

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

CATERPILLAR INC.,
Petitioner,

v.

WIRTGEN AMERICA, INC.,
Patent Owner.

IPR2022-01278
Patent 8,424,972 B2

Before BARRY L. GROSSMAN, JAMES J. MAYBERRY, and
RICHARD H. MARSCHALL, *Administrative Patent Judges*.

MARSCHALL, *Administrative Patent Judge*.

DECISION
Granting Institution of *Inter Partes* Review
35 U.S.C. § 314

I. INTRODUCTION

A. *Background and Summary*

Caterpillar Inc. (“Petitioner”) filed a Petition for *inter partes* review of claims 1–10, 25, 27, 30, 31, 33, 34, and 36–40 of U.S. Patent No. 8,424,972 B2 (Ex. 1001, the “’972 patent”). Paper 2¹ (“Pet.”). Wirtgen, Inc. (“Patent Owner”) timely filed a Preliminary Response to the Petition. Paper 11 (“Prelim. Resp.”).

We have jurisdiction under 35 U.S.C. § 314. Under § 314, an *inter partes* review may not be instituted “unless . . . there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.” 35 U.S.C. § 314(a). The Board determines whether to institute a trial on behalf of the Director. 37 C.F.R. § 42.4(a) (2022).

For the reasons set forth below, we determine that Petitioner has demonstrated that there is a reasonable likelihood that at least one of the challenged claims is unpatentable. Accordingly, we institute an *inter partes* review of all challenged claims and on all grounds asserted in the Petition. *PGS Geophysical AS v. Iancu*, 891 F.3d 1354, 1360 (Fed. Cir. 2018) (stating that a decision to institute is “a simple yes-or-no institution choice respecting a petition, embracing all challenges included in the petition”).

B. *Real Parties-in-Interest*

Caterpillar identifies itself as well as its subsidiaries Caterpillar Paving Products, Inc. and Caterpillar Prodotti Stradali S.r.L. as real parties-

¹ We refer to the public version of the Petition. Petitioner filed a confidential version of the Petition under seal as Paper 1.

in-interest. Pet. 83. Wirtgen identifies itself and Wirtgen GmbH as real parties-in-interest. Paper 9, 2.

C. Related Matters

Petitioner and Patent Owner identify the following district court proceeding as a related matter: *Wirtgen Am., Inc. v. Caterpillar, Inc.*, Case No. 17-770-RGA (D. Del.). Pet. 86; Paper 9, 2.

Petitioner and Patent Owner also identify the following pending *inter partes* review proceeding as a related matter: IPR2022-01310 challenging additional claims of U.S. Patent 8,424,972 B2. Pet. 83; Paper 9, 2; *see* IPR2022-01310. We also note that IPR2022-01264 and IPR2022-01277 between the same parties contain similar claims and challenges.

D. The '972 Patent

The '972 patent, titled “Road Milling Machine and Method for Positioning the Machine Frame Parallel to the Ground,” issued April 23, 2013, from an application filed December 21, 2007. Ex. 1001, codes (22), (45), (54). The '972 patent ultimately claims priority to a German application filed December 22, 2006. *Id.*, code (30).

The '972 patent relates to “a self-propelled road milling machine, especially a cold milling machine, as well as a method for positioning the machine frame parallel to the ground.” Ex. 1001, 1:7–10. The '972 patent explains that there are several known problems with known road milling machines where the machine frame does not extend parallel to the ground. The '972 patent explains that “if the machine frame does not extend parallel to the ground, the stripping means will not rest on the ground with sufficient exactness behind the milling roller to allow for a residue-free stripping process to be performed on the surface under treatment.” *Id.* at 1:33–38.

The '972 patent further states that “if the machine frame is not arranged parallel to the ground, . . . material which has been milled off may intrude into the region between the band shoe and the still untreated ground surface.” Ex. 1001, 1:38–43. Additionally, the '972 patent explains that in known machines “the milling depth can not be controlled accurately enough and that, for this reason, the milling depth has to be measured repeatedly by hand during the milling operation.” *Id.* at 1:46–49.

The '972 patent purports to address these problems, in one embodiment, through “the control device [that] automatically controls the lifting condition of at least one rear and/or front lifting column, as seen in the traveling direction, for positioning the machine frame parallel to the ground or traffic surface or for positioning the machine frame at a predetermined milling level.” *Id.* at 2:1–6. Figure 1 of the '972 patent is reproduced below.

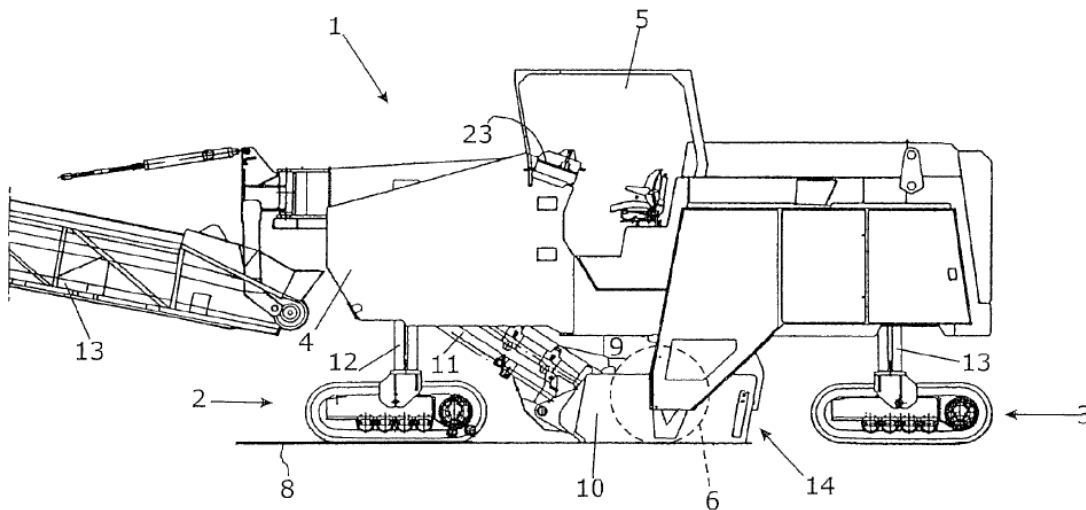


Fig.1

Figure 1 “shows a cold milling machine.” Ex. 1001, 6:42. The milling machine includes machine frame 4 supported by a track assembly

having two front chain tracks 2 and at least one rear chain track 3 through lifting columns 12, 13. *Id.* at 6:66–7:3. Lifting columns 12, 13 allow machine frame 4 to be moved to a predetermined inclined position with respect to the ground or traffic surface 8. Ex. 1001, 7:5–8. Machine frame 4 supports milling roll 6, and arranged behind milling roll 6 is height-adjustable stripping means 14 which, in operation, has stripping plate 15 that engages milling track 17 formed by milling roll 6. *Id.* at 7:16–21. A driver's stand 5 is arranged above the milling roller 6 and provides a control panel for the vehicle operator that includes a control means 23 for controlling the milling depth of the milling roller 6. *Id.* at 7:22–26. Position sensors measure the displacements of side plates 10, a beam 20, or stripping plate 15 with respect to machine frame 4 or relative to each other. *Id.* at 7:39–43.

Figure 3 of the '972 patent is reproduced below.

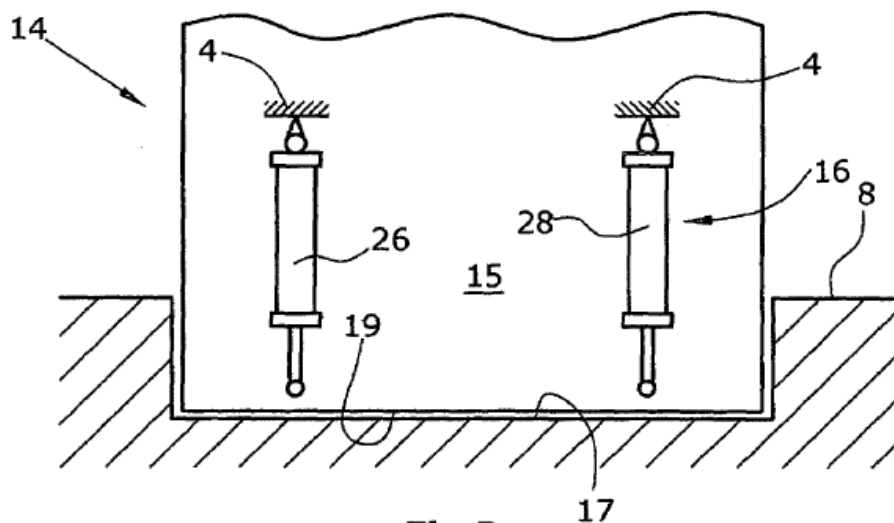


Figure 3 depicts an embodiment of the claimed invention wherein hydraulic pistons or cylinders 26, 28 lift and lower the stripping plate 15 of the stripping means 14. *Id.* at 7:61–64. The depicted hydraulic cylinders

have an integrated position sensing system that generate a position signal and have one end connected to the machine frame 4 and the other to stripping plate 15. Ex. 1001, 7:63–8:3. The '972 patent explains that “[t]he control means 23 can calculate the current milling depth at the level of the milling roller axis from the position sensing signals received” and that “the control means 23 can automatically control the lifted condition of the front and/or rear lifting column 13 . . . to establish parallelism between the machine frame 4 and the ground.” *Id.* at 9:21–30.

E. Illustrative Claim

Among the challenged claims, claims 1, 31, and 38 are independent claims. Independent claim 1 is illustrative and is reproduced below.

1. A self-propelled road milling machine, comprising:
 - [1a] a machine frame;
 - [1b] at least two front ground engaging supports, and at least one rear ground engaging support, with reference to a direction of travel;
 - [1c] front and rear lifting columns supporting the frame from the ground engaging supports;
 - [1d] a milling roller supported from the frame for treatment of a ground surface;
 - [1e] first and second height adjustable side plates arranged on opposite sides of the milling roller;
 - [1f] a height adjustable stripping plate arranged behind the milling roller and operable to be lowered, during operation, into a milling track generated by the milling roller;
 - [1g] at least one ground engaging sensor; and,
 - [1h] a controller operably associated with the at least one ground engaging sensor, the controller being configured to automatically control a lifting condition of at least one of the lifting columns to establish a parallel orientation of the machine frame relative to the ground surface in the direction of travel.

Ex. 1001, 11:63–12:17 (bracketed nomenclature added).

F. Prior Art and Asserted Ground

Petitioner asserts that the challenged claims are unpatentable on the following ground:

Claims Challenged	35 U.S.C. § ²	Basis
1–10, 25, 27, 30, 31, 33, 34, 36–40	103(a)	OMM, ³ Sehr, ⁴ Samuelson ⁵

Pet. 6.

Petitioner also relies on the declaration testimony of William Singhose, Ph.D. *See* Ex. 1006 (providing the Declaration).

The following subsections provide brief descriptions of the asserted prior art references.⁶

1. OMM (Ex. 1002)

OMM is an operation and maintenance manual for the PM-465 cold planer that is used for cold milling pavement. Ex. 1002, Title, 2.⁷

² The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112-29, 125 Stat. 284, 296–07 (2011), took effect on September 16, 2011. The changes to 35 U.S.C. §§ 102 and 103 in the AIA do not apply to any patent application filed before March 16, 2013. Because neither part disputes that the application for the patent at issue in this proceeding has an effective filing date before March 16, 2013, we refer to the pre-AIA version of the statute.

³ Caterpillar, “PM-465 Cold Planer, Operation & Maintenance Manual” (Ex. 1002, hereinafter “OMM” for consistency with the Petition).

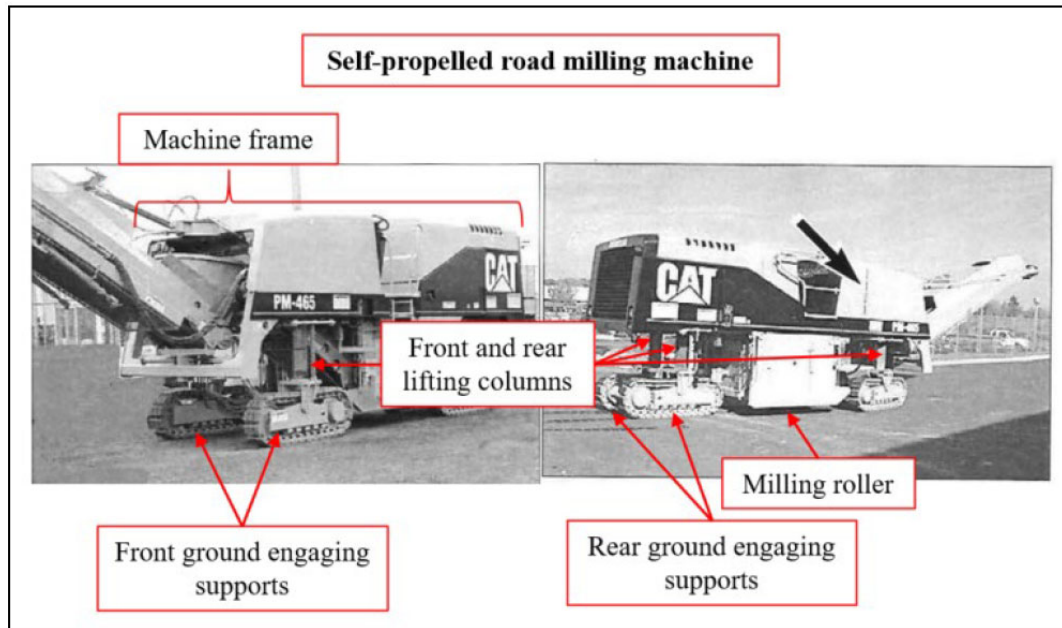
⁴ US 5,309,407, issued May 3, 1994 (Ex. 1037, “Sehr”).

⁵ US 6,450,048 B1, issued Sept. 17, 2002 (Ex. 1004, “Samuelson”).

⁶ When discussing prior art references, Petitioner typically italicizes the name of the reference. When we quote the Petition, we do not italicize the name.

⁷ For ease of understanding our analysis of the Petition and Petitioner’s arguments, when referencing OMM, we follow Petitioner’s practice of citing the pagination of the manual, rather than the exhibit. Going forward, the parties must agree on the same citing format and cite to the exhibit page

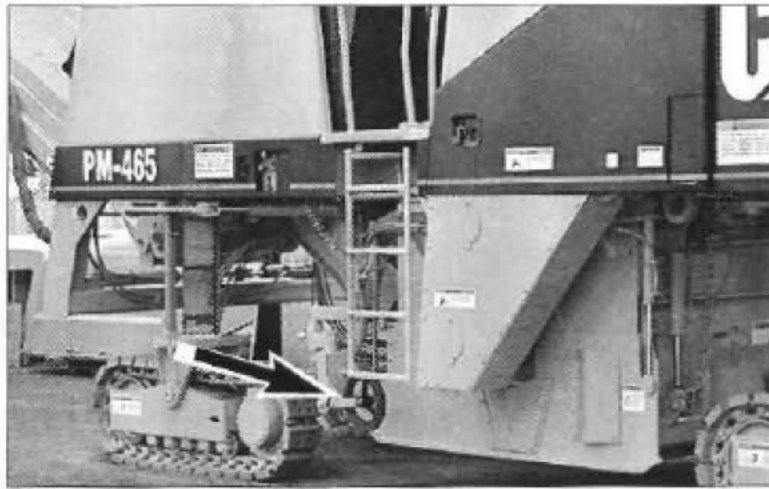
We reproduce below Petitioner’s annotated versions of the images depicted on pages 2 and 40 of OMM.



The images on pages 4 and 42 of OMM are annotated by Petitioner to denote uncontested components of the milling machine. Pet. 8; *see also* Prelim. Resp. 9–11. In particular, Petitioner adds the title, “Self-propelled road milling machine” placed inside a red rectangle. *Id.* Petitioner also denotes the “machine frame,” “milling roller,” “front and rear lifting columns,” “front ground engaging supports,” and “rear ground engaging support,” by placing these terms in red rectangles and using a lead arrow that extends from a rectangle to its respective component. *Id.* OMM’s machine also includes Caterpillar’s “Grade and Slope Electronic Control System,” which includes, an “Electronic Control Module,” “grade/slope controllers on the left and/or right side of the operator's console, the grade/slope controllers

numbers as a default approach. *See* 37 C.F.R. § 42.63(d)(2) (requiring sequential exhibit numbering).

at ground level in front and/or behind the mandrel, a contacting or a non[-]contacting sensor on each side of the machine, [and] a slope sensor at the center of the machine.” Ex. 1002, 32. According to OMM, the contacting sensor can include a grade slope wheel as depicted in the image on page 49 of OMM, reproduced below.



The image on page 49, on the left-hand side of the page, includes a black arrow denoting a grade slope wheel adjacent to the side plate of machine. Ex. 1002, 49. OMM explains that “[t]he grade slope wheel sends signals to the controller as the ground elevation varies.” *Id.* According to OMM, “[i]f the machine uses the non-contacting method of measuring the grade, a sonic sensor is attached. The sonic grade sensor uses sound waves to monitor the distance from a fixed point on the machine to a grade reference point (such as: finished surface, curb, gutter, or stringline).” *Id.* OMM notes that “[t]he sensors should be positioned on the centerline of the rotor to achieve an accurate cut. The further away from the center of the rotor, the less accurate the reading on the readout and the potential for less accurate cuts.” *Id.* at 48.

2. *Samuelson (Ex. 1004)*

Samuelson, titled “Hydraulic Cylinder Monitoring Apparatus,” issued September 17, 2002. Ex. 1004, codes (54), (45). Samuelson relates to “a hydraulic cylinder monitoring apparatus for a welded construction-type hydraulic cylinder.” *Id.* at 1:15–17. Samuelson discloses that hydraulic cylinders are used in various industries including “mobile equipment.” *Id.* at 1:35–40. Samuelson recognizes the importance of protecting the position measuring structure, e.g. transducer, of the cylinders, while being able to interchange “dumb” cylinders without transducers to “smart” cylinders. *Id.* at 1:45–60. Figures 5 and 6 of Samuelson are reproduced below.

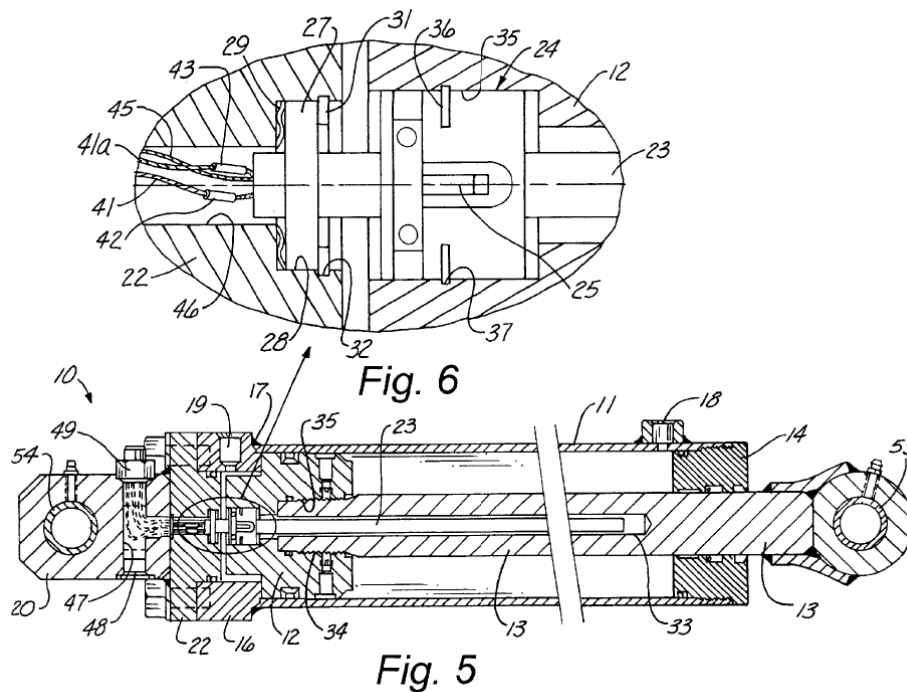


Figure 5 is a cross sectional view of a hydraulic cylinder having a monitoring apparatus disposed therein, and Figure 6 is an enlarged view of the circled portion shown in Figure 5. Ex. 1004, 2:53–57. Samuelson discloses that in operation, hydraulic cylinder 10 is connected at ends 53

and 54 to two objects that need to be selectively controlled by being separated and then moved back together while the relative spacing is monitored by the transducer structure 23 and 24. *Id.* at 4:17–21.

Samuelson explains that in Figure 5, a controller, not shown, is sensing the position of piston 12 with respect to cap 22 through reference supply and/or ground return wires 41 and 41a, which have fixed resistors. *Id.* at 4:22–26. Similarly, output wire 45 is connected to the controller. *Id.* at 4:27–28. According to Samuelson, when pressurized hydraulic oil is directed into port 19, cylinder 12 moves to the right and follower 24 will move with it, which will change the resistance. *Id.* at 4:29–33. “Consequently, the position of the piston (12) and/or rod (13) can readily be monitored as the piston (12) and rod (13) move from one position to another within the cylinder (11).” *Id.* at 4:41–44. Samuelson notes that “[b]ecause the fixed resistors (42) and (43) are disposed within the steel confines of the supplemental cap (22) and its flange (20), there is very little chance that they can be damaged during the use of the device.” *Id.* at 4:48–51.

3. *Sehr (Ex. 1037)*

Sehr, titled “Ultrasonic Control Unit for a Traveling Cutter,” issued May 3, 1994. Ex. 1037, codes (54), (45). Sehr “relates to an ultrasonic control unit for a travelling cutter.” *Id.* at 1:5–6. We reproduce Sehr’s Figure 1, below.

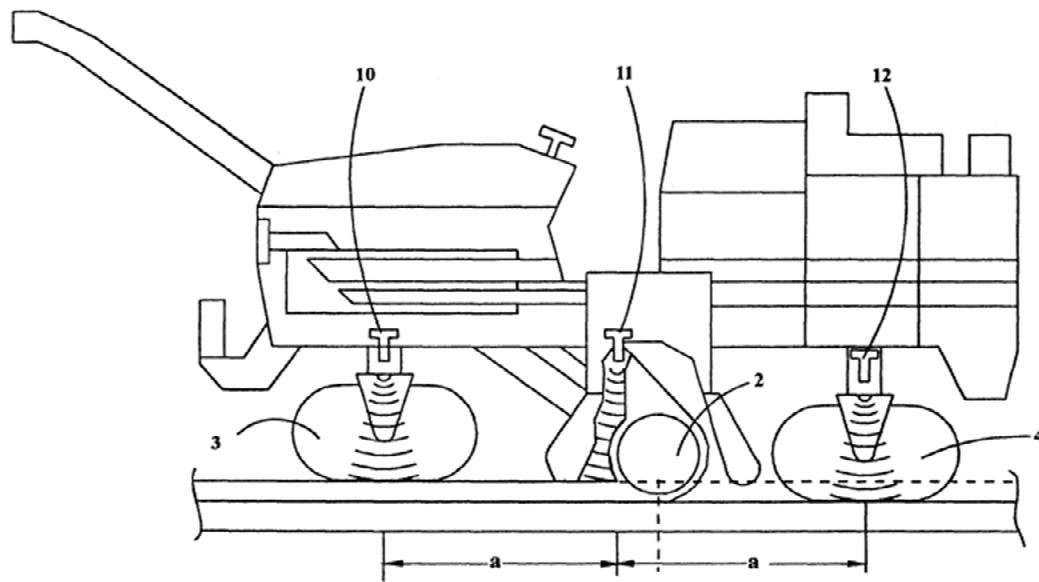


Fig.1

Figure 1 depicts a “a road grooving machine” with a “cutter drum 2, which is rotatably supported on the road grooving machine, as well as front and rear travelling gears 3, 4” and “at least three ultrasonic sensors 10, 11, 12, which are arranged one behind the other essentially in the direction of movement of the road grooving machine 1.” *Id.* at 2:7–10, 2:24–27. The ultrasonic sensors in Sehr sample a “reference plane” with their “sound cones,” and the sampled plane “is normally a marginal strip of a road whose surfacing has to be removed by cutting down to a predetermined depth.” *Id.* at 2:27–31. Sehr further discloses that the control unit “compensates substantially for the waviness of the reference plane, and it facilitates the work of the operator of the road grooving machine by holding the road grooving machine in a parallel position.” *Id.* at 3:53–60.

4. *Zarniko (Ex. 1005)*

The parties address Zarniko as background prior art in their arguments even though Petitioner does not rely on it as disclosing any particular claim

limitations. Accordingly, we summarize Zarniko's disclosure in this section addressing relevant "Prior Art."

Zarniko, titled "Height Control Device and Method for a Fixture for Machining an Object Essentially Defined by a Single Plane," issued July 24, 1990. Ex. 1005, codes (54), (45). Zarniko "relates to a height control device for . . . a milling fixture for stripping road surfacing." *Id.* at 1:6–10. Zarniko discloses a height control device that "provides for two gauging devices, one of which measures the distance to the unmachined plane, the other, the distance to the machined plane." *Id.* at 2:32–34. We reproduce Zarniko's Figure 1, below.

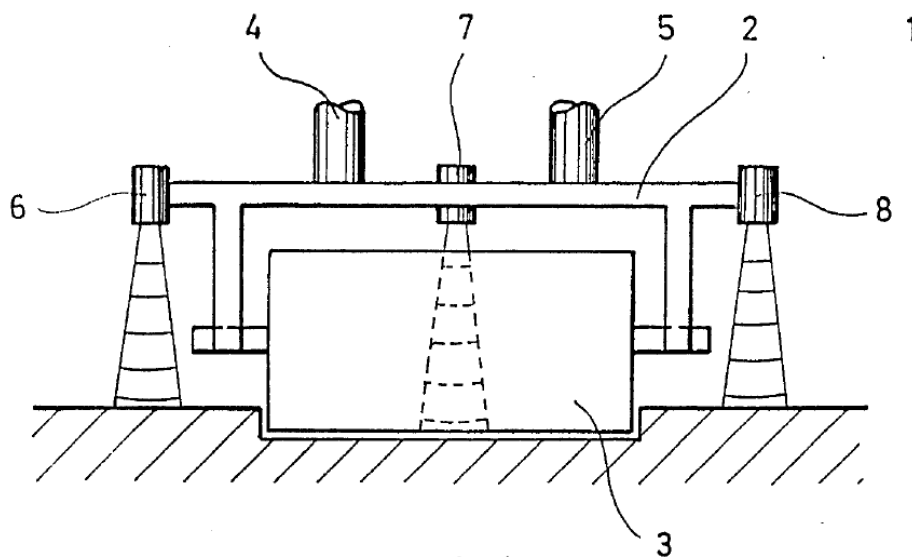


FIG. 1

Figure 1 depicts "a schematic front view of a milling fixture for stripping road surfacing and featuring a height control device in accordance with" Zarniko's invention. Ex. 1005, 3:27–29. Milling fixture 1 includes bearing frame 2 and milling cutter 3. *Id.* at 3:36–37. Zarniko's height control device includes first ultrasonic transceiver 6, second ultrasonic transceiver 7, and third ultrasonic transceiver 8 secured to bearing frame 2.

Id. at 3:57–61. First and third ultrasonic transceivers 6, 8 are positioned outside the cutting width of milling cutter 3, so that these transceivers “can gauge the distance to the unmachined plane of the road surfacing by sensing the ultrasonic propagation time.” *Id.* at 3:62–66. Second ultrasonic transceiver 7 is configured to gauge the distance to the road surface after the surface is machined by milling cutter 3. *Id.* at 3:67–4:1.

II. ANALYSIS

A. *Legal Standards*

Section 103 forbids issuance of a patent when “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.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations, including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) when available, evidence such as commercial success, long felt but unsolved needs, and failure of others.⁸ *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966); *see KSR*, 550 U.S. at 407 (“While the sequence of these questions might be reordered in any particular case, the [Graham] factors continue to define the inquiry that controls.”). The Court in *Graham* explained that these factual inquiries promote “uniformity and definiteness,” for “[w]hat is obvious is not a question upon which there is likely to be uniformity of thought in every given factual context.” 383 U.S. at 18.

The Supreme Court made clear that we apply “an expansive and flexible approach” to the question of obviousness. *KSR*, 550 U.S. at 415. Whether a patent claiming the combination of prior art elements would have been obvious is determined by whether the improvement is more than the predictable use of prior art elements according to their established functions.

⁸ The parties do not direct us to any objective evidence of non-obviousness at this stage of the proceeding.

Id. at 417. To support this conclusion, however, it is not enough to show merely that the prior art includes separate references covering each separate limitation in a challenged claim. *Unigene Labs., Inc. v. Apotex, Inc.*, 655 F.3d 1352, 1360 (Fed. Cir. 2011). Rather, obviousness additionally requires that a person of ordinary skill at the time of the invention “would have selected and combined those prior art elements in the normal course of research and development to yield the claimed invention.” *Id.*

“[O]bviousness must be determined in light of *all the facts*, and . . . a given course of action often has simultaneous advantages and disadvantages, and this does not necessarily obviate motivation to combine” teachings from multiple references. *Medichem, S.A. v. Rolabo, S.L.*, 437 F.3d 1157, 1165 (Fed. Cir. 2006) (emphasis added); *see also PAR Pharm., Inc. v. TWI Pharms., Inc.*, 773 F.3d 1186, 1196 (Fed. Cir. 2014) (“The presence or absence of a motivation to combine references in an obviousness determination is a pure question of fact.”). As a factfinder, we also must be aware “of the distortion caused by hindsight bias and must be cautious of arguments reliant upon *ex post* reasoning.” *KSR*, 550 U.S. at 421.

B. Level of Ordinary Skill in the Art

The level of skill in the art is “a prism or lens” through which we view the prior art and the claimed invention. *Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001). “This reference point prevents . . . factfinders from using their own insight or, worse yet, hindsight, to gauge obviousness.” *Id.* Factors pertinent to a determination of the level of ordinary skill in the art include: (1) educational level of the inventor; (2) type of problems encountered in the art; (3) prior art solutions to those problems; (4) rapidity with which innovations are made; (5) sophistication of the technology; and

(6) educational level of workers active in the field. *Env't Designs, Ltd. v. Union Oil Co.*, 713 F.2d 693, 696–697 (Fed. Cir. 1983) (citing *Orthopedic Equip. Co. v. All Orthopedic Appliances, Inc.*, 707 F.2d 1376, 1381–82 (Fed. Cir. 1983)). Not all such factors may be present in every case, and one or more of these or other factors may predominate in a particular case. *Id.* Moreover, these factors are not exhaustive but are merely a guide to determining the level of ordinary skill in the art. *Daiichi Sankyo Co. v. Apotex, Inc.*, 501 F.3d 1254, 1256 (Fed. Cir. 2007). In determining a level of ordinary skill, we also may look to the prior art, which may reflect an appropriate skill level. *Okajima*, 261 F.3d at 1355.

Petitioner asserts that a person of ordinary skill in the art would have had “at least a four-year degree in mechanical engineering or a closely related field and at least two years of experience designing, developing, servicing or operating heavy machinery, including their components and control systems.” Pet. 6 (citing Ex. 1006 ¶ 23). Petitioner also states that “[a]dditional education could substitute for professional experience, and significant work experience—such as working with, servicing, or operating heavy machinery in the field—could substitute for formal education.” *Id.*

“Patent Owner does not dispute the Petition’s definition” at this stage of the proceeding. Prelim. Resp. 16.

For purposes of this Decision, based on the prior art, the sophistication of the technology at issue, and Dr. Singhose’s Declaration testimony, we adopt Petitioner’s undisputed definition of the level of ordinary skill.

C. Claim Construction

We construe each claim “using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. [§] 282(b).” 37 C.F.R. § 42.100(b). Under this standard, claim terms are generally given their ordinary and customary meaning as would have been understood by a person of ordinary skill in the art at the time of the invention and in the context of the entire patent disclosure. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–14 (Fed. Cir. 2005) (en banc) (“We have frequently stated that the words of a claim ‘are generally given their ordinary and customary meaning.’” (citations omitted)).

Petitioner contends that “[t]he prior art renders all challenged claims unpatentable under the plain and ordinary meaning of the claims.” Pet. 6.⁹ “Patent Owner does not believe that any claim terms need construction to resolve the grounds raised in the Petition.” Prelim. Resp. 16.

We determine that we need not expressly construe any claim terms to resolve the parties’ disputes on the record before us. *See Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1375 (Fed. Cir. 2019) (“The Board is required to construe ‘only those terms that . . . are in controversy, and only to the extent necessary to resolve the controversy.’”) (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)). To the extent that the scope of any particular claim term requires discussion, however, we provide it in our assessment of the challenges, which we turn to next.

⁹ Petitioner “notes that the parties exchanged preliminary claim constructions in the parallel litigation,” and provides the construction for two terms from that litigation, “controller” and “ground engaging sensor,” but argues that “[t]hose constructions are irrelevant to the outcome here and the Board thus need not address them.” Pet. 6–7.

D. Ground 1: Claims 1–10, 25, 27, 30–31, 33–34, and 36–40 as unpatentable over OMM, Sehr, and Samuelson

Petitioner contends that the combination of OMM, Sehr, and Samuelson teaches or suggests each limitation of claims 1–10, 25, 27, 30–31, 33–34, and 36–40. Pet. 6, 20–82. We first address Petitioner’s reasons for combining the teachings of OMM, Sehr, and Samuelson and then address Petitioner’s arguments and evidence directed to specific claim limitations.

1. Petitioner’s proposed combination of OMM, Sehr, and Samuelson

We first present Petitioner’s reasoning for combining the teachings of OMM, Sehr, and Samuelson to arrive at the subject matter of the claims challenged under Ground 1. We then present Patent Owner’s counter arguments, and our analysis of the reasoning.

a) Petitioner’s reasoning

Petitioner contends that OMM, Sehr, and Samuelson are analogous art, as all three references are in the same field of endeavor and reasonably pertinent to the problem that the ’972 patent attempts to solve. Pet. 20–22 (citing Ex. 1002, 2, 32, 48–49, 52; Ex. 1004, 1:35–63, 2:28–31, 4:17–47; Ex. 1006 ¶¶ 62–63; Ex. 1037, code (57), 1:60–63, 2:44–54); *cf. In re Bigio*, 381 F.3d 1320, 1325 (Fed. Cir. 2004) (“References . . . qualify as prior art for an obviousness determination only when analogous to the claimed invention.”). Patent Owner does not dispute, at this stage of the proceeding, that OMM, Sehr, and Samuelson are analogous art.

Petitioner contends that a person of ordinary skill in the art (“POSITA”) would have been motivated to incorporate Sehr’s “sensor-driven parallel orientation adjustments, which provides for parallelism in the

direction of travel, into the machine described by OMM.” Pet. 22 (citing Ex.1006 ¶¶ 64–65). Petitioner notes that PM-465 already has a “grade-and-slope system [with] controllers that receive signals from multiple sensors, and this information is used to control the drum’s milling depth by adjusting the ‘heights of the legs.’” *Id.* (citing Ex. 1002, 32, 48–49). Petitioner contends that Sehr discloses a similar system that relies on sensor data “for the vertical adjustment of the front as well as of the rear traveling gear height adjustment means.” Pet 22 (citing Ex. 1037, 3:48–52). Petitioner further argues that because both systems use systems to adjust the orientation of their respective machines by changing the height of the lifting columns that “[a] POSITA would have understood that incorporating Sehr’s orientation adjustments would require nothing more than the use of additional sensors.” *Id.* at 22–23 (citing Ex.1006 ¶ 64). Petitioner asserts that this modification would have a reasonable expectation of success because the state of the art recognizes “[t]hose skilled in the art can readily write software for implementing’ sensors in road-milling machines.” *Id.* (citing Ex. 1050, 4:19–24).

Petitioner argues that there are several benefits that a POSITA would recognize from this modification. Pet. 23. First, Petitioner contends that Sehr’s system permits more accurate adjustment of the cutting depth in the milling process. *Id.* (citing Ex. 1037, 1:60-63; Ex. 1006 ¶ 65). Second, Petitioner argues that Sehr’s system avoids cutting depth faults and can compensate for a wavy reference plane while assisting the operators work by holding the machine in a parallel position. *Id.* (citing Ex. 1037, 3:53–61). According to Petitioner, a “POSITA would have recognized that these

benefits would apply to and improve OMM, thus further motivating a POSITA to modify OMM with Sehr's parallel adjustment mechanism." *Id.*

Next, Petitioner turns to a further modification of OMM and Sehr with Samuelson. Petitioner contends that a person having ordinary skill in the art "would have been motivated to implement Sehr's parallel adjustment system in OMM by using sensor-integrated cylinders like Samuelson's in the PM-465's legs." Pet. 24–34 (citing Ex. 1006 ¶¶ 66–80). Petitioner asserts that the prior art already shows how to use sensors on the front and rear legs of a road-milling machine. *Id.* (citing Exs. 1052–1054 (discussing the Roadtec RX-500 road milling machine)).

Petitioner presents several benefits that would inspire a POSITA to make the proposed modification. First, Petitioner contends Sehr's parallel-to-ground orientation avoids cutting depth faults caused by undesirable inclination angles and allows the system to compensate for waviness of the reference plane. Pet. 25 (citing Ex. 1037, 3:53-61). Second, the parallel-to-ground orientation promotes machine stability and improves the operator's comfort. *Id.* (citing Ex. 1006, ¶ 68; Ex. 1037, 3:53-61).

As to the stability, Petitioner contends road-milling machines can become unstable if the elevation differs too much or they encounter uneven terrain. Pet. 25–26 (citing Ex. 1057 (explaining controlling the legs of milling machines can prevent instability); Ex. 1058 (explaining improper control can be "detrimental to stability of the machines"); Ex. 1059 (recognizing stability benefits in keeping a large machine parallel to the ground)). Petitioner contends a POSITA would be familiar with the prior art and would be motivated to keep the machine parallel to improve stability. *Id.* at 26–27.

Petitioner also contends that Samuelson expressly discloses additional motivating factors, such as improvements in controller technology over time that “became cost effective and it became easier to use sensors on hydraulic cylinders in mobile construction equipment.” Pet. 32 (citing Ex. 1004, 1:19–49, Ex. 1006 ¶ 78); *see also id.* at 32 (“A [person having ordinary skill in the art] would have known to consider the technological advances in the art and to look for ways to improve the PM-465 machine’s design by implementing those advances (e.g., by using sensor-integrated hydraulic cylinders on the machine).”).

In addition to the reasons provided above, Petitioner contends that “[a] POSITA would have known that using leg sensors in all four legs to achieve the parallelism and stability described above would provide a more robust and accurate control system as compared to other options.” Pet. 28 (citing Ex. 1006, ¶ 73). Petitioner argues that a POSITA would rely on a solution such as the leg sensors of Samuelson instead of ultrasonic sensors such as those present in Sehr, because a POSITA would know that ultrasonic sensors suffer from several key flaws. *Id.* Specifically, Petitioner asserts that Zarniko teaches ultrasonic sensors that are not capable of highly accurate control because ultrasonic sensor accuracy is influenced by operating conditions including temperature, humidity, operating voltage, and atmospheric pressure. *Id.* (citing Ex. 1005, 1:46-52, 1:52-68). Petitioner further contends that Zarniko recommends using “mechanical sensors” such as those found in Samuelson. *Id.* (citing Ex. 1005, 1:41-45).

According to Petitioner, based on the teachings of Zarniko, “a POSITA would have been motivated to look for more robust and accurate sensing systems for achieving Sehr’s parallelism” and that “Samuelson in

combination with OMM provides the solution.” Pet. 28–29. Petitioner contends that Samuelson’s mechanical sensors are robust because the sensors are inside the hydraulic cylinder and protected from damage and environmental degradation. *Id.* at 29 (citing Ex. 1004, 1:45-49; Ex. 1006 ¶ 74). Petitioner further argues that a POSITA would have been motivated to incorporate the robust sensors of Samuelson into the legs of the PM-465 to avoid known issues, including damage and accuracy problems exemplified by the disclosures in Zarniko. *Id.* According to Petitioner, the resulting modification would provide the parallelism disclosed in Sehr without the potential for accuracy problems the ultrasonic sensors of Sehr would encounter. Petitioner claims that a POSITA would know that while in operation, the PM-465 machine with the modified leg sensors would be able to “continually position the machine frame at the desired parallel-to-ground orientation, maximizing the stability and milling efficiency of the machine—all while using robust sensors.” *Id.* (citing Ex. 1006, ¶ 74).

Petitioner contends that like the disclosures in Zarniko, OMM recognizes that the PM-465 sensors can be compromised by dust and debris and require cleaning. Pet. 31–32 (citing Ex. 1002 ¶¶ 109, 112; Ex. 1005, 1:23–45; Ex. 1006 ¶ 77). Petitioner argues that OMM’s disclosures would motivate a POSITA to replace the replace the PM-465’s existing leg cylinders with the cylinders of Samuelson to measure the legs’ elevation. *Id.* (citing Ex. 1006, ¶ 77). Petitioner contends that this modification would improve the sensing capabilities of PM-465 and allow the modified machine “to measure, with precision, the exact amount of each leg’s extension,” thereby enabling the controller to adjust the machine “parallel to the ground.” *Id.* at 31–32.

In addition to the motivations discussed above, Petitioner contends that a POSITA would have had a reasonable expectation of success in performing the proposed modifications. Pet. 30–34. For example, Petitioner contends PM-465 was “primed to receive” the sensor-integrated cylinder of Samuelson because PM-465 already uses hydraulic cylinders inside all four legs, PM-465 uses numerous sensors including service height sensors to determine the extension of the machine’s legs, and sensors at the right rear corner to sense the elevation of the rear legs. *Id.* at 30–32 (citing Ex. 1002, 32, 66, 108, 109, 112; Ex. 1003, 39–40; Ex. 1006 ¶¶ 75–77). Further, Petitioner notes that Samuelson discloses its invention is “designed for the equipment rather than modifying the equipment design to accept the cylinder” and that Samuelson’s design is in a state where it can be integrated easily with PM-465’s controllers. *Id.* at 33 (citing Ex. 1003, 1:54–63, 4:17–62; Ex. 1006 ¶ 79).

b) Patent Owner’s counter arguments

Patent Owner argues that Petitioner’s alleged motivations to combine rely on faulty reasoning, namely that the ultrasonic sensors of Sehr have accuracy problems. Prelim. Resp. 20–28. Specifically, Patent Owner argues that Petitioner “advances a single motivation to modify OMM/Sehr by implementing Samuelson’s smart cylinders—that Sehr’s ultrasonic sensors suffered from ‘sensing accuracy’ problems that would have led a POSITA ‘to look for more robust and accurate sensing systems for achieving Sehr’s parallelism.’” *Id.* at 21 (citing Pet. 28–29). Patent Owner points to Petitioner’s reliance on Zarniko for the idea that Sehr’s ultrasonic sensors have sensing accuracy problems and argues that Petitioner’s arguments stem from an incorrect reading of Zarniko. *Id.* at 23–28. Patent Owner contends

that Zarniko discloses using multiple ultrasonic sensors to overcome any accuracy problems that exist when using ultrasonic sensors. *Id.* at 23–24 (citing Ex. 1005, 2:32-63 (disclosures including “[h]ighly accurate height control can thus be achieved by a simple arrangement of at least two ultrasonic gauging devices which is insensitive to said disturbing factors”)). Patent Owner concludes that because Sehr teaches three or more ultrasonic sensors that “Sehr does not suffer from the purported problems with sensing accuracy advanced by Petitioner and its expert.” *Id.* at 25.

c) *Analysis of reasons to combine OMM and Samuelson*

Based on our review of the current record, we determine that Petitioner has provided sufficient reasoning, supported by a rational underpinning of facts, that a person having ordinary skill in the art would have been motivated to modify OMM’s hydraulic cylinder’s with Samuelson’s smart cylinders and to further modify the resulting system with Sehr’s parallel adjustment control system. Specifically, we determine that Petitioner makes an adequate showing, for purposes of institution, that a person having ordinary skill in the art would have implemented Sehr’s sensor driven parallel orientation adjustments and modified the hydraulic cylinders to include sensors to implement Sehr’s adjustments in the PM-465 machine disclosed in the OMM reference. For example, Petitioner persuasively argues that Sehr’s control scheme in combination with the smart sensors from Samuelson would better compensate for rough terrain, improve the stability of PM-465, and improve operator comfort. *See* Pet. 25–27. Petitioner provides reasons why a POSITA would seek to implement Samuelson’s internal sensors, instead of relying on external ultrasonic

sensors that are more prone to being comprised by dust and debris and need to be cleaned. *See id.* at 29, 31.

We have considered Patent Owner's arguments and determine, on the current record, that it does not demonstrate an overall deficiency in Petitioner's reasoning as to motivation to combine. First, we find Patent Owner's arguments as to Zarniko are persuasive based on the current record. Petitioner appears to misread Zarniko because Zarniko does not broadly teach avoiding the use of ultrasonic sensors, and instead merely suggests that using only one such sensor may introduce accuracy problems, as Patent Owner notes. *See Prelim. Resp.* 23–25. However, we do not agree with Patent Owner that Petitioner's reliance on Zarniko amounts to Petitioner's "single motivation to modify OMM/Sehr by implementing Samuelson's smart cylinders." *Id.* at 21. Petitioner sets forth numerous reasons why a POSITA would be motivated to combine the references at issue beyond "sensing accuracy" concerns, and Patent Owner does not address with persuasive argument or evidence Petitioner's additional argument and evidence supporting its motivation to combine rationale. For example, Petitioner argues that Sehr's control scheme in combination with the smart sensors from Samuelson would better compensate for rough terrain, improve the stability of PM-465, and improve operator comfort. *See Pet.* 25–27. Further, independent of Zarniko, Petitioner provides reasons why a POSITA would seek to implement internal sensors, instead of relying on external ultrasonic sensors. For example, Petitioner provides disclosures in OMM that external sensors, like those in Sehr, are prone to being comprised by dust and debris and need to be cleaned. *See id.* at 29, 31. OMM's external sensors require cleaning which reduces efficiency and provides a reason why

a POSITA may have sought a different solution like the one in Samuelson.
See id.

Furthermore, Petitioner limits its reliance on Sehr to the control scheme and parallel orientation teachings. Petitioner argues persuasively that numerous other prior art references recognized the benefits of a parallel orientation. Pet. 26–27 (citing Exs. 1057–1059). Petitioner need not establish that a POSITA would not make use of Sehr’s ultrasonic sensor configuration to show a POSITA would be motivated to use its parallel orientation controllers. Petitioner shows, on the current record, that a POSITA would understand there are benefits of using the controllers outside of Sehr, and a POSITA would be motivated to use Sehr’s proven control scheme.

In summary, we determine, on the current record, that Petitioner has provided sufficient reasoning, supported by a rational underpinning of facts, that a person having ordinary skill in the art would have been motivated to modify OMM’s hydraulic cylinders with Samuelson’s smart cylinders. *Cf. KSR Int’l Co.*, 550 U.S. at 418 (stating that, to facilitate the analysis of an obviousness position, the proponent should provide “some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness”).

2. *Independent claim 1*

We turn our analysis now to the scope and content of the prior art and any differences between the prior art and the subject matter of independent claim 1, on a limitation-by-limitation basis.

a) Preamble

The preamble of claim 1 recites “[a] self-propelled road milling machine.” Ex. 1001, 11:63. Petitioner contends that OMM discloses a self-propelled milling machine, the PM-425. Pet. 34 (citing Ex. 1002, 2, 27; Ex. 1006 ¶ 93).

Upon review of the information in the Petition and corresponding evidence, we determine Petitioner has made a sufficient showing, at this stage of the proceeding, that OMM teaches or suggests the subject matter of the preamble. In view of this determination, we need not resolve, at this stage of the proceeding, whether the preamble limits the claim.

Patent Owner does not dispute Petitioner’s contentions with respect to the subject matter of the preamble at this stage of the proceeding.

b) Limitation [1a]

Claim 1 recites “a machine frame.” Ex. 1001, 11:64 (limitation “[1a]”). Petitioner contends that OMM discloses a machine frame. Pet. 34–35 (citing Ex. 1002, 2, 8); *see, e.g., id.* at 35 (providing an annotated image of the PM-425 machine identifying the machine frame).

Upon review of the information in the Petition and corresponding evidence, we determine Petitioner has made a sufficient showing, at this stage of the proceeding, that OMM teaches or suggests limitation [1a] of claim 1. Patent Owner does not dispute Petitioner’s contentions with respect to this limitation at this stage of the proceeding.

c) Limitation [1b]

Claim 1 recites “at least two front ground engaging supports, and at least one rear ground engaging support, with reference to a direction of travel.” Ex. 1001, 11:65–67 (limitation “[1b]”). Petitioner contends that

OMM discloses a machine with at least two front ground engaging supports, and at least one rear ground engaging support—the machine’s front tracks and rear tracks. Pet. 35–37 (citing Ex. 1002, 2, 29, 40; Ex. 1006 ¶ 95); *see, e.g., id.* at 36 (providing annotated images of the PM-425 machine identifying the front and rear engaging supports).

Upon review of the information in the Petition and corresponding evidence, we determine Petitioner has made a sufficient showing, at this stage of the proceeding, that OMM teaches or suggests limitation [1b] of claim 1. Patent Owner does not dispute Petitioner’s contentions with respect to this limitation at this stage of the proceeding.

d) Limitation [1c]

Claim 1 recites “front and rear lifting columns supporting the frame from the ground engaging supports.” Ex. 1001, 12:1–2 (limitation “[1c]”). Petitioner contends that OMM discloses a machine with front and rear lifting columns as recited, “two that support the PM-465’s frame from the front tracks and two that support the frame from the rear tracks.” Pet. 37–39 (citing Ex. 1002, 2, 14, 30–32, 40; Ex. 1006 ¶ 97); *see, e.g., id.* at 38 (providing annotated images of the PM-425 machine identifying the front and rear lifting columns, and a leg of the PM-425).

Upon review of the information in the Petition and corresponding evidence, we determine Petitioner has made a sufficient showing, at this stage of the proceeding, that OMM teaches or suggests limitation [1c] of claim 1. Patent Owner does not dispute Petitioner’s contentions with respect to this limitation at this stage of the proceeding.

e) Limitation [1d]

Claim 1 recites “a milling roller supported from the frame for treatment of a ground surface.” Ex. 1001, 12:3–4 (limitation “[1d]”). Petitioner contends that OMM discloses a rotor drum supported from the frame as corresponding to the recited milling roller. Pet. 39 (citing Ex. 1002, 12, 32, 51, 111, 117, 134; Ex. 1006 ¶ 98); *see, e.g., id.* at 39 (providing an annotated image of the PM-425 machine “showing that ‘Support Bearing’ for ‘Rotor Drum’ is connected to machine frame”).

Upon review of the information in the Petition and corresponding evidence, we determine Petitioner has made a sufficient showing, at this stage of the proceeding, that OMM teaches or suggests limitation [1d] of claim 1. Patent Owner does not dispute Petitioner’s contentions with respect to this limitation at this stage of the proceeding.

f) Limitation [1e]

Claim 1 recites “first and second height adjustable side plates arranged on opposite sides of the milling roller.” Ex. 1001, 12:5–6 (limitation “[1e]”). Petitioner contends that OMM discloses first and second height adjustable side plates arranged as recited. Pet. 40–42 (citing Ex. 1002, 2, 40, 49, 59; Ex. 1006 ¶¶ 99–101). Petitioner explains that PM-465’s side plates are height-adjustable using two hydraulic cylinders. *Id.* at 40–42; *see, e.g., id.* at 41 (providing an annotated image identifying the left side plate and two height-adjustment cylinders, and providing an annotated image of the PM-425 machine identifying the right side plate and two height-adjustment cylinders).

Upon review of the information in the Petition and corresponding evidence, we determine Petitioner has made a sufficient showing, at this

stage of the proceeding, that OMM teaches or suggests limitation [1e] of claim 1. Patent Owner does not dispute Petitioner's contentions with respect to this limitation at this stage of the proceeding.

g) Limitation [1f]

Claim 1 recites “a height adjustable stripping plate arranged behind the milling roller and operable to be lowered, during operation, into a milling track generated by the milling roller.” Ex. 1001, 12:7–9 (limitation “[1f]”). Petitioner contends that OMM discloses a machine with a moldboard, corresponding to the recited height-adjustable stripping plate. Pet. 42–45 (citing Ex. 1002, 14, 38, 60, 118; Ex. 1006 ¶¶ 102–105; Ex. 1020 ¶ 49). Petitioner contends that the moldboard is the bottom portion of PM-465's rotor door. *Id.* at 42. Petitioner explains that “[a] primary purpose of the moldboard is to scrape away the milled material generated by the milling drum during milling operations.” *Id.* at 45 (citing Ex. 1020 ¶ 49); *see, e.g., id.* at 42 (providing an annotated image of the PM-425 machine and identifying the moldboard and rotor door), 43 (providing an annotated image of the PM-425 machine and identifying the moldboard), 44 (providing an annotated image of the PM-425 machine and identifying the milling roller, rotor door, and milling direction), 45 (providing an annotated image of the PM-425 machine and identifying the moldboard height-adjusting hydraulic cylinders).

Upon review of the information in the Petition and corresponding evidence, we determine Petitioner has made a sufficient showing, at this stage of the proceeding, that OMM teaches or suggests limitation [1f] of claim 1. Patent Owner does not dispute Petitioner's contentions with respect to this limitation at this stage of the proceeding.

h) Limitation [1g]

Claim 1 recites “at least one ground engaging sensor.” Ex. 1001, 12:10 (limitation “[1g]”). Petitioner contends that OMM, as modified by Samuelson’s teachings of a sensor-integrated hydraulic cylinder, renders obvious the subject matter of limitation [1g]. Pet. 45–47. Petitioner explains that, unmodified, the machine of PM-465 includes four legs and that “each leg has an internal hydraulic cylinder that controls the extension and retraction of the leg.” Pet. 46 (citing Ex. 1002, 32; Ex. 1006, ¶ 106). Petitioner argues that a POSITA would have been motivated to modify PM-465 by replacing the four hydraulic cylinders of PM-465 with “sensor-integrated cylinders like Samuelson’s that produce signals indicating positions of their sensing elements.” *Id.* (citing Ex. 1006 ¶ 106). Petitioner adds that this modification “would have allowed the PM-465 to measure the extension and retraction of the hydraulic cylinders in each leg.” *Id.*

Petitioner argues that the modified PM-465 legs are “ground engaging sensors” and references the usage of “sensor-integrated cylinders” as “ground engaging sensors” in the ’972 patent. Pet. 46. Petitioner notes that claim 9 of the ’972 patent recites “each of the first and second ground engaging sensors [of claim 1] comprises a path measurement system,” and that claim 10 explains one possible path measurement system is “integrated in the lifting columns or in hydraulic cylinders of the lifting columns.” Ex. 1001, 12:57–60, 12:61–63. Petitioner also contends that Patent Owner “has alleged that sensor-integrated cylinders” in Petitioner’s milling machines meet the “ground engaging sensors” limitation. Pet. 46 (citing Ex. 1019, 9–27). According to Petitioner, “the sensor-integrated cylinders in the modified PM-465’s legs are ground engaging sensors because those

cylinders are sensors that comprises a sensing element that contacts the ground via an associated front or rear track and an element that produces a signal indicating a position of the sensing element.”¹⁰ Pet. 47 (citing Ex. 1006 ¶ 106).

Patent Owner argues that the “Petition never argues that any of OMM, Sehr, or Samuelson teaches the claimed ‘ground engaging sensor’” and that none of the references teach other aspects of these sensors required by certain dependent claims. Prelim. Resp. 17. Patent Owner contends that Petitioner improperly uses the ’972 patent as a roadmap “to create an entirely new sensor arrangement.” *Id.* at 17 (citing Pet. 46–47). Patent Owner contends that Petitioner’s arguments as to the proposed smart cylinders are nothing more than hindsight, and that Petitioner fails to “explain why a POSITA would have made the choice to replace the specific dumb cylinder relied on for any of its proposed combinations.” *Id.* at 17–20. Patent Owner’s additional arguments as to this limitation relate to the motivation to combine the references, and we address these in detail above. *See id.* at 20–28.

We have considered Patent Owner’s arguments and determine, on the current record, that they do not demonstrate a deficiency in Petitioner’s position. As an initial matter, to the extent that Patent Owner argues that each reference, when considered separately, fails to disclose the claimed ground engaging sensors, such an argument is improper in the obviousness

¹⁰ Petitioner’s argument parallels the claim construction for “ground engaging sensor” the parties agreed to in the parallel district court litigation. *See* Ex. 1031, 8. We note that neither party has proposed a construction for “ground engaging sensor” here.

context. *See, e.g., In re Merck & Co., Inc.*, 800 F.2d 1091, 1097 (Fed. Cir. 1986) (“Non-obviousness cannot be established by attacking references individually where the rejection is based upon the teachings of a combination of references.”). We note that at this stage in the proceeding, Patent Owner does not appear to dispute that, once the teachings of the references are combined in the manner Petitioner proposes, that the resulting combination discloses the “ground engaging sensor” claim 1 requires. *See* Prelim. Resp. 17–20. Accordingly, we view Patent Owner’s arguments as largely going to whether Petitioner adequately establishes a motivation to combine the references, which we discuss above.

We also disagree with Patent Owner to the extent that it argues that none of the prior art, considered separately, discloses a ground engaging sensor. *See* Prelim. Resp. 17. In its discussion of OMM, Petitioner indicates that the unmodified PM-465 includes ground engaging sensors at least in the form of “contacting ‘grade sensor[s]’ to detect changes in the position of the milling machine relative to the ground.” Pet. 12–15 (citing Ex. 1002, 32–33, 48–49, 53; Ex. 1006 ¶¶ 46–48). Petitioner further identifies the “grade slope wheel contacting grade sensor” that “rolls along the ground and ‘sends signals to the controller as the ground elevation varies.’” *Id.* at 13–14 (citing Ex. 1002, 49). Petitioner does not repeat these assertions when addressing the “ground engaging sensor” limitation in claim 1, but, based on the current record, OMM’s ground engaging wheel teaches a “ground engaging sensor.” *See id.* at 45–47.

As to Patent Owner’s contention that Petitioner bases its argument entirely on improper hindsight, we also disagree, based on the current record. *See* Prelim. Resp. 18–20. We do not read Petitioner’s reliance on

the '972 patent as impermissible hindsight because Petitioner appears to be making the point that modifying PM-465 with Samuelson's sensor-integrated cylinders results in a structure that meets the "ground engaging sensor" limitation because the '972 patent describes and claims a similar sensor-integrated cylinders as falling within the scope of "ground engaging sensors." *See* Pet. 46 (citing Ex. 1001, claims 9 and 10). Similarly, Petitioner contends that Patent Owner accuses Petitioner's milling machines, which incorporate sensor-integrated cylinders, of infringing claims that require ground engaging sensors, suggesting that the claim must cover the sensor-integrated cylinders in Petitioner's proposed combination. *Id.* (citing Ex. 1019, 9–27). To the extent that Patent Owner continues to assert that Petitioner's proposed combination fails to disclose "ground engaging sensors" during trial (as part of claim 1 or more detailed limitations in claims 9 and 10), Patent Owner should explain how Petitioner's proposed combination differs from the structures disclosed and claimed in the '972 patent and Petitioner's milling machines that Patent Owner contends are covered by the challenged claims.

Accordingly, upon review of the information in the Petition and corresponding evidence, and our analysis of Petitioner's reasons to combine the teachings of OMM and Samuelson, we determine Petitioner has made a sufficient showing, at this stage of the proceeding, that OMM, as modified by Samuelson, teaches or suggests limitation [1g] of claim 1.

i) Limitation [1h]

Finally, claim 1 recites "a controller operably associated with the at least one ground engaging sensor, the controller being configured to automatically control a lifting condition of at least one of the lifting columns

to establish a parallel orientation of the machine frame relative to the ground surface in the direction of travel.” Ex. 1001, 12:11–16 (limitation “[1h]”).

Petitioner contends that OMM discloses an electronic controller that was designed to receive and process signals from a variety of sensors, including at least one ground engaging sensor. Pet. 47 (citing Ex. 1002, 32).

Petitioner argues that Sehr discloses a control system that uses information from sensors to adjust the elevation of a milling machine’s legs, such that the milling machine remains parallel to the ground. *Id.* at 47–48. Petitioner contends that a POSITA would have been motivated to modify OMM to incorporate additional sensors to implement Sehr’s control system. *Id.* at 47–51. Specifically, Petitioner argues that a POSITA would replace the hydraulic cylinders of PM-465 with Samuelson’s smart cylinders, which would provide sensing capability and control for each of the legs of the milling machine. *Id.* Petitioner bolsters its argument with additional state of the art references, including to the Roadtec RX-500 machine that utilizes leg sensors to level the machine. *Id.* at 50.

Patent Owner presents two arguments relating to the modification of OMM and Samuelson with Sehr. First, Patent Owner argues that Petitioner’s only motivation to modify OMM with Sehr is that the ultrasonic sensors of Sehr suffer from sensing accuracy problems. Prelim. Resp. 21–23. Second, Patent Owner argues that the sensing accuracy problems Petitioner identifies from Zarniko are a misreading of Zarniko’s teachings and that the ultrasonic sensors of Sehr “do not suffer from the ‘sensing accuracy’ problem alleged by Petitioner. *Id.* We address both arguments in detail above in the context of the motivation to combine issue. For the reasons provided above, we agree with Patent Owner that Petitioner has

overstated the teachings of Zarniko, but we disagree with Patent Owner that this is the sole reason for the proposed modification. Petitioner sets forth several other arguments why a POSITA would be motivated to make the proposed modifications, and supports its proposal with unrebutted declarant testimony.

We determine, upon review of the information in the Petition and corresponding evidence, and our analysis of Petitioner's reasons to combine the teachings of OMM, Sehr, and Samuelson, that Petitioner has made a sufficient showing, at this stage of the proceeding, that OMM, as modified by Sehr and Samuelson, teaches or suggests limitation [1h] of claim 1.

j) Conclusion as to independent claim 1

Having reviewed the preliminary record, including Petitioner's showing as to how the combined teachings of OMM, Sehr, and Samuelson disclose each of the limitations of claim 1, and the reasons for combining the teachings of these references, we conclude that Petitioner demonstrates a reasonable likelihood that claim 1 is unpatentable under 35 U.S.C. § 103(a) over OMM, Sehr, and Samuelson.

3. Independent claims 31 and 38

Independent method claim 31 differs from independent claim 1 by reciting “detecting a longitudinal inclination of the machine frame relative to the ground surface in the direction of travel by detection of at least one measurement value from at least one ground engaging sensor.” *Compare* Ex. 1001, 11:63–12:17, *with id.* at 14:51–67. Additionally, claim 31 recites “automatically controlling a lifting condition of at least one of the lifting columns so as to automatically establish a parallel orientation of the machine

frame to the ground surface in the direction of travel, in dependence on the detected longitudinal inclination of the machine frame.” *Id.* at 14:51–67.

Independent claim 38 differs from independent claim 1 by not requiring “at least one ground engaging sensor” and adding a required “sensor located laterally within a width of the machine defined by the side plates.” *Compare* Ex. 1001, 12:10–17, *with id.* at 16:14–21.

Patent Owner does not make any specific arguments directed to claims 31 and 38 at this stage of the proceeding, other than those we address in our analysis of claim 1. We have reviewed Petitioner’s contentions and citations to the evidence and determine that Petitioner has made a sufficient showing, on the current record, that claims 31 and 38 are unpatentable under 35 U.S.C. § 103(a) over OMM, Sehr, and Samuelson.

4. *Dependent claims 2–10, 25, 27, 30, 33–34, 36–37, and 39–40*

We have reviewed Petitioner’s contentions and citations to the evidence that dependent claims 2–10, 25, 27, 30, 33–34, 36–37, and 39–40, which depend ultimately from independent claim 1, 31 or 38, are unpatentable under 35 U.S.C. § 103(a) over OMM, Sehr, and Samuelson. Pet. 51–72, 74–78, 81–82. Patent Owner does not make any arguments directed to these dependent claims, except for the arguments directed to the independent claims, which we address above in connection with our analysis of claim 1.

As we discuss above, Petitioner has demonstrated a reasonable likelihood of success in proving that at least independent claims 1, 31, and 38 of the ’972 patent are unpatentable. Accordingly, we institute on all challenges raised in the Petition, including the challenges to these dependent

claims. *See SAS Inst., Inc. v. Iancu*, 138 S. Ct. 1348, 1354, 1359–60 (2018); *see also PGS Geophysical AS*, 891 F.3d at 1360 (interpreting the statute to require “a simple yes-or-no institution choice respecting a petition, embracing all challenges included in the petition”); Patent Trial and Appeal Board Consolidated Trial Practice Guide 64 (Nov. 2019) (“The Board will not institute on fewer than all claims or all challenges in a petition.”), *available at* <https://www.uspto.gov/TrialPracticeGuideConsolidated> (“CTPG”).

III. DISCRETIONARY DENIAL

Patent Owner urges us to deny the Petition under 35 U.S.C. § 325(d). Prelim. Resp. 28–50. We have discretion to deny review when “the same or substantially the same prior art or arguments previously were presented to the Office.” 35 U.S.C. § 325(d). In that respect, § 325(d) provides that the Director may elect not to institute a proceeding if the challenge to the patent is based on matters previously presented to the Office. *Advanced Bionics, LLC v. MED-EL Elektromedizinische Geräte GmbH*, IPR2019-01469, Paper 6 at 7 (PTAB Feb. 13, 2020) (precedential) (“*Advanced Bionics*”).

In evaluating matters under § 325(d), the Board uses the following two-part framework: (1) determining whether the same or substantially the same art previously was presented to the Office or whether the same or substantially the same arguments previously were presented to the Office; and (2) if either condition of the first part of the framework is satisfied, determining whether the petitioner has demonstrated that the Office erred in a manner material to the patentability of challenged claims. *Advanced Bionics* at 8.

In applying the two-part framework, we consider several nonexclusive factors, including: (a) the similarities and material differences between the asserted art and the prior art involved during examination; (b) the cumulative nature of the asserted art and the prior art evaluated during examination; (c) the extent to which the asserted art was evaluated during examination, including whether the prior art was the basis for rejection; (d) the extent of the overlap between the arguments made during examination and the manner in which petitioner relies on the prior art or patent owner distinguishes the prior art; (e) whether petitioner has pointed out sufficiently how the examiner erred in its evaluation of the asserted prior art; and (f) the extent to which additional evidence and facts presented in the petition warrant reconsideration of the prior art or arguments. *Becton, Dickinson & Co. v. B. Braun Melsungen AG*, IPR2017-01586, Paper 8 at 17–18 (PTAB Dec. 15, 2017) (precedential as to Section III.C.5, first paragraph) (“*Becton, Dickinson*”).

Factors (a), (b), and (d) of the *Becton, Dickinson* factors relate to whether the art or arguments presented in the Petition are the same or substantially the same as those previously presented to the Office. *Advanced Bionics* at 10. Factors (c), (e), and (f) “relate to whether the petitioner has demonstrated a material error by the Office” in its prior consideration of that art or arguments. *Id.* Only if the same or substantially the same art or arguments were previously presented to the Office do we then consider whether petitioner has demonstrated a material error by the Office. *Id.* “[T]his framework reflects a commitment to defer to previous Office evaluations of the evidence of record unless material error is shown.” *Id.* at 9.

A. Part One of the Advanced Bionics Framework

Patent Owner argues that the prior art presented in the Petition was either before the examiner, or is substantially similar to art before the examiner during examination of the '972 patent. Specifically, Patent Owner argues that Sehr was before the Examiner, and that OMM and Samuelson are substantially similar to art applied by the Examiner in rejecting claims during prosecution of the application that matured into the '972 patent. Prelim. Resp. 30–47.

Patent Owner argues that OMM's disclosure of a "conventional mill machine" is not materially distinct from the machines disclosed in Berning, Jakob, Davis, or Sehr before the Examiner in the examination of the '972 patent. *Id.* at 33–41 (citing Exs. 1008, 1010, 1037, 2001, 2002, 2003). Patent Owner argues the general elements of a milling machine that Petitioner relies on from OMM were before the examiner in at least the machines of Berning, Campbell, and Swisher. *Id.* (citing Exs. 1010, 2005, 2006). Patent Owner compares each element of OMM that Petitioner relies on with elements from art before the Examiner, and concludes that there are "no notable distinctions between how Petitioner relies upon OMM and how the Examiner considered the combination of Sehr and Berning aside from the fact that Berning additionally discloses a ground engaging sensor." *Id.* at 41.

Patent Owner further argues that "Petitioner relies on the same reference, Sehr, in the same manner as the Examiner—for its alleged teaching of controlling a road milling machine to establish a parallel-to-surface orientation of the machine frame." Pet. 42–44 (citing Ex. 1008, 2–3, 239–240). Patent Owner makes note of an office rejection which relied

upon Sehr and a second reference, Berning, and cites to prosecution where the Examiner stated “Sehr further teaches the establishing parallel orientation” and “Sehr teaches the process including detecting longitudinal inclination and automatically controlling.” *Id.* at 42 (citing Ex. 1008, 239–240). Patent Owner argues that Petitioner’s argument mirrors the Examiner’s reasoning. *Id.* (citing Pet. 21–22, 47–48).

We disagree with Patent Owner that the prior art, as applied by Petitioner, is substantially similar or cumulative to the prior art before the examiner. As an initial point, the issue is not whether the PM-465 *machine* disclosed in OMM is substantially similar to Berning or other prior art *machines*. Instead, the issue is whether OMM is substantially similar to the prior art before the Examiner. OMM provides detailed information on the operation and maintenance of the PM-465 machine. *See* Ex. 1002, 16–78. Berning, and similar prior art, provides little comparable detail to the operation of their respective machines. *See, e.g.,* Ex. 1010 ¶¶ 1–55, Figs. 1–4.

Further, Patent Owner argues that Sehr was fully reviewed by the Examiner and we should not reconsider it. *See* Prelim. Resp. 42–44. However, Patent Owner did not traverse the substance of the Examiner’s arguments as they relate to Sehr and Berning; instead, Patent Owner successfully argued that Berning was not prior art. Ex. 1008, 211–215, 230–232, 292–294, 301. The substance of the Petitioner’s arguments as to Sehr were never addressed by the Examiner, much less Sehr in combination with the other art Petitioner relies on, such that we cannot say that Petitioner’s Sehr-based combination was fully considered by the Examiner.

More significantly, the other art relied on by Petitioner, OMM and Samuelson, were not before the Examiner. Accordingly, none of the proposed combinations in the Petition were before the Examiner and, as we note above, the Examiner's reliance on Sehr was not substantively addressed by Patent Owner in its response to the Examiner's action. Patent Owner argues that other references before the Examiner are substantively the same as OMM and Samuelson because Petitioner relies on OMM and Samuelson for disclosing the same limitations as those references, but those general similarities do not establish that both OMM and Samuelson are cumulative of the art before the Examiner. *See* Prelim. Resp. 30–41. As noted above, OMM alone provides more detailed teachings when compared to the art relied on by the Examiner. *See* Ex. 1002, 16–78; Ex. 1010 ¶¶ 1–55, Figs. 1–4.

For the reasons discussed above we determine that that Patent Owner does not sufficiently demonstrate that part one of the *Advanced Bionics* framework is satisfied. That is, we determine that the same or substantially the same art previously was not presented to the Office or that the same or substantially the same arguments previously were not presented to the Office. *Cf. Advanced Bionics* at 8.

B. Conclusion

Based on our analysis within the *Advanced Bionics* framework, we find that the Petition does not implicate § 325(d) in a manner sufficient to warrant discretionary denial, and we decline to exercise our discretion to deny institution under § 325(d).

IV. CONCLUSION

For the above reasons, we determine that the information presented in the Petition shows a reasonable likelihood that at least one claim of the '972 patent is unpatentable as obvious over OMM, Sehr, and Samuelson. Because Petitioner demonstrates that at least one claim of the '972 patent meets the threshold for institution, we institute an *inter partes* review of all claims as challenged in the Petition. 37 C.F.R. § 42.108(c); *SAS*, 138 S. Ct. at 1359–60.

V. ORDER

Accordingly, it is:

ORDERED that, pursuant to 35 U.S.C. § 314(a), an *inter partes* review of claims 1–10, 25, 27, 30, 31, 33, 34, and 36–40 of the '972 patent is *instituted*; and

FURTHER ORDERED that, pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4(b), notice is hereby given of the institution of trial, which will commence on the entry date of this Decision.

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Patent 8,424,972 B2

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