121 for citations to Hideji.

4. Judges Wood and Boucher disagree with Judges Medley, Arbes, and Tartal that 35 U.S.C. § 315(c) permits issues presented in IPR2015-00762 to have been joined to IPR2014-01121. Paper 67 (Boucher, APJ, dissenting).

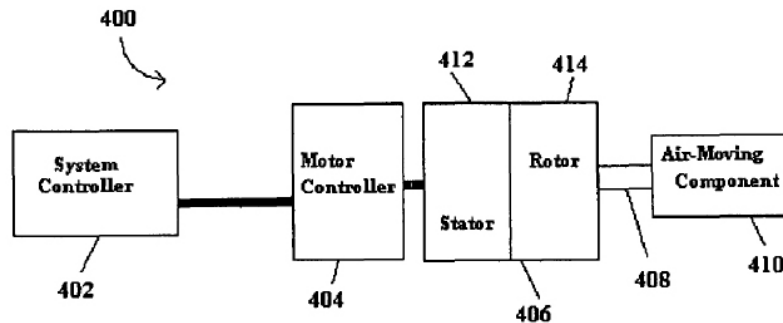


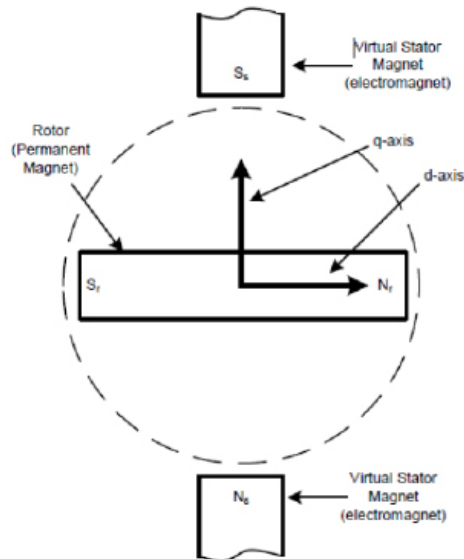
Figure 4

Figure 4 is a block diagram of HVAC system 400, which includes system controller 402, motor controller 404, permanent magnet motor 406, and air-moving component 410. *Id.* at col. 3, ll. 50–52. Permanent magnet motor 406 includes shaft 408, stationary assembly 412, and rotatable assembly 414. *Id.* at col. 3, ll. 52–54. The rotatable and stationary assemblies are magnetically coupled, and the rotatable assembly is coupled to the air-moving component via the shaft to drive rotation of the air-moving component. *Id.* at col. 3, ll. 54–58. The motor controller is configured to perform sinewave commutation in response to one or more control signals received from the system controller to produce continuous-phase currents in the permanent magnet motor for driving the air-moving component. *Id.* at col. 3, ll. 59–63.

Petitioner’s expert, Dr. Mark Ehsani, provides an explanation of “vector control” of permanent-magnet synchronous motors, which we accept as an accurate description of the understanding of one of ordinary skill

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in the art. Dr. Ehsani explains that “[t]he concept of vector control, which typically uses d and [Q] current components, arises from [a] principle [in which] torque arrives from the interaction of two magnetic fields, one originating from the stator and one originating from the rotor.” Ex. 1009 ¶ 13. The drawing from page 6 of Dr. Ehsani’s Declaration is reproduced below.



The drawing from Dr. Ehsani’s Declaration illustrates a rotor, which has a permanent magnet having north and south poles  $N_r$  and  $S_r$ , respectively, and illustrates a stator, which includes electromagnets that result in a virtual stator magnet having north and south poles  $N_s$  and  $S_s$ , respectively. *Id.* ¶ 15. The  $d$  axis is aligned with

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the rotor and the Q axis<sup>5</sup> is offset  $90^\circ$  from the d axis. The motor commutates the winding currents to maintain orthogonality of the d and Q axes as the rotor turns. *Id.* ¶ 16.

The Specification of the '349 patent provides sparse details of how vector control is achieved in the context of the claimed invention. Figure 8 of the '349 patent is reproduced below, with reference numbers in red added by the Board.

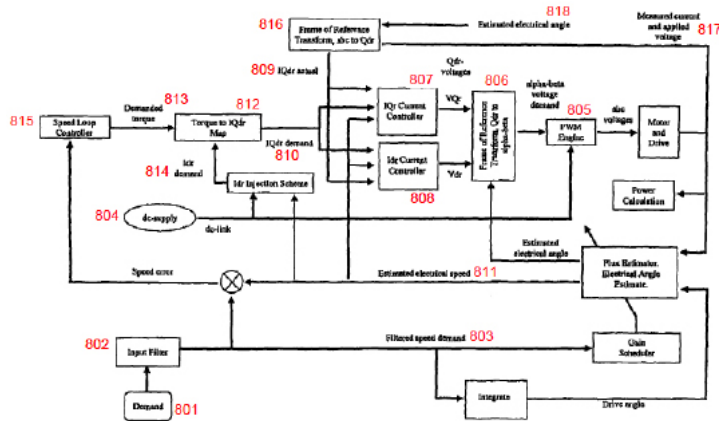


Figure 8

Figure 8 is a block diagram of a sensorless vector control scheme. Ex. 1001, col. 3, ll. 16–17. Although the Specification of the '349 patent does not explain the

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5. Dr. Ehsani uses a lower-case letter q in referring to this axis. We use an upper-case letter Q for consistency with the claims that are before us.

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drawing, very similar drawings are provided as Figures 2 and 3 in U.S. Patent No. 7,342,379 B2 (Ex. 3001, “the ’379 patent”), the disclosure of which is incorporated by reference into the ’349 patent. *Id.* at col. 4, ll. 23–29. In addition, Patent Owner’s expert, Dr. Gary Blank, was questioned extensively by Petitioner’s counsel at his deposition regarding Figure 8. *See* Ex. 1043, 24:3–51:4. With respect to the following observations, we find Dr. Blank’s testimony consistent with the explanation of Figures 2 and 3 of the ’379 patent provided by the Specification of the ’379 patent, and accept Dr. Blank’s testimony as an accurate description of what one of ordinary skill in the art would understand from Figure 8.

Demand 801 provides a speed demand as a source of power for the motor drive, which is filtered by input filter 802 to provide filtered speed demand 803. Ex. 1043, 24:23–25:25. The power to drive the motor originates from dc-supply 804 and is supplied to pulse width modulation engine 805, which converts a direct-current signal into alternating current voltages, and controls the magnitude of those voltages by varying the width of the pulse. *Id.* at 26:24–27:18. Such control is effected by using an  $\alpha$ - $\beta$  voltage demand generated by frame of reference transform 806 using VQr and Vdr signals, as well as an estimated electrical angle. *Id.* at 27:19–29:8. The VQr and Vdr signals are supplied respectively by IQr current controller 807 and Idr current controller 808, which receive “IQdr actual” signal 809, “IQdr demand” signal 810, and estimated electrical speed 811 derived from filtered speed demand 803. *Id.* at 30:20–31:3, 32:10–18. The “IQdr actual” signal is a combination of signals along the

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Q and d axes, and the “IQdr demand” signal results from a conversion performed by torque to IQdr map 812 using demanded torque 813 (provided by speed loop controller 815, which is part of the motor controller) and Idr demand 814. *Id.* at 31:4–24, 26:18–23. The “IQdr actual” signal 809 is determined by frame of reference transform 816 from measured current and applied voltage 817, as well as estimated electrical angle 818. *Id.* at 65:6–66:11.

## C. Illustrative Claim

Claim 1 of the '349 patent is illustrative of the claims at issue:

1. A heating, venting and/or air conditioning (HVAC) system comprising a system controller, a motor controller, an air-moving component, and a permanent magnet motor having a stationary assembly, a rotatable assembly in magnetic coupling relation to the stationary assembly, and a shaft coupled to the air-moving component, wherein the motor controller is configured for performing sinewave commutation, using independent values of Q and d axis currents, in response to one or more signals received from the system controller to produce continuous phase currents in the permanent magnet motor for driving the air-moving component.

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## II. ANALYSIS

## A. Claim Construction

The Board interprets claims of an unexpired patent using the broadest reasonable construction in light of the specification of the patent in which they appear. *See* 37 C.F.R. § 42.100(b); *In re Cuozzo Speed Techs., LLC*, 793 F.3d 1268, 1278 (Fed. Cir. 2015) (“We conclude that Congress implicitly approved the broadest reasonable interpretation standard in enacting the AIA”), *cert. granted sub nom. Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 890 (mem.) (2016).

## 1. Preambles

Patent Owner contends that “[t]he preambles of the challenged claims, requiring an ‘HVAC system,’ are limiting.” Paper 30, 8. We disagree that the “HVAC system” portions of the preambles are limiting.<sup>6</sup>

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6. Independent claim 1 recites a “heating, ventilating and/or air conditioning (HVAC) system.” Independent claim 16 recites a “blower assembly for a heating, ventilating and/or air conditioning (HVAC) system.” Independent claim 19 recites a “method for driving an air-moving component of a heating, ventilating and/or air conditioning (HVAC) system in response to a control signal, the HVAC system including a permanent magnet motor having a stationary assembly and a rotatable assembly in magnetic coupling relation to the stationary assembly, said rotatable assembly coupled in driving relation to the air-moving component.”



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“Generally, . . . the preamble does not limit the claims.” *DeGeorge v. Bernier*, 768 F.2d 1318, 1322 n.3 (Fed. Cir. 1985). In particular, “[t]he preamble of a claim does not limit the scope of the claim when it merely states a purpose or intended use of the invention.” *In re Paulsen*, 30 F.3d 1475, 1479 (Fed. Cir. 1994) (citing *DeGeorge*, 768 F.2d at 1322 n.3). In this instance, the “HVAC system” portions of the preambles of the challenged claims provide no antecedents for ensuing claim terms, with the bodies of the claims neither repeating nor referencing HVAC systems. Because the language in the bodies of the claims, standing alone, is sufficient to set forth the invention, the “HVAC system” portions merely provide a stated purpose for the invention. Accordingly, we find no compelling reason to afford weight to the “HVAC system” language in the preambles.

2. “using independent values of Q and  
d axis currents”

In the Institution Decisions, the Board construed “using independent values of Q and d axis currents,” which is recited in independent claims 1, 16, and 19, as requiring the use of Q and d axis current values that are developed independently of each other, without relying on one to derive the other. Paper 20, 7–8; IPR2015-00762, Paper 12, 6–7. Patent Owner does not explicitly contest this construction, and advocated for this construction in its Preliminary Responses. Paper 14, 9–10; IPR2015-00762, Paper 10, 19. But Patent Owner presents arguments that implicitly construe the phrase as requiring the use of independent *demand* Q and d axis currents, rather than

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the use of independent *actual* Q and d axis currents. See Paper 72, 6, 8.

The phrase was added to the claims during prosecution, and Petitioner contends that it refers to the *actual* Q and d axis currents, noting the patentee's representation that support for the limitation "can be found, among other places, in Fig. 8 of the instant application as filed." Paper 78, 8–9 (quoting Ex. 1002, 16). Petitioner observes that, in Figure 8 of the '349 patent (reproduced above), "[t]he 'estimated electrical angle' and 'measured current and applied voltage' signals [818 and 817] are input to the 'Frame of Reference transform, abc to Qdr' [816], which outputs the 'IQdr actual' signal [809]." *Id.* at 10. The '379 patent, incorporated by reference into the '349 patent, addresses decoupling of the IQdr components in producing torque:

The decoupling of IQdr components in the production of torque can be applied within either a sensorless control system or a sensor-controlled system. If a given motor does not show any discernible hybrid behavior, the control technique can default to that classically used with a [permanent-magnet] motor (i.e., Idr torque contribution assumed to be zero) where the torque contribution comes from IQr.

Ex. 3001, col. 6, ll. 1–7. Petitioner's position that these IQdr components refer to the *actual* Q and d axis currents, rather than the *demand* Q and d axis currents, is supported by the above disclosure as well as by Dr.

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Ehsani’s testimony that, in an ideal permanent-magnet, it is the *actual* d axis current value that is assumed to be zero. *See* Ex. 1009 ¶¶ 18–19.

We clarify our construction of “using independent values of Q and d axis currents” as requiring the use of actual Q and d axis current values that are developed independently of each other, without relying on one to derive the other.

### 3. “back-emf . . . motor”

In the Institution Decisions, the Board construed “back-emf . . . motor,” which is recited in claim 9, as coterminous with “permanent magnet motor.” Paper 20, 7–8; IPR2015-00762, Paper 12, 6–7. Neither party contests that construction and we adopt it for this Final Written Decision.

### B. Petitioner’s Motion to Exclude

Petitioner filed a Motion to Exclude portions of Exhibit 2003 and the entirety of Exhibits 2010, 2011, and 2018–2025. Paper 50. But as Patent Owner contends, Petitioner’s Motion does not address Patent Owner’s timely supplementation of the challenged evidence pursuant to 37 C.F.R. § 42.64(b)(2). Paper 54, 1. Patent Owner contends that the supplemental evidence is curative and that “[b]ecause Petitioners do not argue in their motion that [Patent Owner’s] supplemental evidence failed to cure the deficiencies they identify (or is deficient in any other way), Petitioners have waived any argument regarding

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the sufficiency of the supplemental evidence.” *Id.* (citing 37 C.F.R. § 42.23(b)). Petitioner counters that Patent Owner failed to seek authorization to file its supplemental evidence or its Opposition: “The Board should therefore ignore both Patent Owner’s supplemental evidence and its Opposition because it failed to seek authorization from the Board beforehand.” Paper 68, 1–2 (citing *Gnosis S.P.A. v. South Alabama Med. Sci. Found.*, Case IPR2013-00116, Paper 29, 3 (October 9, 2013)).

Petitioner’s argument does not accurately reflect the requirements of the Board’s rules governing *inter partes* review proceedings. Once a trial has been instituted, any objection to evidence must be filed within five business days of service of the evidence and must identify the grounds for the objection “with sufficient particularity to allow correction in the form of supplemental evidence.” 37 C.F.R. § 42.64(b)(1). The party relying on the evidence to which an objection is timely served is then provided an opportunity to correct, by serving supplemental evidence within ten business days of service of the objection. *See* 37 C.F.R. §§ 42.64(b)(1), 42.64(b)(2). If, upon receiving the supplemental evidence, the opposing party is still of the opinion that the evidence is inadmissible, the opposing party may file a motion to exclude such evidence. Service of such supplemental evidence does not require Board authorization, nor does filing of an opposition to a motion to exclude. 37 C.F.R. §§ 42.23, 42.64(b)(2), 42.64(c). Nothing in the *Gnosis* order cited by Petitioner stands for any contrary proposition. Indeed, the Scheduling Orders for this proceeding explicitly set forth deadlines for filing oppositions to motions to exclude. Paper 21, 4; Paper 70, 4.

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We have considered the parties' arguments, but need not reach the merits of Petitioner's Motion to Exclude because, as explained below, even if the disputed evidence is considered, Patent Owner has not shown proof of secondary considerations that would support a conclusion of nonobviousness of the challenged claims. Accordingly, Petitioner's Motion to Exclude is dismissed as moot.

C. Patent Owner's Motion to Exclude

Patent Owner filed a Motion to Exclude portions of Exhibit 1020 and the entirety of Exhibits 1034 and 1035. Paper 53. As Petitioner points out, Patent Owner failed to follow the correct procedure to preserve its objections to Petitioner's evidence. *See* Paper 58, 1–2. On May 19, 2015, the Office amended 37 C.F.R. § 42.64(b)(1) in a final rule-making notice to require that objections be “filed” rather than “served” within five business days of service of evidence to which the objections are directed. 80 Fed. Reg. 28,561, 28,563 (May 19, 2015). Patent Owner acknowledges that it *served* its objections on Petitioner on August 28, 2015, but did not *file* them until September 21, 2015 “in accordance with established practice under the former version of 37 C.F.R. § 42.[64](b)(1).” Paper 65, 1.

Patent Owner requests that, in view of the rule change, we exercise our discretion under 37 C.F.R. § 42.5(b) to waive or suspend the requirement of the version of 37 C.F.R. § 42.64(b)(1) in effect at the relevant time. *Id.* at 2. We do not question the sincerity of Patent Owner's representations that it “was admittedly unaware” of the rule change and that its errors “were honest mistakes

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on its part.” Paper 65, 1–2. Those representations are relevant. Nevertheless, in considering Patent Owner’s request, we are mindful of the history of this proceeding and guided by considerations of fairness. Patent Owner has benefited from our previous strict enforcement of 37 C.F.R. § 42.63(b) over strenuous efforts by Petitioner—including a request that we exercise our discretion under 37 C.F.R. § 42.5—to correct Petitioner’s failure to include an affidavit attesting to the accuracy of the English translation of Hideji with its original filing in IPR2014-01121. *See* Paper 25. In this context, we decline to use our discretionary authority to excuse Patent Owner’s error.

Accordingly, we dismiss Patent Owner’s Motion to Exclude.<sup>7</sup>

#### D. Obviousness Over Bessler and Kocybik

Petitioner contends that claims 1–3, 8, 9, 12, 16, and 19 are unpatentable over Bessler and Kocybik under 35 U.S.C. § 103(a). Pet. 1121, 4. Bessler discloses an HVAC system that uses an electronically commutated motor (“ECM”). Ex. 1006, col. 4, ll. 11–13. In challenging independent claim 1, Petitioner contends that Bessler discloses all limitations but one, acknowledging that “Bessler does not explicitly disclose the use of sine wave commutation and independent [Q]- and d- axis currents.” Pet. 1121, 36. For the limitation that recites such features, Petitioner relies on Kocybik, noting that, like Bessler, Kocybik discloses an ECM. *Id.* at 41–46.

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<sup>7</sup> Alternatively, the Motion would be dismissed because we do not rely on the evidence sought to be excluded in this Decision.

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Figure 1 of Bessler is reproduced below.

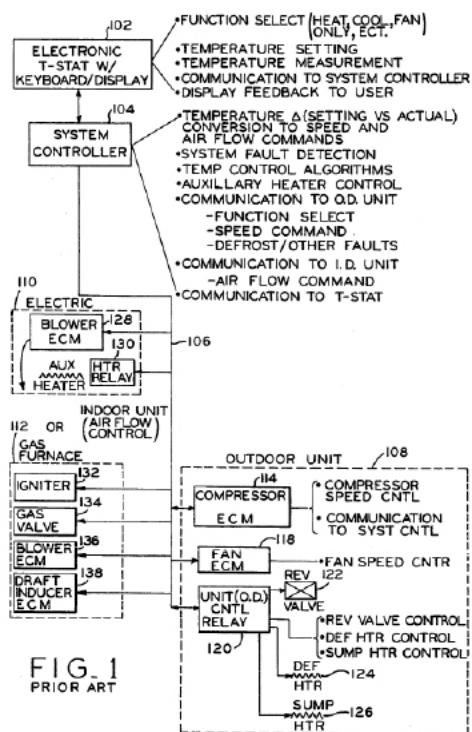


Figure 1 illustrates a central heating and air-conditioning variable speed control system. Ex. 1006, col. 3, ll. 8–11. Petitioner draws a correspondence between (1) structural elements shown in Figure 1 and a related embodiment shown in Figure 2; and (2) the “system controller,” “motor controller,” “blower” or “air-moving component,” and “permanent magnet motor” recited in different combinations in independent claims 1, 16, and 19. Pet. 1121, 37–41, 53–56.

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Petitioner relies on Kocybik, which is a doctoral thesis that includes a survey of electric motor control schemes for permanent magnet motors,<sup>8</sup> for disclosure of sinewave commutation using vector control with independent Q and d axes to produce continuous phase currents. *Id.* at 43–46 (citing Ex. 1007, 11–12, 17, 37, 40, 80, 86, 140, 144, Fig. 6.3, Fig. 6.10, Figs. 7.13–7.14, Fig. 9.1). We agree with Petitioner’s analysis as to how Bessler and Kocybik teach the limitations of claims 1, 16, and 19, which is supported by the testimony of Dr. Ehsani. *See* Ex. 1009 ¶¶ 47–55. Indeed, Patent Owner does not dispute that Kocybik teaches sinewave commutation using vector control with independent Q and d axes to produce continuous phase currents. Furthermore, Petitioner has provided adequate reasoning why a person of ordinary skill in the art would have effected the combination proposed (i.e., configuring the system of Bessler to perform sinewave commutation in the manner described in Kocybik), namely that the use of sinewave commutation and independent Q and d axis currents would have provided predictable results to address known problems associated with other types of motors. Pet. 1121, 36–37 (citing *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 415–421 (2007)). In particular, Petitioner reasons persuasively that “using rectangular currents

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8. Patent Owner does not dispute Petitioner’s assertion that Kocybik qualifies as a prior art printed publication under 35 U.S.C. § 102(b). *See* Pet. 1121, 4; Paper 30, 3 (“Kocybik describes high end applications at the time of its publication”), 25 (“Kocybik references higher end applications at the time of its publication”); Paper 21, 3 (“The patent owner is cautioned that any arguments for patentability not raised in the response will be deemed waived.”); Paper 70, 3 (same).



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creates unwanted torque, and the use of sinusoidal currents can reduce unwanted torque and create smoother and quieter motor operation.” *Id.* at 37 (citing Ex. 1007, 25; Ex. 1009 ¶ 52).

We are not persuaded by Patent Owner’s counterarguments. First, Patent Owner contends that Bessler teaches away from the claimed combinations because “one of the principal objects of Bessler is to eliminate the need for a system controller in an HVAC system,” and that a benefit of such elimination is a reduction in the number of microprocessors used. Paper 30, 15–16 (citing Ex. 1006, col. 1, ll. 22–34, col. 2, ll. 3–5). Patent Owner observes that Bessler “provides an integral microprocessor in its motor controller that can interpret, for example, the cycling of the on/off signal of the thermostat and *directly* create motor control signals without the need of a system controller developing interim system demand signals.” *Id.* at 19–20 (citing Ex. 1006, col. 5, l. 66–col. 6, l. 22). Like Bessler, the Specification of the ’349 patent describes that the “system controller” may be a thermostat *or* a separate controller: “the system controller **402** *may be a thermostat*, an additional control module in communication with a thermostat, or a standalone controller for the HVAC system **400**.” Ex. 1001, col. 4, ll. 35–38 (emphasis added). Thus, the claims do not require a separate standalone system controller. For these reasons, Patent Owner’s teaching away arguments are not commensurate in scope with the claim language.

Second, Patent Owner contends that Kocybik is applied too expansively by Petitioner because Kocybik

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limits its disclosure to “higher end applications” like hybrid car engines, the aerospace industry, and high-accuracy machine tooling applications: “To be sure, Kocybik discusses motor control schemes including that sine wave commutation may be used with a [brushless permanent magnet] motor, but Kocybik does not discuss HVAC systems or the motors used in them.” Paper 30, 25–27. Patent Owner argues that only through hindsight reconstruction would one apply the teachings of Kocybik to Bessler because common sense in the industry cautioned against using more complex technology in HVAC systems.<sup>9</sup> *Id.* at 27. But Patent Owner’s argument does not effectively rebut the testimony of Dr. Ehsani that a person of ordinary skill in the art “would have recognized that a permanent magnet motor using sinusoidal commutation, such as is disclosed in Kocybik, could result in a motor that exhibits less unwanted ripple torque and, in turn, smoother output torque.” Ex. 1009 ¶ 52 (citing Ex. 1007, 25.)

Third, Patent Owner argues that the claims are nonobvious in light of certain objective indicia of nonobviousness. Paper 30, 27–35. When considering evidence of secondary considerations, we are mindful that the objective evidence of nonobviousness in any given case may be entitled to more or less weight, depending on its nature and its relationship with the merits of the claimed invention. *See Stratoflex Inc. v. Aeroquip*, 713 F.2d 1530, 1538 (Fed. Cir. 1983). To be given substantial weight, evidence of secondary considerations must be relevant

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9. Patent Owner also argued that economic infeasibility suggested against the proposed combination, but withdrew that argument at the oral hearing. Tr. 57:20–23.

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to the subject matter as claimed, and there must be a nexus between the merits of the claimed invention and the evidence of secondary considerations. *Ashland Oil, Inc. v. Delta Resins & Refractories, Inc.*, 776 F.2d 281, 305 n.42 (Fed. Cir. 1985).

Patent Owner provides a narrative describing its attempts “to break into the market for variable speed electronically commutated motors for HVAC applications” by designing and selling a square-wave commutated brushless permanent magnet motor and controller called “Magellan.” Paper 30, 29. Dissatisfied with its market share, Patent Owner “decided it needed a different approach,” developing “a more highly functional motor even if the resulting product would cost more.” *Id.* at 30. Patent Owner contends that the quiet operation, a beneficial consequence of sinewave commutation, “was a key feature that led to sales and gained market share,” and supports that contention with testimony by Mark E. Carrier, one of the inventors of the ’349 patent and the Vice President of New Product Development for Patent Owner. *Id.* at 30–31 (citing Ex. 2003 ¶¶ 12(b), 29–32, 34, 44–48). Patent Owner also contends that the selection of independent Q and d axis current control “benefited” the resulting product “because it directly contributed to making torque control easier and more accurate.” *Id.* at 31. Tellingly, Patent Owner cites to no testimony or documentation that establishes such a connection between the independence of Q and d axis current control and the increase in sales for its new product. For this reason alone, Patent Owner fails to establish the necessary nexus between the merits of the claimed invention and its

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evidence of secondary considerations. *See In re Pearson*, 494 F.2d 1399, 1405 (CCPA 1974) (unsupported attorney argument in a brief cannot take the place of evidence). We also note our agreement with Petitioner that the evidence of record suggests a number of other features of Patent Owner’s products that may have contributed to commercial success so that we cannot conclude that there is an established nexus between that commercial success and the features recited in the claims. *See Paper 36, 22–23* (citing Exs. 2005, 2006, 2014) (other advantages include “segmented stator benefits,” “processor boards are separated,” “use of a power module and DSP chip for enhanced performance and reliability,” “Includes Innovative Twist Lock”).

Having considered all of the evidence of record, including Patent Owner’s evidence of alleged secondary considerations of nonobviousness, we conclude that Petitioner has demonstrated, by a preponderance of the evidence, that independent claims 1, 16, and 19 of the ’349 patent are unpatentable.<sup>10</sup>

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10. Our conclusion would be unaffected by a determination that the preambles of the claims reciting an HVAC system are limiting. Although Kocybik is not directed explicitly to HVAC systems, Petitioner relies on Bessler for such a teaching. We are persuaded that a person of ordinary skill in the art would have combined the teachings of the references in the manner articulated by Petitioner, particularly given Petitioner’s identification of the disclosure of an ECM by Kocybik and Bessler’s discussion of ECMs. *See Pet. 1121, 36–37, 41–42*. In particular, the suggestion that one of ordinary skill in the art would substitute a sinusoidally commutated ECM, as disclosed by Kocybik, for the square-wave commutated ECM disclosed by Bessler is supported by sufficient rational underpinnings. *See KSR*, 550 U.S. at 418.

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With respect to dependent claims 2, 3, 8, 9, and 12, we also conclude that Petitioner has demonstrated that they are unpatentable. Claims 2, 3, 8, and 9 recite specific features that Petitioner identifies as disclosed in Kocybik, and we agree with those identifications. Pet. 11–21, 46–52. Claim 12 recites that “at least one control signal from the system controller represents a desired torque or speed of the permanent magnet motor,” which Petitioner identifies as disclosed by Bessler. *Id.* at 52–53 (citing Ex. 1006, col. 2, ll. 47–50, col. 6, ll. 7–20). We agree with that identification. The rationale expressed by Petitioner for combining Bessler and Kocybik for the limitations of the dependent claims remains unchanged, and we determine that that rationale sufficiently supports a conclusion that the subject matter of the dependent claims would have been obvious to one of ordinary skill in the art at the time of the invention. *See* Pet. 1121, 36–37.

#### E. Anticipation by Hideji

Hideji discloses a refrigerant circuit of an air conditioning device with a compressor driven by a permanent magnet synchronous motor.<sup>11</sup> Ex. 1005 ¶ 22. Figure 2 of Hideji is reproduced below.

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11. Hideji uses the terms “permanent magnet synchronous motor” and “brushless DC motor” synonymously. Ex. 1005 ¶ 22.

【Fig. 2】

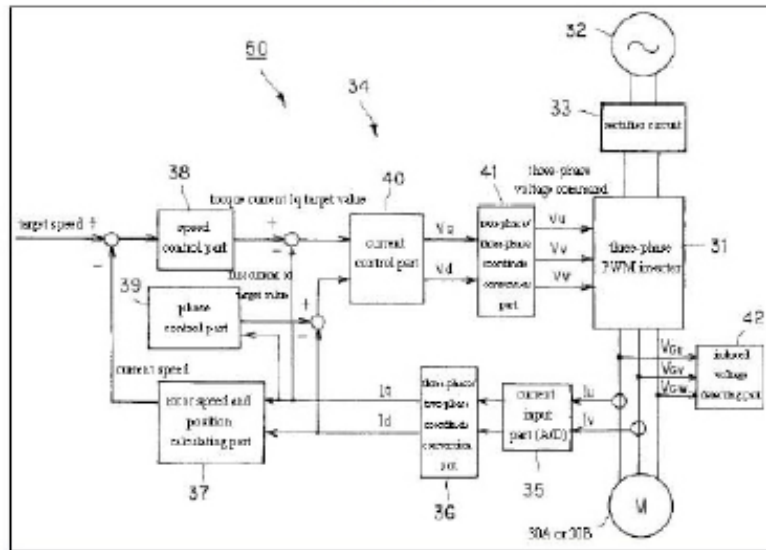


Figure 2 is a block diagram of a driving device for a permanent magnet synchronous motor. *Id.* ¶ 28. Driving device 50 includes three-phase pulse-width modulation (“PWM”) inverter 31, alternating-current power supply 32, rectifier circuit 33, and control device 34. *Id.* ¶ 30. The control device includes power input part 35, three-phase/two-phase coordinate conversion part 36, rotor speed and position calculating part 37, speed control part 38, phase control part 39, current control part 40, two-phase/three-phase coordinate conversion part 41, and induced voltage detecting part 42. *Id.* ¶ 32. Two-phase/three-phase coordinate conversion part 41 outputs pulse-modulated sinusoidal voltage commands  $V_u$ ,  $V_v$ , and  $V_w$  to a switching element of the three-phase PWM inverter, thereby providing quasisinusoidal three-phase alternating current to the motor. *Id.* ¶ 33. Three-phase/two-phase coordinate

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conversion part 36 converts coordinates of two-phase alternating current  $I_u$  and  $I_v$  introduced by current input part 35 to a revolving coordinate system on the rotor of the motor, and calculates flux current  $I_d$  (d axis current) and torque current  $I_q$  (Q axis current). *Id.* ¶ 35.

Petitioner adequately identifies the “system controller,” “motor controller,” “blower” or “air-moving component,” and “permanent magnet motor,” recited in different combinations in independent claims 1, 16, and 19, with reference to the above structures disclosed by Hideji. Pet. 762, 12–19, 32–44. Petitioner also identifies sufficient structure of Hideji’s brushless DC motor that includes stator and rotor components, i.e., stationary and rotatable assemblies with a shaft coupled to the air-moving component or blower, as recited in the independent claims. *Id.* at 17–19. Petitioner’s analysis is supported with testimony by Dr. Ehsani. Ex. 1009.

With respect to the limitations requiring “performing sinewave commutation, using independent values of Q and d axis currents, in response to one or more control signals received from the system controller to produce continuous phase currents in the permanent magnet motor for driving the air-moving component,” recited in each of independent claims 1, 16, and 19, Petitioner observes that Figure 2 of Hideji illustrates that three-phase/two-phase coordinate conversion part 36 outputs separate values for  $I_q$  and  $I_d$ , i.e., the Q and d axis currents.<sup>12</sup> Pet. 762, 23–24. Hideji discloses that

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12. We note that the labels “ $I_q$ ” and “ $I_d$ ” output from part 36 of Hideji are identified directly as such in the original Japanese reference. Ex. 1003, 8.

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[t]he three-phase/two-phase coordinate conversion part 36 converts the coordinates of the alternating current  $I_u$  and  $I_v$  introduced by the current input part 35 to a revolving coordination system (d-q coordination system) on the rotor of the brushless DC motor 30A, and calculates flux current  $I_d$  (d-axis current) and torque current  $I_q$  (q-axis current).

Ex. 1005 ¶ 35. Petitioner reasons that such transformation results in separate, independent values of Q and d axis currents determined from control signals received from the system controller. Pet. 762, 23. Petitioner supports this reasoning with testimony by Dr. Ehsani. Ex. 1009 ¶ 38.

Patent Owner responds that “[t]aken in context, the independent Q and d axis current must necessarily be the Q and d axis currents the motor controller calculates are required to satisfy the system controller demand and that are used to set or produce the continuous phase sine wave commutated currents for the motor.” Paper 72, 6. In light of our construction of “using independent values of Q and d axis currents,” we disagree with this position. In particular, Patent Owner’s argument that the structure identified by Petitioner “at best, represents the instantaneous measured current values of  $I_q$  and  $I_d$ ” and “is not the demanded value of  $I_q$  and  $I_d$  developed by the motor controller,” *id.*, is unpersuasive. For the reasons expressed above, we construe the claim limitation as requiring the use of *actual* Q and d axis currents that are developed independently of each other.



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Patent Owner further argues that, if Hideji were to anticipate, “it must show that independently derived  $I_q$  and  $I_d$  values are fed into the current control part 40.” *Id.* at 10. Patent Owner observes that, in this context, Hideji explicitly describes a dependence on “the Q axis current and d axis current”:

The phase control part 39 identifies the state of a load by introducing the torque current  $I_q$  in direct proportion to the change of the load acting on the brushless DC motor 30A, to generate a flux current  $I_d$  target value corresponding to the state of the load. Specifically, by introducing the torque current  $I_q$  in direct proportion to the increase of the load acting on the brushless DC motor 30A, the flux current  $I_d$  target value is reduced on the basis of the following formula. In addition, in the following formula,  $k$  is a positive constant.

The flux current  $I_d$  target value is equal to  $k \times I_q^2$ . By reducing the flux current  $I_d$  target value, the flux voltage  $V_d$  output by the after-mentioned current control part 40 is reduced, the phases of the voltage commands  $V_u$ ,  $V_v$  and  $V_w$  output by the two-phase/three-phase coordinate conversion part 41 are advanced, and the phases of the voltage commands  $V_u$ ,  $V_v$  and  $V_w$  delayed due to the increase of the load are restored.

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Ex. 1005 ¶¶ 38–39. This argument obscures the fact that the expression in paragraph 39 of Hideji relates the  $I_d$  target value (equivalent to the *demand* d axis current value) to the *actual* Q axis current value  $I_q$ , a fact confirmed by both parties at the oral hearing. Tr. 15:14–16:4, 33:7–16. Hideji’s disclosure of a proportionality of the *demand* d axis current and the square of the *actual* Q axis current is irrelevant in light of our construction of “using independent values of Q and d axis currents.”

We conclude that Petitioner has demonstrated, by a preponderance of the evidence, that independent claims 1, 16, and 19 are anticipated by Hideji.

With respect to dependent claims 2, 3, 8, 9, and 12, we also conclude that Petitioner has demonstrated that they are anticipated by Hideji. Petitioner identifies disclosures in Hideji that correspond to the limitations in each of these claims, identifications that are not contested by Patent Owner, and we agree with those identifications. *See* Pet. 762, 27–32.

#### F. Motion to Amend

Contingent upon respective Board determinations that original independent claims 1, 16, and 19 are unpatentable, Patent Owner moves to amend those claims by substituting proposed claims 21–23. Paper 73, 6. The proposed amendments are similar for each of the independent claims, reciting the use of “vector control” having independent values of Q and d axis currents, “wherein the control signals received from the system

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controller are at least one member selected from the group consisting of demanded torque, demanded speed, and demanded airflow and wherein vector control of the motor controller enables substantially no interaction between the motor controller and an airflow control loop of the system.” *Id.* at 1–3. Patent Owner asserts that its conditional amendments “add[] limitations to those claims that further define and narrow the scope of the claimed invention.” *Id.* at 7. Patent Owner provides charts on pages 7–9 of the Motion to Amend identifying support for existing claims limitations and for its conditional amendments. The identified support for existing claim limitations includes, *inter alia*, Figure 8 of the ’349 patent and Exhibit 3001, i.e. the ’379 patent, which is incorporated by reference into the ’349 patent. *Id.* at 7–9; Ex. 1001, col. 4, ll. 23–29.

In our Order memorializing the conference call with the parties regarding the Motion to Amend, we directed the parties to *Idle Free Sys., Inc. v. Bergstrom, Inc.*, Case IPR2012-00027 (PTAB June 11, 2013) (Paper 26) (informative), and *MasterImage 3D, Inc. v. RealD Inc.*, Case IPR2015-00040 (PTAB July 15, 2015) (Paper 42), for “[g]uidance regarding the mechanics and substance of motions to amend.” Paper 71, 2. As the moving party, Patent Owner bears the burden of establishing that it is entitled to the relief—namely, addition of the proposed claims to the patent. 37 C.F.R. § 42.20(c). To satisfy that burden, Patent Owner must meet the requirements of 37 C.F.R. § 42.121 and demonstrate the patentability of the proposed substitute claims. *Idle Free*, Paper 26, at 6–10; *see also Microsoft Corp. v. Proxyconn, Inc.*, 789 F.3d

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1292, 1308 (Fed. Cir. 2015) (“Assuming an amendment is appropriately responsive to the grounds of unpatentability involved in the trial, the patentee must still go on to show that it is entitled to its substitute claim.”).

A component of Patent Owner’s burden includes the need “to show patentable distinction over the prior art of record and also prior art known” to Patent Owner. *Idle Free*, Paper 26, at 7. The Board has held that “prior art of record” refers to material art in the prosecution history of the patent, material art of record in the current proceeding before the Board, and material art of record in any other proceeding before the Office involving the patent. *See MasterImage 3D*, Paper 42, at 2. To that end, Patent Owner discusses Bessler, Kocybik, and Hideji, and combinations of the three, in its motion. Paper 73, 15–21. But Patent Owner does not discuss the ’379 patent, nor does it discuss U.S. Patent Nos. 6,326,750, 6,756,757, or 7,208,895, each of which is also incorporated by reference into the ’349 patent. *See Ex. 1001*, col. 4, ll. 23–29. Each of these references also appears on the face of the ’349 patent as having been cited during prosecution of the ’349 patent. *Id.* at [56].

Patent Owner does not challenge Petitioner’s contention that each of these references is prior art to the ’349 patent. *See Paper 77*, 14–16. The omission of these references from Patent Owner’s analysis is significant. As we note above, the Specification of the ’349 patent provides sparse details of how vector control is achieved in the context of the claimed invention—whether as originally claimed or as proposed by the conditional amendments.

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The drawing on which the patentee relied for adding limitations related to vector control during prosecution is very similar to Figures 2 and 3 of the '379 patent; indeed, it is substantially identical to those drawings in those respects that relate to vector control. As such, we find at least the '379 patent to be material prior art of record. Patent Owner addresses the disclosure of the '379 patent in its Reply to Petitioner's Opposition to Patent Owner's Motion to Amend. Paper 80, 8–10.

When questioned at the oral hearing regarding its failure to address the '379 patent and other patents incorporated by reference into the '349 patent in its Motion to Amend, Patent Owner responded that “we have to make judgments about what we think is the closest prior art given the page limitations that are imposed upon us.” Tr. 63:13–25. Yet Patent Owner used less than 21 of the 25 pages permitted for motions to amend, leaving an unused portion that exceeds the space it devotes to addressing the '379 patent in its Reply to Petitioner's Opposition to Patent Owner's Motion to Amend. *See* 37 C.F.R. § 42.24(a)(1)(vi).

With respect to the proposed additional limitations, Patent Owner's expert, Dr. Blank, testified that the '379 patent discloses “vector control.” Ex. 1043, 14:14–15:14. The “speed loop controller” that appears in Figure 8 of the '349 patent (identified by the Board as element 815 *supra*) also appears in Figure 3 of the '379 patent, interfacing with elements of the vector control scheme in the same way. Dr. Blank testified that the “airflow control loop” proposed to be added to the claims would be recognized as included in the “speed loop controller.” *Id.* at 80:8–82:4

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(“So it’s not explicit, but it’s in there.”). According to Dr. Blank, there would be substantially no motor controller interaction with such an airflow loop controller. *Id.* at 82:5–83:3. Furthermore, Dr. Blank testified that column 6, lines 1–7 of the ’379 patent would teach a person of ordinary skill how to generate independent Q and d axis currents. *Id.* at 46:13–49:1.

Thus, we are not persuaded that Patent Owner’s proposed amendments adequately distinguish from the disclosure of the ’379 patent. Accordingly, we deny Patent Owner’s Motion to Amend.

#### F. Motions for Observation

Patent Owner filed three (sealed) motions for observation on the cross-examination of three witnesses of Petitioner (Papers 46–49). Petitioner responded with three separately filed Responses (Papers 59–61). The Scheduling Order provides for a single motion for observation on cross-examination from either party, and a single response from the opposing party, each of which is limited to 15 pages. *See* Paper 21, 5; 37 C.F.R. §§ 42.24(a)(1)(v), 42.24(b)(3). As such, we have considered only the first 15 pages filed by each party in rendering our Decision. *See* Papers 46, 59, 60; Paper 61, 1.

### III. ORDER

In consideration of the foregoing, it is hereby:

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ORDERED that, based on a preponderance of the evidence, claims 1–3, 8, 9, 12, 16, and 19 of U.S. Patent No. 7,626,349 B2 are held to be unpatentable;

FURTHER ORDERED that Petitioner’s Motion to Exclude portions of Exhibit 2003 and the entirety of Exhibits 2010, 2011, and 2018–2025 is *dismissed*;

FURTHER ORDERED that Patent Owner’s Motion to Exclude portions of Exhibit 1020 and the entirety of Exhibits 1034 and 1035 is *dismissed*;

FURTHER ORDERED that Patent Owner’s Motion to Amend is *denied*; and

FURTHER ORDERED that, because this is a final written decision, parties to this proceeding seeking judicial review of our decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.