

NOTE: This disposition is nonprecedential.

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

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**INFINEUM USA L.P.,**  
*Appellant*

v.

**CHEVRON ORONITE COMPANY LLC,**  
*Appellee*

**DREW HIRSHFELD, PERFORMING THE  
FUNCTIONS AND DUTIES OF THE UNDER  
SECRETARY OF COMMERCE FOR  
INTELLECTUAL PROPERTY AND DIRECTOR OF  
THE UNITED STATES PATENT AND TRADEMARK  
OFFICE,**  
*Intervenor*

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2020-1333

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Appeal from the United States Patent and Trademark  
Office, Patent Trial and Appeal Board in No. IPR2018-  
00922.

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Decided: January 21, 2021

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CHRISTOPHER STRATE, Gibbons P.C., Newark, NJ, for  
appellant. Also represented by DAVID E. DE LORENZI,

SAMUEL H. MEGERDITCHIAN.

NAVEEN MODI, Paul Hastings LLP, Washington, DC, for appellee. Also represented by STEPHEN BLAKE KINNAIRD, IGOR VICTOR TIMOFEYEV, MICHAEL WOLFE, DANIEL ZEILBERGER; SCOTT FREDERICK PEACHMAN, New York, NY.

DANIEL KAZHDAN, Office of the Solicitor, United States Patent and Trademark Office, Alexandria, VA, for intervenor. Also represented by MARY L. KELLY, THOMAS W. KRAUSE, FARHEENA YASMEEN RASHEED.

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Before O'MALLEY, TARANTO, and STOLL, *Circuit Judges*.

STOLL, *Circuit Judge*.

Infineum USA L.P. appeals from the final written decision of the Patent Trial and Appeal Board holding claims 1–20 of U.S. Patent No. 6,723,685 unpatentable under 35 U.S.C. § 103. The '685 patent claims cover lubricating oil compositions and their use in internal combustion engines. Because substantial evidence supports the Board's determination of obviousness, we affirm.

#### BACKGROUND

Lubricating oil compositions for internal combustion engines comprise a base oil (or mixture of base oils) of lubricating viscosity and additives used to improve the performance characteristics of the base oil. Base oils are comprised of basestocks classified by the American Petroleum Institute (API) in Groups I–V. Additive components are generally known by their structure and properties and may be used to inhibit corrosion and to reduce engine wear, oil consumption, and friction loss.

Industry standards, such as those set by the International Lubricant Standardization and Approval Committee

(ILSAC), set requirements for certain properties, ingredients, and performance of base oils. The ILSAC GF-3 standard, in effect as of the filing date of the '685 patent, set a maximum engine oil volatility of 15%.<sup>1</sup> A higher viscosity index (VI)<sup>2</sup> reduces base oil and finished oil volatility. The base oil is the primary influence on a finished engine oil's volatility. High VI is a feature of premium, high-quality base oils. Though the GF-3 standard does not recite any particular VI threshold, it was understood that commercially available base oils would need to have a VI of at least 95 for the engine oil to comply with the maximum Noack volatility requirement of 15%. *See* J.A. 1835, 1847 Fig. 1, 2285–86. At the time of the '685 patent's filing, the industry was using base oils in Groups III and IV and certain base oils in Group II in developing engine oils that would meet the GF-3 standard. *See* J.A. 566.

Traditionally, anti-wear additive components contained phosphorous. The GF-3 standard set a limit on the phosphorous content of engine oils. Seeking to reduce phosphorous content in additive components, formulators turned to solutions such as oil-soluble molybdenum compounds and organic friction modifiers to control wear and reduce friction.

The '685 patent, titled "Lubricating Oil Composition," was filed on April 5, 2002, and sought "to find a lubricating oil composition that provides improved fuel economy benefit[,] demonstrates excellent wear protection

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<sup>1</sup> The GF-3 standard measures volatility using an industry-standard Noack volatility test, which measures the evaporative loss of lubricant oil at a high temperature.

<sup>2</sup> VI is a measure of base oil viscosity that indicates an oil's change in viscosity with variations in temperature. A high-VI oil exhibits significantly lower changes in viscosity over the temperature range of use than a low-VI oil.

characteristics, is relatively low in cost, and is free of nitrogen-containing friction modifiers.” ’685 patent col. 1 ll. 63–67.

Claim 1 is the sole independent claim of the ’685 patent:

1. A lubricating oil composition comprising:
  - a) an oil of lubricating viscosity having a viscosity index of at least 95;
  - b) at least one calcium detergent;
  - c) at least one oil soluble molybdenum compound;
  - d) at least one organic ashless nitrogen-free friction modifier; and
  - e) at least one metal dihydrocarbyl dithiophosphate compound, wherein said composition is substantially free of ashless aminic friction modifiers, has a Noack volatility of about 15 wt. % or less, from about 0.05 to 0.6 wt. % calcium from the calcium detergent, molybdenum in an amount of from about 10 ppm to about 350 ppm from the molybdenum compound, and phosphorus from the metal dihydrocarbyl dithiophosphate compound in an amount up to about 0.1 wt. %.

*Id.* at col. 13 ll. 47–62.

Chevron Oronite Co. filed a petition for inter partes review challenging all claims of the ’685 patent as obvious

under 35 U.S.C. § 103 over primary reference Toshikazu<sup>3</sup> in view of Henderson.<sup>4</sup>

Toshikazu is a published Japanese patent application titled “Lubricating Oil Composition for Internal Combustion Engines” that discloses formulations having “excellent wear resistance and friction characteristics.” Toshikazu ¶ 55. Toshikazu’s Examples 1–19 are inventive lubricating oil formulations, most of which contain varying amounts of each of the additive components claimed in the ’685 patent. Toshikazu Tables 1–2.

Henderson is a technical paper published in 1998 and discusses the changing requirements for engine oils as of that time. Henderson describes an industry shift toward higher-viscosity, lower-volatility base oils and discusses the then-upcoming GF-3 standard, its requirements, and its expected performance improvements to engine oils.

Relevant to this appeal, the petition challenged claims 1–4, 6–11, and 13–20 as obvious over Toshikazu Example 16 in view of Henderson, and challenged claims 1–20 as obvious over Toshikazu Example 2 in view of Henderson.<sup>5</sup> Oronite supported its petition with a declaration from its expert, Dr. Donald Smolenski, who has significant experience in lubricating engine oil development and testing.

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<sup>3</sup> Japanese Pub. Pat. App. No. JP H5-279686 A (published Oct. 26, 1993). We cite to the same certified English-language translation of Toshikazu relied on by the Board. See J.A. 542–52.

<sup>4</sup> H.E. Henderson, et al., *Higher Quality Base Oils for Tomorrow’s Engine Oil Performance Categories 1–10* (SAE Tech. Paper Series, No. 982582, 1998).

<sup>5</sup> The obviousness grounds for claims 4, 9, 16, and 17 included additional references not relevant to the issues on appeal. See J.A. 74–76.

Infineum did not file a preliminary response to Oronite's petition, and the Board instituted review of all challenged claims on all grounds. Infineum then filed a patent owner response supported by the declaration of its expert, Dr. Jai Bansal. In addition to responding to the merits of Oronite's petition, Infineum's patent owner response argued that Dr. Smolenski was not a person of ordinary skill in the art because he had not worked as a formulator, and that the Board should disregard his testimony in its entirety.

In reply, Oronite argued that Dr. Smolenski was a person of ordinary skill, and it further supported its reply with the declaration of a new expert, Dr. Syed Rizvi, who has experience in engine oil formulation. The Board permitted Infineum to file a sur-reply, in which Infineum responded to Oronite's reply arguments on the merits, in addition to arguing that the Board should disregard Oronite's reply and Dr. Rizvi's testimony in their entirety. The Board denied Infineum's request to file a motion to strike the reply and Dr. Rizvi's testimony, but permitted the parties to file a joint chart identifying reply arguments and evidence that Infineum considered improper.

Relevant to this appeal, the Board issued a final written decision holding claims 1–4, 6–11, and 13–20 obvious over Example 16 of Toshikazu in view of Henderson and holding claims 1–20 obvious over Example 2 of Toshikazu in view of Henderson. *Chevron Oronite Co. v. Infineum USA L.P.*, IPR2018-00922, 2019 WL 5806946, at \*14–15, \*17–19, \*21–23 (P.T.A.B. Nov. 6, 2019) (*Decision*).

Infineum appeals. We have jurisdiction pursuant to 28 U.S.C. § 1295(a)(4).

#### DISCUSSION

On appeal, Infineum argues that the Board improperly relied on new theories and evidence raised for the first time in Oronite's reply, that substantial evidence does not

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support the Board's decision, and that the decision runs afoul of certain constitutional provisions. We address each set of arguments in turn.

## I

Infineum first asserts that the Board improperly relied on certain new theories and evidence that Oronite raised for the first time in its reply. We disagree.

“Whether the Board improperly relied on new arguments is reviewed *de novo*.” *Nike, Inc. v. Adidas AG*, 955 F.3d 45, 50 (Fed. Cir. 2020) (citing *In re IPR Licensing, Inc.*, 942 F.3d 1363, 1369 (Fed. Cir. 2019)). The IPR provisions of the America Invents Act (AIA) require that a petition identify, “with particularity, each claim challenged, the grounds on which the challenge to each claim is based, and the evidence that supports the grounds for the challenge to each claim.” 35 U.S.C. § 312(a)(3). The regulations implementing the AIA further state that “[a] reply may only respond to arguments raised in the corresponding opposition, patent owner preliminary response, or patent owner response.” 37 C.F.R. § 42.23(b); *see also* 35 U.S.C. § 316(a). Because an IPR must proceed “[i]n accordance with’ or ‘in conformance to’ the petition,” *SAS Inst., Inc. v. Iancu*, 138 S. Ct. 1348, 1356 (2018) (alteration in original) (quoting Oxford English Dictionary (3d ed., Mar. 2016), [www.oed.com/view/Entry/155073](http://www.oed.com/view/Entry/155073)), it would “not be proper for the Board to deviate from the grounds in the petition and raise its own obviousness theory,” *Sirona Dental Sys. GmbH v. Institut Straumann AG*, 892 F.3d 1349, 1356 (Fed. Cir. 2018).

As *inter partes* review is a formal adjudication, the Administrative Procedures Act (APA) also “imposes certain procedural requirements on the agency.” *Genzyme Therapeutic Prods. Ltd. v. Biomarin Pharm. Inc.*, 825 F.3d 1360, 1365–66 (Fed. Cir. 2016). For example, “[i]n interpreting the APA’s notice provisions in the context of IPR proceedings, we have cautioned that ‘an agency may not change

theories in midstream without giving respondents reasonable notice of the change and the opportunity to present argument under the new theory.” *Nike*, 955 F.3d at 52 (first quoting *SAS Inst., Inc. v. ComplementSoft, LLC*, 825 F.3d 1341, 1351 (Fed. Cir. 2016), *rev’d on other grounds*, 138 S. Ct. 1348 (2018); and then citing *Genzyme*, 825 F.3d at 1366).

But the AIA and APA do not uniformly preclude the introduction of new evidence after the petition is filed in an IPR proceeding. *See Anacor Pharms., Inc. v. Iancu*, 889 F.3d 1372, 1380 (Fed. Cir. 2018) (“There is, however, no blanket prohibition against the introduction of new evidence during an inter partes review proceeding.”). Rather, “the introduction of new evidence in the course of the trial is to be expected in *inter partes* review trial proceedings and, as long as the opposing party is given notice of the evidence and an opportunity to respond to it, the introduction of such evidence is perfectly permissible.” *Genzyme*, 825 F.3d at 1366.

Infineum argues that the Board erred by relying on two new theories raised for the first time in Oronite’s reply—first, that a skilled artisan “would select Examples 2 or 16 because they are equal to all other examples,” and second, “that other examples from Toshikazu did not perform better than Examples 2 or 16.” Appellant’s Br. 28; *see id.* at 30–31. Contrary to Infineum’s assertions, the Board did not err in concluding that these arguments were proper rebuttal arguments or in relying on them in its decision. Oronite’s reply arguments that a skilled artisan would have understood that “all of *Toshikazu*’s Examples 1–19 performed similarly” and “performed significantly better than *Toshikazu*’s Comparative Examples 1–5,” J.A. 1451, responded directly to Infineum’s contentions that a skilled artisan would not have been motivated to select Examples 2 and 16, J.A. 773, would have considered examples other than Examples 2 and 16 “more promising for further development,” J.A. 792, and would have understood that



Example 16 “did not perform as well . . . as Examples 3, 5 and 7,” J.A. 793.

To the extent Infineum argues that the Board impermissibly “change[d] theories in midstream” in violation of the APA, we disagree. *Genzyme*, 825 F.3d at 1366. The theory of unpatentability advanced in Oronite’s petition remained the same throughout the proceedings. Oronite’s reply maintained the petition’s position that each of the challenged ’685 patent claims would have been obvious over either Toshikazu Example 16 in view of Henderson or Toshikazu Example 2 in view of Henderson. *Compare* J.A. 146 (petition noting that obviousness Grounds 1–3, covering claims 1–4, 6–11, and 13–20, “rely on Example 16 of *Toshikazu*,” and that obviousness Grounds 4–6, covering claims 1–20, “rely on Example 2 of *Toshikazu*”), *with* J.A. 1450 (reply arguing that “Examples 16 and 2 of *Toshikazu*, in combination with *Henderson*, each renders the independent claims (and others) unpatentable as obvious”). And the Board’s decision held each of the challenged claims obvious on those same grounds. *Decision*, 2019 WL 5806946, at \*14–15, \*17–19 (relying on Example 16 of *Toshikazu* to hold obvious claims 1–4, 6–11, and 13–20); *id.* at \*21–23 (relying on Example 2 of *Toshikazu* to hold obvious claims 1–20).

Infineum’s argument that the Board’s reliance on Dr. Rizvi’s testimony was improper appears to be tied to its assertions that the Board impermissibly relied on new theories advanced for the first time in Oronite’s reply.<sup>6</sup> *See*,

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<sup>6</sup> Infineum’s opening brief also alleges that Oronite’s “new theories” were supported by “thirty new pieces of evidence,” Appellant’s Br. 28 (emphasis omitted), some of which Infineum identifies in a footnote, *id.* at 28 n.1. The same footnote acknowledges that “Infineum sought the Board’s permission to move to strike the Reply, Dr. Rizvi’s Declaration,” and certain exhibits submitted with the

*e.g.*, Appellant’s Br. 29; Reply Br. 12 (“Oronite admits that it tried to introduce the theory as to why [a] POSITA would select Examples 2 and 16 for the first time in its Reply, . . . and does not deny that this new theory was only supported by Dr. Rizvi’s reply declaration.”); *accord* J.A. 2634 (arguing before the Board that portions of Dr. Rizvi’s testimony subsequently relied on by the Board “[p]resent[] a new theory regarding the interpretation of the data from Toshikazu”).

Like the reply arguments Infineum identifies on appeal, Dr. Rizvi’s testimony was a proper rebuttal to arguments raised in Infineum’s patent owner response. For example, Infineum takes issue with the Board’s reliance on paragraphs 35–38 of Dr. Rizvi’s declaration. *See* Appellant’s Br. 29; *see also Decision*, 2019 WL 5806946, at \*12 (citing J.A. 2281–82 (Rizvi Dec. ¶¶ 35–38)). Paragraphs 35–38 merely explain, based on the state of the art, Dr. Rizvi’s statement in paragraph 34 (which Infineum did not challenge as improper) that “[a] person of ordinary skill in the art would not have found the differences between coefficient of friction or wear values reported in *Toshikazu* for Examples 1–19 to be important.” J.A. 2280. And Dr. Rizvi’s assertion of unimportant differences responded to Dr. Bansal’s assertion that a skilled artisan would “pursue formulations based on Examples 3, 5, and 7 and not on Example 16.” *Id.* (quoting J.A. 908). Further, the portions of Dr. Rizvi’s declaration Infineum highlights on appeal rely principally on record evidence, not new evidence. *E.g.*, J.A. 2290–91, 2313–15. We discern no impropriety in the challenged portions of Dr. Rizvi’s declaration.

Additionally, the Board’s reliance on Dr. Rizvi’s testimony did not violate the APA because Infineum had ample

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reply, and filed a motion to exclude certain reply exhibits. *Id.* Infineum has not appealed the Board’s denials of its motion to strike and motion to exclude.

notice and opportunity to respond to Dr. Rizvi's testimony. The Board permitted Infineum to depose Dr. Rizvi after receiving his reply declaration, and then to file a sur-reply, in addition to allowing the parties to file a joint chart identifying the reply arguments and evidence Infineum believed were improper.<sup>7</sup> Infineum availed itself of both of these opportunities to respond. For example, Infineum's sur-reply argued that the Board should disregard Oronite's reply and Dr. Rizvi's testimony in their entirety, J.A. 2344–47, in addition to responding extensively to Dr. Rizvi's testimony on the merits, J.A. 2347–65. Accordingly, the Board afforded Infineum the process it was due under the APA.

We thus conclude that the Board did not err in considering Oronite's reply arguments or Dr. Rizvi's testimony.

## II

Infineum also challenges several aspects of Board's decision as unsupported by substantial evidence. We find none of Infineum's challenges persuasive.

We review the Board's legal determinations de novo, *In re Elsner*, 381 F.3d 1125, 1127 (Fed. Cir. 2004), and its fact findings for substantial evidence, *In re Gartside*, 203 F.3d 1305, 1316 (Fed. Cir. 2000). Substantial evidence is "such relevant evidence as a reasonable mind might accept as adequate to support a conclusion." *OSI Pharms., LLC v. Apotex Inc.*, 939 F.3d 1375, 1381 (Fed. Cir. 2019) (quoting *Consol. Edison Co. v. NLRB*, 305 U.S. 197, 229 (1938)). Obviousness is a question of law based on underlying findings of fact. *Id.* at 1382 (quoting *In re Kubin*, 561 F.3d 1351, 1355 (Fed. Cir. 2009)). "An obviousness

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<sup>7</sup> To the extent that Infineum contends that the Board was categorically prohibited from relying on Dr. Rizvi's testimony, our precedent forecloses any such argument. *See Anacor*, 889 F.3d at 1380.

determination requires finding that a person of ordinary skill in the art would have been motivated to combine or modify the teachings in the prior art and would have had a reasonable expectation of success in doing so.” *Id.* (quoting *Regents of Univ. of Cal. v. Broad Inst., Inc.*, 903 F.3d 1286, 1291 (Fed. Cir. 2018)). “Whether a person of ordinary skill in the art would have been motivated to modify or combine teachings in the prior art, and whether he would have had a reasonable expectation of success, are questions of fact.” *Id.* (quoting *Regents of Univ. of Cal.*, 903 F.3d at 1291).

Infineum’s assertion that the Board erred in giving any credit to Oronite’s “unqualified expert,” Dr. Smolenski, lacks merit. It merely reprises the same argument Infineum essentially raised before the Board—that Dr. Smolenski’s testimony is not admissible because he is not sufficiently qualified. Much like district court evidentiary rulings, the Board’s evidentiary determinations, such as its decision not to exclude Dr. Smolenski’s testimony, are reviewed for abuse of discretion. *See Belden Inc. v. Berk-Tek LLC*, 805 F.3d 1064, 1078 (Fed. Cir. 2015) (citing *Chen v. Bouchard*, 347 F.3d 1299, 1307 (Fed. Cir. 2003)); *Sundance, Inc. v. DeMonte Fabricating Ltd.*, 550 F.3d 1356, 1363 (Fed. Cir. 2006) (holding that the district court abused its discretion in permitting a witness not qualified as an expert in the pertinent art to testify as an expert regarding issues of noninfringement or invalidity); *see also Hologic, Inc. v. Minerva Surgical, Inc.*, 764 F. App’x 873, 881 n.8 (Fed. Cir. 2019) (“We find no abuse of discretion in the Board’s determination that Dr. Mirabile had enough knowledge and skill to testify about this topic.”). We also “defer to the Board’s findings concerning the credibility of expert witnesses.” *Yorkey v. Diab*, 601 F.3d 1279, 1284 (Fed. Cir. 2010) (citing *Velandar v. Garner*, 348 F.3d 1359, 1371 (Fed. Cir. 2003)); *see also Shoes by Firebug LLC v. Stride Rite Children’s Grp., LLC*, 962 F.3d 1362, 1372 (Fed. Cir. 2020) (“The Board was within its discretion to weigh the credibility of expert testimony.” (citing *Yorkey*,

601 F.3d at 1284)). Abuse of discretion occurs if the ruling: “(1) is clearly unreasonable, arbitrary, or fanciful; (2) is based on an erroneous conclusion of law; (3) rests on clearly erroneous fact findings; or (4) follows from a record that contains no evidence on which the Board could rationally base its decision.” *Bouchard*, 347 F.3d at 1307 (citing *Geritsen v. Shirai*, 979 F.2d 1524, 1529 (Fed. Cir. 1992)).

Here, Infineum does not challenge the Board’s determination, grounded in the ’685 patent specification and the prior art of record, that “one of ordinary skill in the art could have experience in either formulating an engine oil or testing such oils in internal combustion engines.” *Decision*, 2019 WL 5806946, at \*5. Rather, Infineum argues that Dr. Smolenski’s “experience in a tangential aspect of testing motor oils, did not qualify him to testify as to how [a] POSITA would make or formulate a new motor oil.” Appellant’s Br. 45–46 (citation omitted). The Board reasonably considered and rejected this argument when it determined that “Dr. Smolenski has sufficient education and experience of a specialized nature to assist the Board in understanding the evidence of record.” *Decision*, 2019 WL 5806946, at \*5; see *Hologic*, 764 F. App’x at 880 n.6 (applying abuse of discretion standard to the Board’s rejection of a patent owner’s argument that an expert lacked sufficient experience with the relevant technology after finding no error in the Board’s determination of the level of ordinary skill in the art). Infineum offers no basis to contradict this conclusion, or to call into question the Board’s statement that it accounted for “Dr. Smolenski’s lack of benchtop formulating experience” in “determining the weight to give his testimony.” *Decision*, 2019 WL 5806946, at \*5. Accordingly, we discern no abuse of discretion in the Board’s consideration of or reliance on Dr. Smolenski’s testimony.

No more compelling is Infineum’s argument that the Board’s decision is unsupported by substantial evidence because the Board relied on Dr. Smolenski’s “hindsight

analysis” to select Examples 2 and 16 from Toshikazu, when “other examples from Toshikazu performed better.” Appellant’s Br. 41–42. We have rejected the notion that a patent challenger seeking to demonstrate obviousness must prove that a person of ordinary skill would have been motivated to select one prior art disclosure over another. *Novartis Pharms. Corp. v. W.-Ward Pharms. Int’l Ltd.*, 923 F.3d 1051, 1059 (Fed. Cir. 2019) (“It is thus improper to require West-Ward to prove that a person of ordinary skill would have selected everolimus over other prior art treatment methods.”); *see also In re Fulton*, 391 F.3d 1195, 1200 (Fed. Cir. 2004) (“[O]ur case law does not require that a particular combination must be the preferred, or the most desirable, combination described in the prior art in order to provide motivation for the current invention.”). In any event, Infineum’s argument amounts to a disagreement with how the Board weighed the evidence. The Board was within its province to credit Dr. Rizvi’s testimony that “one of ordinary skill in the art [would] have selected any of the example lubricating oils of Toshikazu for further development.” *Decision*, 2019 WL 5806946, at \*12 (discussing J.A. 2280–82 (Rizvi Dec. ¶¶ 33–38) and J.A. 174–76 (Smolenski Dec. ¶¶ 44–47)). The Board reasonably credited Dr. Rizvi’s explanation that “benchtop testing rigs, such as the shell-type four ball test employed in *Toshikazu*, have a certain amount of repeatability associated with their data,” and that the variance in the coefficients of friction reported in Toshikazu’s Examples 1–19 was within the repeatability specified by the applicable American Society for Testing and Materials standard. J.A. 2280–82; *see Decision*, 2019 WL 5806946, at \*12.

Similarly unavailing is Infineum’s apparent assertion that the Board’s decision is not supported by substantial evidence because “[t]he overwhelming evidence . . . showed that [a] POSITA would not presume that modifying additive components and base oils would necessarily work or improve the performance of a formulation.” Appellant’s

Br. 47. The Board reasonably relied on primary reference Toshikazu's express teachings to conclude that a skilled artisan "would have had a reasonable expectation of success in using a synthetic base oil that imparts an overall viscosity index of 95 or above to the lubricating composition of Example 16 of Toshikazu." *Decision*, 2019 WL 5806946, at \*8 (citations omitted); *see id.* ("Toshikazu expressly indicates that '[t]here is no particular limitation on the base oil used in the present invention, and it is possible to use various types of mineral oils, synthetic oils, and so on that are known in the art.'" (alteration in original) (quoting Toshikazu ¶ 12)); *id.* ("Toshikazu reports essentially identical results when the additive package of Example 16 is used with a mineral base oil, a synthetic base oil, or a mineral oil/high pressure hydrogenated base oil." (citing Toshikazu Examples 3, 16, and 17)). The general need for routine compatibility testing of any modified formulation does not undermine Toshikazu's teachings that different base oils could be used.

Moreover, contrary to Infineum's contentions, the Board's rationale for holding claim 12 obvious is not internally inconsistent. Infineum identifies a purported contradiction between: (1) the Board's conclusion that a skilled artisan "would have found it obvious to increase the amount of aliphatic acid glyceride," an organic ashless nitrogen-free friction modifier, "in Example 2 to at least 'about 0.25 wt. %' in order to save on costs," *id.* at \*22 (citing J.A. 140); and (2) the Board's finding with respect to claim 1, from which claim 12 depends, that notwithstanding that "mineral oils are cheaper than synthetic oils," a skilled artisan "would have sought to substitute the mineral oil of Example 2 with . . . a synthetic oil . . . in order to comply with the GF-3 standard and to achieve the benefits of higher quality oils discussed in Henderson," *id.* at \*20 (citing J.A. 127–28, 131–32). Appellant's Br. 48–49. To the extent that Infineum argues that the Board's first finding amounts to a conclusion that a skilled artisan would have

settled for decreased performance to reduce costs, the Board considered this argument and reasonably rejected it. *Decision*, 2019 WL 5806946, at \*22 (“Patent Owner’s arguments based on an alleged decrease in performance from such a change are not persuasive because we have found that one of ordinary skill in the art would not have differentiated the performance results reported for Examples 1–19 of Toshikazu.”).

Indeed, the Board credited the petition’s argument that cost would motivate a skilled artisan to increase the amount of aliphatic acid glyceride in Toshikazu’s Example 2 in view of the fact that it was “less expensive than other anti-wear compounds, including molybdenum,” *id.* (citing J.A. 139–40 (petition)), and the fact that “other examples in Toshikazu indicate that the amount of organic ashless nitrogen-free friction modifier may be increased without significantly affecting the performance of the lubricating compositions,” *id.* (first citing J.A. 139–40; and then citing J.A. 1471–72 (reply)); *see also* Toshikazu Table 1 (reflecting similar friction coefficients and wear track diameters for Examples 2 and 4 notwithstanding differences in aliphatic acid glyceride content). It is reasonable for a skilled artisan to be driven more by cost when effects on performance are minor or nonexistent. The Board’s conclusion that claim 12 would have been obvious is supported by substantial evidence.

Substantial evidence also supports the Board’s decision to give “limited weight” to Infineum’s unexpected results evidence with respect to fuel economy. *Decision*, 2019 WL 5806946, at \*14. Infineum argued before the Board that because a skilled artisan would have expected formulations with large amounts of molybdenum to provide superior fuel economy performance, the ’685 patent’s demonstration of superior fuel economy test results for the claimed formulations containing a low amount of molybdenum in combination with an organic ashless nitrogen-free friction modifier provided “truly unexpected” results. *Id.* at \*13 (quoting



J.A. 825). Relying on *Allergan, Inc. v. Sandoz Inc.*, 726 F.3d 1286, 1293 (Fed. Cir. 2013), the Board concluded that Infineum's unexpected results evidence was not meaningful in view of the fact that Toshikazu "provide[d] a strong reason to use low levels of molybdenum in combination with an organic ashless nitrogen-free friction modifier." *Decision*, 2019 WL 5806946, at \*14. Toshikazu discloses "excellent wear resistance and friction characteristics" of formulations containing low levels of molybdenum in combination with an organic ashless nitrogen-free friction modifier. Toshikazu ¶ 55. Toshikazu's formulations containing combinations of these two additives "further improved" the "wear resistance and the friction characteristics" "in comparison with the cases where either one is solely used." *Id.* ¶ 24. Considering Infineum's "evidence that this same combination of additives also provides an additional benefit with respect to fuel economy," the Board reasoned that it did "not alter the fact that the advantages of the combination of low molybdenum and an organic ashless nitrogen-free friction modifier were known in the art." *Decision*, 2019 WL 5806946, at \*14 (citing J.A. 1474).

Infineum does not meaningfully challenge this analysis, offering only an unsupported argument that "there was no evidence in this IPR that showed a clear motivation to combine." Appellant's Br. 39. This assertion does not call into question the Board's amply supported finding that Toshikazu taught advantages of the combination of low levels of molybdenum and an organic ashless nitrogen-free friction modifier independent of any improved fuel economy performance, or that Toshikazu would provide a skilled artisan with "a strong reason to use" a formulation with this combination. *Decision*, 2019 WL 5806946, at \*14; see Toshikazu ¶¶ 1, 9, 24, 55. Nor does Infineum meaningfully engage with the Board's finding that a skilled artisan would have a motivation, separate from increased fuel economy, to combine Toshikazu and Henderson to meet the then-applicable GF-3 industry standard. *Decision*,

2019 WL 5806946, at \*9. Accordingly, substantial evidence supports the Board’s decision finding that Infineum’s unexpected results evidence did not outweigh the evidence of obviousness in this case. *See Allergan*, 726 F.3d at 1293 (concluding that evidence that a particular combination solved additional problems was insufficient to outweigh other evidence of obviousness in view of a separate motivation to make the combination).

### III

Finally, our precedent forecloses Infineum’s constitutional challenges to the Board’s decision.

Infineum requests “vacatur and remand to the Board with instructions to dismiss the IPR” because under *Arthrex, Inc. v. Smith & Nephew, Inc.*, 941 F.3d 1320, 1329 (Fed. Cir. 2019), “the [Administrative Patent Judges (APJs)] who presided over this IPR were unconstitutionally appointed.” Appellant’s Br. 49. In Infineum’s view, the remedy this court adopted in *Arthrex* did not cure the Appointments Clause violation, and “there is no permissible interpretation of the statute.” *Id.* Infineum implicitly acknowledges, however, that we must apply *Arthrex*, which forecloses Infineum’s argument. *Arthrex*, 941 F.3d at 1337 (“This as-applied severance is the narrowest possible modification to the scheme Congress created and cures the constitutional violation in the same manner as *Free Enterprise Fund* [*v. Public Co. Accounting Oversight Board*, 561 U.S. 477 (2010)] and *Intercollegiate* [*Broadcasting System, Inc. v. Copyright Royalty Board*, 684 F.3d 1332 (D.C. Cir. 2012)]. Title 5’s removal protections cannot be constitutionally applied to APJs, so we sever that application of the statute.”); *see* Appellant’s Br. 52 (“Infineum presents this challenge in order to preserve its rights in the event that these issues are resolved by the Supreme Court.”).

Our precedent also undermines Infineum’s alternative argument that vacatur and remand to a new panel of Administrative Patent Judges is warranted because the

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Board issued its final written decision prior to issuance of the mandate in *Arthrex*. See Appellant’s Br. 52–53; *Caterpillar Paving Prods. Inc. v. Wirtgen Am., Inc.*, 957 F.3d 1342 (Fed. Cir. 2020). Infineum acknowledges that “in *Caterpillar*[,] this [c]ourt found that where an *inter partes* review argument occurred before the *Arthrex* opinion issued and the *inter partes* review’s final written decision issued post-*Arthrex*, the patent holder was not entitled to vacatur and remand for a new hearing.” Reply Br. 26 (citing *Caterpillar*, 957 F.3d at 1343). In *Caterpillar*, as here, the Board’s final written decision issued before the mandate issued in *Arthrex*. Applying *Caterpillar* and *Arthrex* to this case, there is no Appointments Clause violation because the Board’s final written decision issued after *Arthrex* was decided. See *Caterpillar*, 957 F.3d at 1342–43; *Arthrex*, 941 F.3d at 1340.

Finally, our precedent also forecloses Infineum’s argument that the Board’s retroactive application of IPR proceedings to invalidate the ’685 patent claims violates the Takings and Due Process Clauses of the U.S. Constitution. See Appellant’s Br. 54–59. Infineum appears to acknowledge as much, abandoning its Takings and Due Process Clause arguments in its reply brief. In any event, *Celgene Corp. v. Peter* held “that the retroactive application of IPR proceedings to pre-AIA patents is not an unconstitutional taking under the Fifth Amendment.” 931 F.3d 1342, 1362 (Fed. Cir. 2019), *cert. denied*, 141 S. Ct. 132 (2020).

#### CONCLUSION

We have considered the parties’ remaining arguments and do not find them persuasive. Accordingly, we affirm the Board’s decision.

**AFFIRMED**