

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

CMS CEP COR LTD., and CMS CEP COR AMERICAS LLC,
Petitioner,

v.

SANDVIK INTELLECTUAL PROPERTY AB,
Patent Owner.

Patent No. 11,014,090

Inter Partes Review No. IPR2024-01381

PATENT OWNER'S SUR-REPLY

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Patent Owner’s Exhibit List for *Inter Partes* Review of
U.S. Patent No. 11,014,090

Exhibit #	Exhibit Description
2001	Declaration of Harri Kytömaa, PH.D.
2002	Curriculum Vitae and Publications of Dr. Kytömaa
2003	Richard G. Budynas & J. Keith Nisbett, <i>Shigley’s Mechanical Engineering Design</i> , Ninth Edition (2011) (Chapter 3)
2004	Andrew W. Batchelor & Gwidon W. Stachowiak, <i>Engineering Tribology</i> , Second Edition (2001)
2005	Robert C. Juvinall & Kurt M. Marshek, <i>Fundamentals of Machine Component Design</i> , 3rd Edition (2000) (Chapter 9)
2006	Oscar J. Horger, <i>Metals Engineering Design</i> , First Edition (1953)
2007	Second Declaration of Harri Kytömaa, Ph.D.
2008	EP Application No. 13192402.9
2009	U.S. Application No. 15/035,774
2010	Third Declaration of Harri Kytömaa, Ph.D.
2011	Deposition Transcript of David Smith dated June 11, 2025
2012	Merriam-Webster’s Collegiate Dictionary, 11th ed. (2012) (definition of “end”)
2013	The Oxford English Dictionary, 2nd ed. (1989) (definition of “indented”)

2014	PCT Application No. PCT/EP2014/060594
2015	Richard G. Budynas & J. Keith Nisbett, <i>Shigley's Mechanical Engineering Design</i> , Ninth Edition (2011) (Chapter 8)
2016	John H. Bickford, <i>An Introduction to the Design and Behavior of Bolted Joints</i> , 3rd Edition (1995) (excerpts from Chapter 2)
2017	Robert C. Juvinall & Kurt M. Marshek, <i>Fundamentals of Machine Component Design</i> , 3rd Edition (2000) (excerpts from Chapter 10)
2018	Board's email of October 15, 2025, extending DUE DATE 3 and portion of DUE DATE 5 pertaining to Petitioner's sur-reply related to the motion to amend
2019 [NEW]	Second Deposition Transcript of David Smith dated October 24, 2025

I. INTRODUCTION

Sandvik Intellectual Property AB (“Sandvik” or “Patent Owner”) submits this Sur-Reply in response to the Reply (Paper 18) filed by CMS Cepcor Ltd. and CMS Cepcor Americas LLC (collectively, “CMS” or “Petitioner”) and the accompanying Second Declaration of David Smith (“Smith II”; Ex. 1044 (filed as the Second Smith Declaration)). Petitioner fails to rebut Sandvik’s arguments set forth in its Patent Owner Response (“POR”; Paper 15). The Board should find the challenged claims patentable over the sole ground of Polinski in view Piepho and Harless.

II. CLAIM CONSTRUCTION

A. “end”

The claim construction dispute turns on whether “end” refers to the extremity or last part of a claimed feature (as Sandvik proposes) or whether the term includes a region that is merely near such an extremity or last part (as Petitioner proposes). (Paper 15, 14; Paper 18, 9.) All of the intrinsic and extrinsic evidence, including the declaration and deposition testimony of Petitioner’s expert Mr. Smith, establishes that Sandvik’s construction of “end”—“an extremity of a shaft body or sleeve”—is correct.

First, the plain language of the claims shows that Petitioner’s construction—which Petitioner argues encompasses a region that “near such an extremity,” *e.g.*, Ex. 1044, ¶ 22—cannot be correct. The disputed claim term is “end,” which

appears in the claims at 1[a], 1[b], 9[a], 9[b], [9[e], 14[a], and 14[b]. The claims do not use the term “end” with the modifier “region.” Other claim limitations, however, do use the modifier “region.” For example, the claims recite “tapered axial region” (independent claims 1, 9, 14), “perimeter region” (dependent claim 10), “lower region” and “upper region” (independent claim 14). This shows that when the claims refer to a region, they do so expressly. *E.g.*, *NeuroGrafix v. Brainlab, Inc.*, 787 Fed. Appx. 710, 719 (Fed. Cir. 2019) (refusing to construe “selected structure” as equivalent to “region” because the claim recited “selected structure” and “region” as separate terms); *Lab. Corp. v. Qiagen Sciences, LLC*, 2025 WL 2327197, *4-*5 (Fed. Cir. 2025) (“Reading the modifier, ‘a portion,’ into the unmodified term ‘identical’ would render the modifier language superfluous” where other claim language used the term “portion.”).

Petitioner’s argument that the claim term “end” refers to an end region ignores that the claims use “region” to modify some terms, but not “end.” Mr. Smith’s analysis of the specification demonstrates conclusively that Petitioner’s construction is wrong. As Mr. Smith observes, when the ’090 patent specification refers to a portion or a region, it says so: “Examples [in the specification] include ‘end region’ and ‘radially tapered end section.’ These are used to denote when the term ‘end’ means a portion or region.” (Ex. 1044, ¶ 10.) Unlike these specification passages, the claim language does not modify the term

“end” with words like “region” or “section.” The difference between the claim language and the specification language shows that the specification’s language should not be imported into the claim.

FIG. 3 of the '090 patent is illustrative. The “end surface 123” is at the extremity of the shaft. So is upper end 301, which is not itself a surface, but an identification of the “end” of the axial length of both the shaft and the tapered region 113.

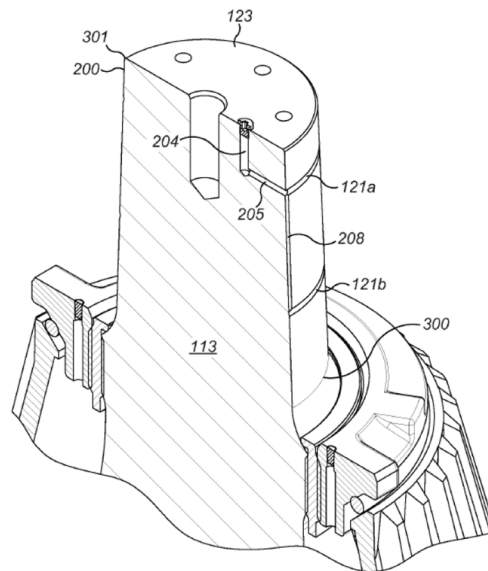


FIG. 3

According to the '090 patent: “Referring to FIGS. 2 to 4 tapered region 113 comprises a lowermost end 300 and an uppermost end 301. The radial taper is uniform along the axial length between ends 300, 301 such that a cross-sectional area decreases from lower end 300 to upper end 301 at a uniform rate to define a frusto-conical region 113 of main shaft 107. Sleeve 124 comprises a first (lower)

end 216 for mating at the end 300 of region 113 and a second (upper) end 215 for positioning at uppermost end 301 substantially coplanar with shaft end surface 123.” (Ex. 1001, 5:26–35.) Like shaft end surface 123, upper end 301 is defined by the extremity of the shaft.

At his deposition, Mr. Smith confirmed that the claimed “end” is not merely “near” an extremity, but rather must *include* the extremity.

Q. So would the end region necessarily include the upper end surface 123?

A. I think that’s reasonable. (Ex. 2019, 84:22–24.)

Mr. Smith’s testimony is consistent with his analysis of the colloquial meaning of “end” and illustrates why Sandvik’s proposed construction of “end” is both correct and fully consistent with the ’090 patent’s specification. As Mr. Smith explains, the colloquial meaning of “end” is “last,” such that a caboose is at the end or last part of a train and the end of a novel is its last few pages. (Ex. 1044, ¶ 22.) So too when the claim language uses the term “second end” of a shaft body, it refers to the last part, *i.e.*, extremity, of the shaft body—not a region of the shaft body that is near the extremity or last part.

Indeed, every example of an end or end region of a shaft or a sleeve in the ’090 patent includes the extremity of the shaft or sleeve. (Ex. 2007, ¶¶ 24–28.) And consistent with Mr. Smith’s testimony (and Sandvik’s construction) the

“sleeve lower end 216 comprises a chamfer region 207,” which means that the chamfer includes the lower extremity of the sleeve. This consistent usage throughout the ’090 patent confirms that the claims’ use of “end”—without the modifier “region”—refers to an extremity of the shaft or sleeve at issue.

B. “indented at the external surface”

Sandvik’s construction—“a depression or recess in an external surface”—is supported by all of the intrinsic evidence. Petitioner’s reliance on extrinsic evidence—Mr. Smith’s declaration and one dictionary definition among many of “at”—to contradict the intrinsic record is improper as a matter of black letter Federal Circuit law. *E.g., Phillips v. AWH Corp.*, 415 F.3d 1303, 1322-23 (Fed. Cir. 2005) (en banc) (“[J]udges ... may [] rely on dictionary definitions when construing claim terms, so long as the dictionary definition does not contradict any definition found in or ascertained by a reading of the patent documents.”). “Extrinsic evidence may not be used ‘to contradict claim meaning that is unambiguous in light of the intrinsic evidence.’” *Profectus Tech. LLC v. Huawei Techs. Co.*, 823 F.3d 1375, 1380 (Fed. Cir. 2016) (quoting *Phillips*, 415 F.3d at 1324).

The independent claims recite “at least one groove indented at the external surface,” where “the external surface” refers to the shaft body. (*See, e.g., Ex. 1001, 7:3–4, 11.*) There is no dispute that “indented” means “impressed, struck, or

dented in, so as to make a depression or hollow in a surface.” (Paper 15, 23) (quoting Ex. 2013, 846 (definition of “indented”). The claim language thus requires a depression or hollow in a surface, *i.e.*, the claimed external surface of the shaft body. The phrase “at the external surface” distinguishes the placement of the groove from the optional placement of the “fluid inlet conduit” which can be “internally within the shaft body” as recited by dependent claim 3.

This straightforward reading of the claim language is consistent with how Sandvik used the phrase “at the external surface” in the Summary of the Invention.

The subject invention provides for the convenient and efficient mounting and dismounting of the sleeve at the main shaft by virtue of the combination of the fluid filled *grooves at the external surface of the main shaft* and the radially tapered end section of the main shaft onto which the sleeve is mounted. ... The conical profiled and *grooved main shaft section* in combination with a corresponding tapered sleeve is therefore advantageous.¹ (Ex. 1001, 2:46–58; *see also* Abstract.)

The specification thus explicitly explains that “grooves at the external surface of the main shaft” result in a “grooved main shaft section.” Grooves at the external surface of the main shaft do *not* result in a grooved sleeve.

To the extent the claim language and specification might be ambiguous (they are not), the prosecution history makes crystal clear that Sandvik’s construction is

¹ All emphases are added unless otherwise noted.

correct. To overcome prior art rejections, Sandvik argued that the claims require “a groove being *in[d]ent[t]ed/recessed into the external surface* of th[e]...main shaft” “as opposed to being recessed into the sleeve.” (Ex. 1001-1, Amendment dated January 25, 2019, 6; Paper 15, 10, 22–23.) Although the Board need not expressly find disclaimer here, the clarity of Sandvik’s statement meets that exacting standard. Petitioner and Mr. Smith have no response to the prosecution history. (Paper 18, 10–11; Ex. 1044, ¶ 42.) In fact, Mr. Smith did not even review the prosecution history in preparing his second declaration on the construction of “indented at the external surface.” (Ex. 2019, 81:15–20.)

To oppose this intrinsic evidence, Petitioner and Mr. Smith rely on one dictionary definition (among multiple definitions) of “at” to argue that a groove at the external surface of the shaft can mean a groove in the sleeve. (*See, e.g.*, Ex. 1044, ¶¶ 31–32.) Specifically, Dr. Smith includes definition 1a of “at” from Webster’s Third New International Dictionary (1993), which states: “used as a function word to indicate presence in, on, or near.”² (Ex. 1044, ¶ 31 (emphasis in original).) As described above, the specification and file history explicitly reject a groove in the sleeve and Petitioner’s reliance on this definition fails.

Finally, Petitioner misreads the following specification passage to argue that ’090 discloses a groove “‘indented’ on the other side of the sleeve”:

² Dr. Smith did not submit the source of his cherry-picked definition as an exhibit.

According to a specific embodiment, the assembly may optionally comprise a fluid inlet conduit extending radially through the wall of the sleeve in fluid communication with the groove to allow a fluid to be supplied to the groove through the sleeve.

Ex. 1044 at ¶¶ 40–41 (quoting Ex. 1001, 4:13-18) (emphasis in original).) There are multiple problems with this reading. One is that the claim recites a groove at the external surface of the shaft. Because the sleeve is mounted on the tapered end of the shaft, *e.g.*, Ex. 1001 at 2:46-52, the “other side of the sleeve” refers to the external surface of sleeve, such that the postulated groove would not assist with dismounting the sleeve from the shaft. Another is that the quoted passage makes no reference to a groove on the sleeve at all. Rather, the passage discloses a fluid inlet through the sleeve, as an alternative embodiment to a fluid inlet at the end of the shaft for supplying fluid to the groove. The references to “the groove” in the quoted passage refer to the groove described in columns 3 and 4, which is exclusively described as being indented in the shaft.

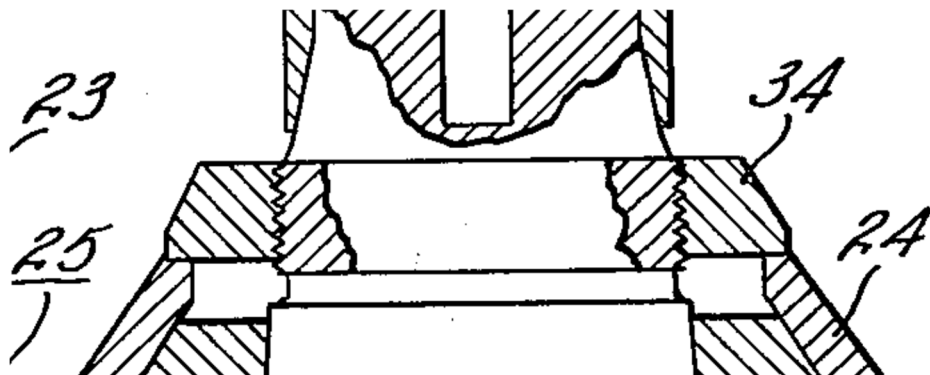
The Board should thus adopt Sandvik’s construction of “indented at the external surface.”

III. POLINSKI AND PIEPHO ARE DEFICIENT

In its POR, Sandvik argued that Polinski and Piepho do not disclose or suggest an axial region of the shaft body *extending from the second end* and being tapered relative to the longitudinal axis as recited in 1[b], 9[b] and 14[a]. (Paper

15, 41–48; *see also* Ex. 2007, ¶¶ 58–65.) In addition, Sandvik explained that Polinski and Piepho fail to disclose or suggest “‘the sleeve having a tapered wall thickness, such that the wall thickness at a second end of the sleeve is greater than the wall thickness at a first end of the sleeve’ as recited in 9[e] and 14[b].” (Paper 15, 48–52; *see also* Ex. 2007, ¶¶ 66–76.) Neither Petitioner nor Mr. Smith rebutted these arguments other than challenging Sandvik’s construction of “end.” (Paper 18, 8–11; Ex. 1044, ¶¶ 9–27, 46.) Thus, if the Board rules in favor of Sandvik on its “end” construction, then all the challenged claims are patentable in view of the above deficiencies of Polinski and Piepho.³

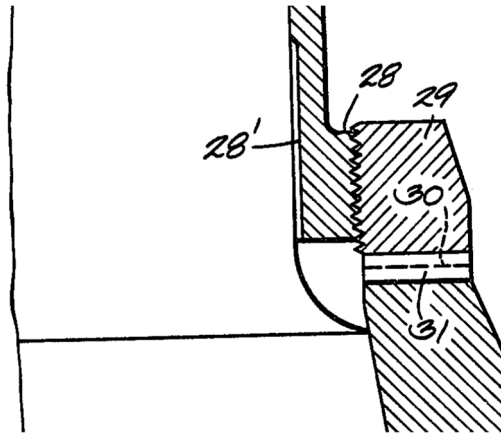
Petitioner’s silence is particularly conspicuous with respect to Polinski. Citing to U.S. Patent No. 4,034,922 to Coxhill, Polinski explains that conventional gyratory crusher shafts typically include a threaded section on the shaft for securing the mantle to the shaft. (Ex. 1017, 1:11–25.) Excerpted FIG. 1 of Coxhill ’922 shows this arrangement:



³ Petitioner did not rely upon Harless for these limitations in its Petition.

Nut 34 is engaged via threads to the shaft to secure mantle 24. Polinski warns that this conventional arrangement can lead to shaft failure. (Ex. 1017,1:26–41.)

Polinski’s invention is to have a bearing sleeve—not the shaft—engage with the mantle as shown in excerpted FIG. 2:



The bearing sleeve provides a threaded shoulder 28 that receives a head nut 29 that secures the mantle to the bearing sleeve. (Ex. 1017, 2:67–3:14.)

In his second declaration, Dr. Kytömaa explained that the mantle in Polinski exerts stresses on its sleeve. For example, he testified that “torsional and axial loads” are “exhibited on the sleeve via threaded shoulder 28.” (Ex. 2007, ¶ 65.) And that the additional material provided by the shoulder 28 relative to the remainder of the sleeve’s axial wall is needed to distribute “the stresses exerted on the sleeve by the mantle.” (Ex. 2007, ¶ 75.) Dr. Kytömaa concluded that it would not have been obvious to modify Polinski to, *e.g.*, reduce the thickness of the threaded shoulder, to meet a tapered shaft or sleeve as claimed. Such a change would “significantly increase the likelihood that the sleeve would fail during

operation” and “introduce a stress concentration at the thread runout locations.” (Ex. 2007, ¶¶ 73–74.) “Moreover, removal of the threaded shoulder present in Polinski would result in more of the load in the threaded connection being concentrated on the first engaged thread.” (Ex. 2007, ¶ 75.)

Petitioner did not cross-examine Dr. Kytömaa on this testimony—both as to stresses exerted on the sleeve by the mantle and the impact of the proposed modification. In contrast, on cross-examination, Mr. Smith demurred when asked even about the preliminary question of whether Polinski’s mantle exerted different types of forces—axial, torsional, bending—on the sleeve. For example, queried if “a person of ordinary skill in the art looking at Polinski, specifically Figure 2, [would] understand that the mantle 10 during the operation of the gyratory crusher exerts axial stresses on sleeve 12,” Mr. Smith stated: “Without doing a proper analysis, I can’t say for sure. I would imagine that as the mantle is fit down onto th[e] tapered section of the shaft that most, if not all, of the forces from the crushing operation from the material that go into the mantle will go, essentially, directly into that tapered portion of the shaft.” (Ex. 2019, 45:22–46:9.) Later, he testified that an upward axial force “is not something that you would expect in a crushing operation, where an axial force would generally be expected in the downward direction just based on the geometry and the function.” (Ex. 2019, 47:7–20.)

With respect to any torsional forces in Polinski's design, Mr. Smith explained that "you could get some of that torsional force from the mantle into the sleeve" but "it looks like it's designed to not have that happen." (Ex. 2019, 48:12–49:12.) Mr. Smith then testified that "I don't think that the mantle would really be exerting bending forces on the sleeve 12." (Ex. 2019, 49:13–22.)

Polinski contradicts Mr. Smith's testimony and thus should be given little weight. *See, e.g., Homeland Housewares, LLC v. Whirlpool Corp.*, 865 F.3d 1372, 1378 (Fed. Cir. 2017) ("[W]e must disregard the testimony of an expert that is plainly inconsistent with the record[.]") (internal citation omitted). Polinski provides that the bearing sleeve engages the crusher mantle "to restrain axial displacement of the mantle along the shaft." (Ex. 1017, 4:49–52.) This disclosure directly contradicts Mr. Smith's testimony that "I can't say for sure" about axial stresses in Polinski. Polinski further discloses that the "heat-shrink type connection will generally be sufficient to secure the sleeve and *thus the crusher mantle* on the shaft during normal crusher operation," thereby making clear that the sleeve absorbs forces imparted on the mantle. (Ex. 1017, 3:18–23.) And Polinski highlights "the substantial stresses generated by the cyclic bending loads applied to the shaft by the mantle during operation of the crusher." (Ex. 1017, 1:26–29.) This is contrary to Mr. Smith's repeated assertions that the mantle would not be exerting forces on the sleeve 12 in Polinski's design.

At other points during cross-examination, Mr. Smith expressed uncertainty as to what forces would be exhibited under either the conventional Coxhill or Polinski's invention. When asked whether the nut 34 exerts bending forces on the shaft in U.S. Patent No. 4,037,800 to Coxhill, which shares a similar disclosure to Coxhill '922 on this issue, he testified that "this is hard to say without doing a full analysis." (Ex. 2019, 61:4–9.) And when asked a similar question with respect to Polinski, he testified the same:

Q. But what I'm trying to understand from you is whether the sleeve would still, in Figure 2 of Polinski, still experience axial, torsional, and bending forces from mantle 10.

A. The real answer is, I don't know without doing a full and complete analysis. (Ex. 2019, 50:17–22.)

Whether Mr. Smith believes there are no forces exerted on the sleeve or simply does not know, he is wrong in both respects. Polinski makes clear that the mantle exerts forces on the sleeve, and those forces foreclose Petitioner's modifications as Dr. Kytömaa testified. If the Board finds in favor of Sandvik on its construction of "end," with respect to limitations 1[a], 9[b] and [e], and 14 [a] and [b], it should find that the challenged claims are patentable.

IV. THERE IS NO MOTIVATION TO COMBINE THE REFERENCES

The challenged claims are patentable for additional reasons. For example, there would be no reason to modify Polinski in view of Piepho and Harless. (Paper

15, 52–59.) Adding a groove—a stress raiser—to Polinski’s shaft would heighten the risk of shaft failure through fracture, precisely what Polinski aims to prevent by removing threads from its shaft. (Ex. 1017, 1:61–67; Ex. 2007, ¶ 79.) A POSITA would know from Shigley that fatigue is a “complicated phenomenon,” and that fatigue failure gives “no warning,” is “sudden and total, and hence dangerous.” (Ex. 1049, 266.) With limited experience and facing a “fairly complex machine[]” a POSITA would not introduce a modification that undermines Polinski’s *raison d’etre*. (Ex. 2007, ¶¶ 19, 87–88; Ex. 1002, ¶ 27.) Although not particularly clear, Petitioner and Mr. Smith appear to make two responsive points. Both are meritless.

First, Sandvik argued that Polinski’s invention is directed to removing abrupt structural discontinuities from high stress regions of the shaft. (*See, e.g.*, Ex. 1017, 1:61–67.) Polinski explains that the relatively abrupt changes in the cross-sectional area of the shaft result in high local stress concentrations. (Ex. 1017, 1:20–32; Ex. 1049, 267.) Dr. Kytömaa testified that cutting an oil groove into the bearing journal “would introduce stress raisers and corresponding stress concentrations into the shaft,” “would have a similar effect to threads,” and “would increase the likelihood of fretting wear and fretting induced fatigue failure.” (Ex. 2007, ¶¶ 78, 79, 81–85; *see also* Ex. 1049, 110 (“stress concentrations can also arise from . . . notches, grooves or threads.”).)

Petitioner and Mr. Smith respond that “[a] POSITA would know that the small depth of the grooves required to perform their function would not [amount to] the ‘abrupt changes in cross-sectional area of the shaft’ that Polinski [was] allud[ing] to.” (Paper 18, 5; Ex. 1044, pp. 28–29.)⁴ But, on cross-examination, Mr. Smith testified differently. He admitted that “there are probably some instances where the sizes of [threads and grooves] line up.” (Ex. 2019, 72:9–15.) This testimony makes clear that there is nothing inherent about a groove being less deep than a thread or any other abrupt change in cross-sectional area. To the contrary, a groove depth could “line up” with the depths of other types of abrupt changes.

As with his testimony on forces, Mr. Smith ultimately testified that he was uncertain. For instance, when asked whether the depth of a groove would be similar in size to the depth of a thread in the context of a gyratory crusher, Mr. Smith responded: “I don’t think I have enough information to compare those.” (Ex. 2019, 72:21–25; *see also* 76:13–77:6.) This testimony suggests that his declaration testimony on the “small depth” of grooves is pure speculation. Either Mr. Smith is speculating as to the depth of a groove in a gyratory crusher, or he believes that a groove may have a depth corresponding to other types of

⁴ Sandvik cites to the page numbers of Ex. 1044 given the length of ¶ 45.

structural discontinuities. In either case, his cross-examination testimony undercuts his direct testimony that a groove does not amount to an abrupt change as described in Polinski.

Second, Petitioner and Mr. Smith argue that the “many sections in Shigley dedicated to calculating fatigue failures both enables a POSITA to analyze the stress as well as educate them on the many methods to reduce high stress regions and concentrations in order to optimize a design for intended use.” (Paper 18, 4; Ex. 1044, pp. 27–28.) They also make similar arguments with respect to fretting and fretting induced failure. (Paper 18, 6–7; Ex. 1044, pp. 29–31.) But Mr. Smith’s understanding of Shigley’s discussion of fatigue was spotty. When asked if a POSITA would find fatigue to be a complicated phenomenon, he testified “[n]o, I don’t think so.” (Ex. 2019, 68:8–14.)

Shigley, however, explains that “[f]atigue is a much more complicated phenomenon, only partially understood . . .” and that the “surface fatigue mechanism is not definitively understood.” (Ex. 1049, 266, 327; *see also* Ex. 2007, ¶ 87 (“fatigue is a complicated failure mechanism that is difficult to predict analytically”).) Shigley thus belies Mr. Smith’s assertion that a POSITA would be able to analyze stresses and optimize designs for a gyratory crusher. The combination of a limited level of skill (Ex. 2009, ¶ 19), a “fairly complex machine[]” (Ex. 1002, ¶ 27) and a phenomenon that is “complicated” and

“partially understood” would not lead to the proposed modifications to Polinski, especially when Polinski’s stated purpose is mitigating shaft fatigue failure and the modification risks undermining that purpose. (Ex. 1017, 1:61–67; Ex. 2001, ¶ 30; Ex. 2007, ¶¶ 19, 87.)

Indeed, where Mr. Smith agreed with Shigley only further underscores the lack of motivation to combine the references. Mr. Smith agreed with Shigley that fatigue is “sudden,” “total,” and “dangerous.” (Ex. 1049, 266; Ex. 2019, 69:8–71:2.) Shaft fatigue failure would thus be front and center for a POSITA because of its existential threat. The increased risk of shaft failure posed by the addition of an oil groove would dissuade a POSITA from incorporating a groove. (Ex. 2007, ¶ 86.) And it would tip against the Petitioner’s modification under the *Winner* weighing of any purported advantages against the clear disadvantages, because shaft failure is an existential threat that is “sudden,” “total,” and “dangerous.” (Ex. 2007; *Winner Int’l Royalty Corp. v. Wang*, 202 F.3d 1340, 1349 n. 8 (Fed. Cir. 2000); *see also Henny Penny Corp. v. Frymaster LLC*, 938 F.3d 1324, 1332 (Fed. Cir. 2019) (noting that *Winner* emphasizes the benefits “*both lost and gained*” and finding that benefits *lost* outweighed any purported gains) (emphasis in original).)

Finally, Mr. Smith argues that Shigley would provide a POSITA with working knowledge of fatigue failure, including due to fretting, and would guide her in addressing the possibility of failure. (*See, e.g.,* Ex. 1044, p. 29 (“fretting is

another issue that a POSITA would be aware of from textbooks and prior art, such as Shigley Section 6-9. . . .”).) But this testimony is based on wrong assumptions. Mr. Smith believes that fatigue is *not* a complicated phenomenon. (Ex. 2019, 68:8–19.) Shigley states otherwise. (Ex. 1049, 266.) Nor is it correct to assume that a few equations or tables in Shigley would simply unlock an answer. Dr. Kytömaa testified, without challenge, that “[f]atigue testing is difficult to setup and run and requires many samples to generate meaningful data.” (Ex. 2007, ¶ 87.) He explained that “a strong understanding of the fatigue loading conditions is required to evaluate fatigue, but a POSITA would have difficulty predicting the fatigue loads to use in this scenario to run the analysis.” (Ex. 2007, ¶ 87.) To assume that a POSITA, two years out of college, with a limited handle on fatigue failure and not necessarily experienced with gyratory crushers, would modify Polinski in a manner that *increases* the risk of shaft failure is unsupported by the record.

V. PETITIONER HAS DROPPED ITS CHALLENGE TO CLAIM 11

In its Reply, Petitioner does not request cancellation of claim 11: “For all of the reasons stated above, CMS Cepcor requests the cancellation of claims 1-10 and 12-14 of the ’090 patent[.]” (Paper 18, 11.) Rightly so. FIG. 7 of Harless does not disclose a recess as recited in claim 11. FIG. 7 of Harless in the Petition—modified to show a purported recess—was a creation of Petitioner, not Harless. (Paper 2, 39.) And Mr. Smith confirmed that point on cross-examination when he

could not identify the lines under the retainer in Harless as a recess. (Ex. 2011, 88:3–8; 89:22–90:8; Paper 15, 59–62.) Thus, the Board should find claim 11 patentable for this additional reason.

VI. DR. KYTÖMAA’S UNREBUTTED TESTIMONY SHOULD BE GIVEN FULL WEIGHT

Petitioner and Mr. Smith challenge Dr. Kytömaa’s testimony as biased. (Paper 18, 1–8; Ex. 1044, pp. 24–31.) The record does not support this charged word. To contrary, Dr. Kytömaa provided unbiased direct testimony, and he was never cross-examined by Petitioner on that testimony. His testimony should be given full weight.

Mr. Smith contends that Dr. Kytömaa stated that tribology, fracture mechanics and fluid mechanics would not be obvious to a POSITA and beyond her skill. (Ex. 1044, p. 25.) Not true. These topics were listed by *Mr. Smith* while describing gyratory rock crushers as “fairly complex machines.” (Ex. 1002, ¶ 27.) And, in discussing those topics, Dr. Kytömaa explained that the *proposed modifications* to the prior art—not the topics themselves—were beyond the level of skill. (Ex. 2007, ¶ 19.)

Next Mr. Smith contends that Dr. Kytömaa is somehow diminishing the capabilities of a POSITA by stating that “the shaft must withstand variable and unpredictable fatigue loads resulting from a wide range of material hardnesses.” (Ex. 1044, p. 26–27; Ex. 2007, ¶ 20.) This is an accurate statement and does not

state that a POSITA has diminished knowledge. To the contrary, such knowledge would motivate against Petitioner's combination.

On page 27 of his declaration, Mr. Smith simply mischaracterizes what Dr. Kytömaa testified as to reducing the thickness of Polinski's threaded shoulder 28. Dr. Kytömaa never argued that a POSITA "would have no experience with fatigue or material hardness." (Ex. 1044, p. 27.) As discussed above, he testified as to the knowledge of a POSITA on these topics.

Mr. Smith criticizes Dr. Kytömaa for not giving weight to Polinski's statement that "this type of arrangement has proven to be satisfactory for most crusher installations[.]" (Ex. 1044, p. 28; Ex. 1017, 1:20–22.) But it is *Mr. Smith* who does not give proper weight to Polinski's disclosure. The statement concludes by explaining that "experience has indicated that the relatively abrupt changes in the cross-sectional area of the shaft above and below the threaded section have resulted in high local stress concentrations in these regions of the shaft." (Ex. 1017, 1:22–25.) Then Polinski describes in detail its design to eliminate abrupt structural discontinuities. (*See, e.g.*, Ex. 1017, 1:61–67; *Henny Penny*, 938 F.3d at 1332 (underscoring the "longstanding principle that the prior art must be considered for all its teachings, not selectively.")).

Finally, Mr. Smith criticizes Dr. Kytömaa for failing to consider Piepho's disclosure of a coating. (Ex. 1044, p. 30.) Yet, it is Mr. Smith's combination that ignores the coating—relying on Piepho for only its tapered sleeve.

The attack on Dr. Kytömaa as “biased” is meritless.

VII. CONCLUSION

For the foregoing reasons, the challenged claims are patentable.

Dated: October 31, 2025

Respectfully submitted,

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Certification of Word Count (37 C.F.R. § 42.24)

I hereby certify that this PATENT OWNER’S SUR-REPLY has 4,708 words (as counted by the “Word Count” feature of the Microsoft Word™ word-processing system), exclusive of “a table of contents, a table of authorities, mandatory notices under § 42.8, a certificate of service or word count, or appendix of exhibits or claim listing.”

Dated: October 31, 2025

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CERTIFICATE OF SERVICE

I hereby certify that the attached PATENT OWNER’S SUR-REPLY was served as of the below date via email (by agreement) to the following counsel of record for the Petitioner:

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