

Filed on behalf of: CMS Cepcor Ltd., and
CMS Cepcor Americas LLC

By: Terry M. Sanks (tsanks@firstiniplaw.com; litigation@firstiniplaw.com)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

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

v.

SANDVIK INTELLECTUAL PROPERTY AB,
Patent Owner.

Case No. IPR2024-01380
Patent No. 9,827,568

**PETITIONERS' SUR-REPLY TO PATENT OWNER'S REPLY TO
PETITIONER'S OPPOSITION TO REVISED CONTINGENT
MOTION TO AMEND**

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PETITIONER'S EXHIBIT LIST

<u>EXHIBIT</u>	<u>DESCRIPTION</u>
<u>Ex. 1001</u>	<u>US Patent No. 9,827,568</u>
<u>Ex. 1001-1</u>	<u>File History for US Patent No. 9,827,568</u>
<u>Ex. 1002</u>	<u>Declaration of David Smith MSME, MBA, PE, CSP under 37 C.F.R. § 1.68.</u>
<u>Ex. 1002-1</u>	<u>Curriculum Vitae of David Smith MSME, MBA, PE, CSP</u>
<u>Ex. 1002-2</u>	<u>Deposition and Trial Testimony of David Smith MSME, MBA, PE, CSP</u>
<u>Ex. 1002-3</u>	<u>Documents considered by David Smith MSME, MBA, PE, CSP in creating Declaration</u>
<u>Ex. 1003</u>	<u>https://www.linkedin.com/in/niklas-åberg-0a30a116b/</u>
<u>Ex. 1004</u>	<u>https://www.linkedin.com/in/fredrik-rosdahl-431b91219/</u>
<u>Ex. 1005</u>	<u>https://www.nature.com/articles/d41586-021-02612-5</u>
<u>Ex. 1006</u>	<u>https://www.driveasphalt.org/why-asphalt</u>
<u>Ex. 1007</u>	<u>https://pubs.usgs.gov/periodicals/mcs2022/mcs2022-stone-crushed.pdf</u>
<u>Ex. 1008</u>	<u>https://i.ytimg.com/vi/vQCgnGrSz7M/hqdefault.jpg</u>
<u>Ex. 1009</u>	<u>https://aggregates.seprosystems.com/history-of-rock-crushers/</u>
<u>Ex. 1010</u>	<u>https://ogden_images.s3.amazonaws.com/www.mininggazette.com/images/2022/04/01160835/4-2-CCPP.gj-.jpg</u>
<u>Ex. 1011</u>	<u>U.S. Patent No. 3,813,047</u>
<u>Ex. 1012</u>	<u>https://aggregates.seprosystems.com/history-of-rock-crushers/</u>

<u>Ex. 1013</u>	https://savree.com/en/encyclopedia/gyratory-crusher
<u>Ex. 1014</u>	https://savree.com/en/encyclopedia/gyratory-crusher
<u>Ex. 1015</u>	U.S. Patent No. 4,410,143 (Polinski)
<u>Ex. 1016</u>	U.S. Patent No. 6,270,026 (Piepho)
<u>Ex. 1017</u>	U.S. Patent No. 4,060,205 (Pollack)
<u>Ex. 1018</u>	https://pbase.com/mainecruising/fitting_a_prop
<u>Ex. 1019</u>	https://www.surpluscenter.com/Hydraulics/Hydraulic-Pumps/Clutch-Pumps-Hydraulic/2-32-cu-in-Hydraulic-Pump-w-Tapered-Shaft-for-Electric-Clutch-Rexroth-AZPN10036RXR12MA-9-1738-P.axd
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<u>Ex. 1021</u>	https://www.brandnewengines.com/cdn/shop/products/SAM_3681_1024x.jpg

Ex. 1022	https://ashdowntooling.co.uk/products/1-5mm-13mm-lathe-tail-stock-drill-chuck-morse-taper-3-mt3-to-b16-arbor
Ex. 1023	Machine Design Data Handbook, K. Lingaiah, c1994
Ex. 1024	https://www.cgtek.co.uk/metalwork/data/morse
Ex. 1025	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3779551/
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Ex. 1028	ASME B18.8.2
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Ex. 1030	U.S. Patent No. 3,343,376 (K.K. Carman)
Ex. 1031	U.S. Patent No. 2,840,399 (C.A. Harless)
Ex. 1032	U.S. Patent No. 3,228,102 (R.E. Stillet)
Ex. 1033	U.S. Patent No. 4,829,718 (Behm)
Ex. 1034	U.S. Patent No. 2,764,437 (A.E. Bratt)
Ex. 1035	“Accurate mounting of bearings, propellers and gears has never been quicker...” by SKF (3603e_skf_hydraulic_bearing_techniques.pdf)
Ex. 1036	“Hydraulically Fitted Hubs, Theory and Practice” by Michael M. Calistrat (T91-10.pdf)
Ex. 1037	“Hydraulic Removal of Coupling Hubs – Keyed and Keyless” by Michael Calistrat and Robert Parker (T22153-160)
Ex. 1038	U.S. Patent No. 1,402,255 (Sanborn)
Ex. 1039	U.S. Patent No. 4,037,800 (Coxhill)
Ex. 1040	U.S. Patent Pub. No. 2011/0006143 (Gunnarsson)

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I. INTRODUCTION

Petitioners, CMS Cepcor Limited and CMS Cepcor America LLC (“CMS Cepcor”), submits that Patent Owner, Sandvik Mining and Construction USA LLC’s Revised Non-Contingent Motion to Amend (the “Revised Motion to Amend”) the claims of U.S. Patent No. 9,827,568 (the “568 Patent”) under 37 C.F.R. § 42.121 remain unpatentable despite the belated arguments made in Patent Owner’s Reply (Paper 38). As discussed below, not only is the prior art analogous art, but there is also motivation to combine.

II. THE PRIOR ART MEETS THE LEGAL STANDARD FOR ANALOGOUS PRIOR ART

Patent Owner has taken a position that, although both the ‘568 Patent (Ex. 1001) and U.S. Patent No. 6,270,026 to Piepho (Ex. 1018) relate to crushing rocks, Piepho is not analogous art because it should be limited only to coal pulverizers. This narrow distinction is not supported by legal standards.

As is well settled, two separate tests define the scope of analogous prior art: (1) whether the art is from the same field of endeavor, regardless of the problem addressed, and (2) if the reference is not within the field of the inventor’s endeavor, whether the reference still is reasonably pertinent to the particular problem with which the invention is involved. *In re Deminski*, 796 F.2d 436, 442 (Fed. Cir. 1986); *see also In re Wood*, 599 F.2d 1032, 1036 (CCPA 1979). It is further well established

that: “[i]n a simple mechanical invention a broad spectrum of prior art must be explored and it is reasonable to permit inquiry into other areas where one of ordinary skill in the art would be aware that similar problems exist.” *See Stevenson v. Int’l Trade Comm.*, 612 F.2d 546, 550, 204 USPQ 276, 280 (CCPA 1979). For example, a predecessor of this Board previously concluded that clutches and brakes were analogous prior art. *See Ex parte Goodyear Tire & Rubber Co.*, 230 USPQ 357 (Bd. Pat. App. & Inter. 1985). Hence, analogous art is simply that which is not too remote to be treated as prior art; labeling it merely connotes that it is relevant to a consideration of obviousness under §103. *In re Sovish*, 769 F.2d 738, 226 USPQ 771 (Fed. Cir. 1985). There is many other prior art references that support Piepho being analogous art. *See, e.g., Scientific Plastic Prods., Inc. v. Biotage AB*, 766 F.3d 1355, 112 USPQ2d 1226 (Fed. Cir. 2014). (“The analogous art inquiry is a factual one, requiring inquiry into the similarities of the problems and the closeness of the subject matter as viewed by a person of ordinary skill”); *In re Clay*, 966 F.2d 656, 23 USPQ2d 1058 (Fed. Cir. 1992); *In re Klein*, 647 F.3d 1343, 98 USPQ2d 1991, 1995-96 (Fed. Cir. 2011) (reversing obviousness rejection because all of the prior art relied on by the Board and the Examiner was non-analogous); *Cable Elec. Prods. Inv. v. Genmark Inc.*, 770 F.2d 1015, 226 USPQ 881 (Fed. Cir. 1985); and *Orthopedic Equip. Co. v. United States*, 702 F.2d 1005, 217 USPQ 193 (Fed. Cir. 1983).

Furthermore, a requirement during patent application examination directs patent examiners to consider fields of invention that are related to the claimed invention, even if they are not directly within the same classification. *See* MPEP 904.01(c) (“Not only must the art be searched within which the invention claimed is classifiable, but also all analogous arts must be searched regardless of where the claimed invention is classified.”).

In view of the established legal standards, Piepho is analogous art to the ‘568 Patent. As further support, both the ‘568 Patent and Piepho have the same section, class, and subclass Cooperative Patent Classification (“CPC”) identifier of B02C which represents “**CRUSHING, PULVERIZING OR DISINTEGRATING IN GENERAL.**” (emphasis added). Even though the specific sub-groups are different, the same main classification supports that Piepho and the ‘090 Patent are in the same field of endeavor.

Also of note is the fact that Piepho has been cited by Petitioners since the initial Petition initiating this action in August 2024. *See* Paper 2 citing Ex. 1016. Then, Piepho was continuously cited throughout this action, such as in Petitioners’ Response in Opposition to Patent Owner’s Non-Contingent Motion to Amend and Request for Preliminary Guidance (Paper 15) and in Petitioners’ Response to Patent Owner’s Revised Non-Contingent Motion to Amend (Paper 28). Yet, only now, over

a year since Piepho was first raised in these proceedings as analogous prior art by Petitioners, is Patent Owner attacking Piepho as being non-analogous prior art.

Both the '568 Patent and Piepho are related to main shaft assemblies for rock crushers. This is further readily apparent considering that the '568 patent is titled "Gyratory Crusher Main Shaft Sleeve" and Piepho is titled "Strain Relief Main Shaft Assembly." (Ex. 1001 1 at 1; Ex. 1016 at 1) wherein both patents are used in the crushing, pulverizing or disintegrating of rocks.

Additionally, both the '568 Patent and Piepho address the same problems. For example, one shared problem is preserving the main shaft i.e. preventing it from needing to be replaced, which is expensive as well as difficult and time consuming to remove. Smith 4th Declaration (Ex. 1056), at ¶ 32. The second problem, related to the first, is how to minimize the down time, thus, minimizing the opportunity cost of not running the rock crushing machines. *Id.* The '090 Patent addresses these problems by using a wear sleeve on the shaft, which can be replaced when worn out. *Id.* As a POSITA recognizes, replacing the wear sleeve is less expensive, easier, and faster than replacing the entire main shaft. *Id.*

In the '090 Patent, the main shaft and sleeve are formed with a tapered interference fit to further increase the speed with which the wear sleeve can be replaced. *Id.* Piepho addresses the problem by using a coating for the shaft that reduces fretting, stress, fatigue, and, ultimately, the failure of the main shaft. *Id.* A

POSITA recognizes that fewer main shaft failures, means fewer main shafts needing to be replaced. *Id.* Additionally, a POSTIA recognizes that fretting is also a consideration for the design of the shaft and wear sleeve of the '090 Patent. *Id.* The main shaft of Piepho on which the coating is applied can be cylindrical, but Piepho points out that it is preferably tapered with a tapered bearing interference fit on the end. *See id.*; *see also* Ex. 1016, 3:29-30. This reality is a fact that Patent Owner and its expert continue to dismiss.

Though Piepho is not a tapered interference fit on the end of the main shaft, Piepho highlights what was already well known in the art – that tapered shafts with tapered bushings/wear sleeves were known and preferable. *See* Ex. 1016, 1:66-2:8, and Smith 4th Declaration ¶ 36. Non-limiting examples of prior art that show tapered shafts with tapered interference fit bushings include the following: US 4,019,344 (Ex. 1029); US 3,343,376 (Ex. 1030); US 2,840,399 (Ex. 1031); US 3,228,102 (Ex. 1032); US 4,829,718 (Ex. 1033); SAE J755 (Ex. 1026); SAE J1419 (Ex. 1027); ASME B18.8.2 (Ex. 1028); Machine Design Data Handbook, K. Lingaiah, c1994 (Ex. 1023); <https://www.cgtek.co.uk/metalwork/data/morse> (Ex. 1024); <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3779551/> (Ex. 1025); https://web.archive.org/web/20101027092713/https://pbase.com/mainecruising/fitting_a_prop (Ex. 1018); <https://www.surpluscenter.com/Hydraulics/Hydraulic-Pumps/Clutch-Pumps-Hydraulic/2-32-cu-in-Hydraulic-Pump-w-Tapered-Shaft-for->

Electric-Clutch-Rexroth-AZPN10036RXR12MA-9-1738-P.axd (Ex. 1019);
https://img.directindustry.com/images_di/photo-g/20030-2339083.jpg (Ex. 1020);
https://www.brandnewengines.com/cdn/shop/products/SAM_3681_1024x.jpg (Ex. 1021); and <https://ashdowntooling.co.uk/products/1-5mm-13mm-lathe-tailstock-drill-chuck-morse-taper-3-mt3-to-b16-arbor> (Ex. 1022).

Furthermore, Patent Owner and Dr. Kytömaa previously agreed that tapered friction fit shafts and sleeves were known in the comminution field (rock crushing field) as well as generally in the mechanical arts. *See* Ex. 1057, 19:1-20:22.

Both the '568 Patent and Piepho are rock crushers. Dr. Kytömaa agreed that coal is a specific kind of rock. *See* Ex. 1057, 7:4-25. He acknowledges that the purpose of the coal crusher references in Piepho is to reduce the size of coal from .075- 1" diameter rocks to a 0.003-0.012 inch rock powder. *See* Ex. 1058, ¶ 17.

It is well known that rock crushing and pulverizing is a multi-stage process. There are primary crushers, of which a gyratory crusher may be one, and there can be secondary and tertiary crushers or pulverizers that are used, of which the pulverizer referenced in Piepho would be one. Ex. 1056 ¶ 38. Dr. Kytömaa testified that "depending on the mining operation, you'll start with a broad range of sizes, and there may be sort of a, let's say, a coarse size classification that allows smaller components to – let's say, smaller pieces of rock to move on, and larger ones may get crushed by some kind of crusher that accommodates large rocks." *See* Ex. 1057,

26:9-18. Dr. Kytömaa continued to testify that “ultimately, the coal has to be reduced in size small enough for the pulverizer to accept ... [s]o there will be multiple steps, typically two or three, that also includes a classification of size. So larger rocks will need to be crushed by a different kind of equipment than the smaller rocks, and the classification will direct different sizes to different pieces of equipment.” *See* Ex. 1057, 26:9-27:6.

In the Third Kytömaa Declaration, Dr. Kytömaa explains that the “Sandvick CH440 cone crusher accepts rocks up to 9.8 inches wide and has an adjustable output size of 0.3 to 1.8 inches.” *See* Ex. 1058, ¶ 19. This is not uncommon for a primary crusher. Dr. Kytömaa further explains that the input for the coal pulverizer “should ideally be 0.75 to 1 inch.” *See* Ex. 1058, ¶ 17. It follows that the output from the gyratory cone crusher could be appropriately sized to be fed into the coal pulverizer.

While primary crushers may have different designs and operate differently than other crushers in the stream of production (Dr. Kytömaa highlights these differences in his Third Declaration, *See* Ex. 1058), a POSITA would be aware of and understand the different machines, the different types of crushers that are used at different stages of processing rocks and coal, and be able to incorporate teachings, designs and principles from one type of crusher into another crusher. Ex. 1056 ¶ 42. A POSITA would recognize this is true even if there are differences in how the crushers operate, how the crushers are loaded, if the wear environment is different

and how often and in what ways the different crushers are assembled and disassembled. *Id.* Thus, it is evident that Piepho and the '090 Patent can be used sequentially while processing coal and, thus, are in the same field of endeavor. *Id.*

Accordingly, it is evident that both sides agree that a POSITA would be aware of tapered shafts with tapered interference fit bushings both generally in the mechanical arts, as well as in the specific field of rock crushing equipment. As taught in prior art, a POSITA would also be aware that tapered shafts are preferable (like Piepho) as they improve the ease of removal and prevent damage to the shaft (Ex. 1035 Behm, 1:13-15, 1:35-42) they are able to be used in more locations as they do not require presses and gear pullers (Ex. 1034 Sillett, 1:15-24), and they make removing components on a tapered shaft particularly easy (Ex. 1033 Harless, 3:15-22.) - particularly when combined with known hydraulic systems for making and breaking the interference fit. Ex. 1056 ¶ 52. As mentioned above, Piepho teaches that a tapered shaft and bushing are preferable, and a POSITA would recognize that it is preferable for at least the above reasons. *Id.* All of these known benefits directly relate to the problem of reducing down time of rock crushing machinery. *Id.*

Considering the foregoing, Piepho and the '568 Patent are directed to solving the same problems and are analogous art.

III. THE MOTIVATIONS TO COMBINE ARE EVIDENT

Dr. Kytömaa notes that when an invention is directed to a different purpose, the inventor would accordingly have less motivation or occasion to consider it in an obviousness analysis. Ex. 1058, ¶ 36. However, Piepho - similar to the '568 Patent - is directed to increasing the life of the main shaft of a rock crusher and would lend itself to consideration in solving that problem. Further, Piepho teaches that a tapered shaft is preferable, and a POSITA would understand that the tapered shaft is preferable because it makes it easier and faster to replace a bushing, with less damage to the main shaft. For that reason, Piepho also lends itself to consideration and solving the problem addressed by the '568 Patent.

"[M]otivation to combine may be found explicitly or implicitly in market forces; design incentives; the 'interrelated teachings of multiple patents'; 'any need or problem known in the field of endeavor at the time of invention and addressed by the patent'; and the background knowledge, creativity, and common sense of the person of ordinary skill." *See* MPEP 2143.01. A POSITA trying to increase the life of a main shaft, and/or reduce down time when performing maintenance on a main shaft assembly would be motivated to combine the straight shaft and wear sleeve of Torrence with the preferable tapered shaft and tapered sleeve of Piepho as tapered shafts improve the ease of removal and prevent damage to the shaft (Ex. 1033 Behm, 1:13-15, 1:35-42), they are able to be used in more locations as they do not require presses and gear pullers (Ex. 1032 Sillett, 1:15-24), and they make removing

components on a tapered shaft particularly easy (Ex. 1031 Harless, 3:15-22), particularly when combined with known hydraulic systems for making and breaking the interference fit.

IV. SUBSTITUE CLAIMS ARE NOT SUPPORTED BY ORIGINAL DISCLOSURE

Patent Owner has added the limitation that the main shaft is “rotating eccentrically and freely rotatable” in Claim 11. Patent Owner and Dr. Kytömaa rely on the Figures of the ‘568 Patent support this claim amendment. Ex. 1058 Pp. 405. However, no such language is found anywhere in the original specification describing that the shaft is freely rotatable.

Even if the figures alone were sufficient to support “freely rotatable” in view of the dearth of written disclosure, including this claim limitation is inconsequential. This limitation is shown both in U. S. Patent 2,833,486 to MacLeod (Ex. 1052) as well as in US Patent No 3,813,047 Torrence (Ex. 1011). Here, it is evident that Patent Owner is claiming a limitation that is a well-known and common operational feature of gyratory crushers, in an attempt to differentiate over the prior art.

In Dr. Kytömaa’s third declaration, no opinion is rendered regarding whether all of the claim elements of the further amended claims are shown in the prior art. Rather, Dr. Kytömaa simply argues that the new grounds for obviousness rely on

non-analogous art, that there is no motivation to combine, and that there are secondary considerations of non-obviousness.

V. SECONDARY CONSIDERATIONS

Petitioners acknowledge that secondary considerations, which may be considered in such an analysis include, among other factors, the commercial success of the patented invention (including evidence of industry recognition or awards), the existence of a long-felt but unmet need in the field satisfied by the invention, the failure of others to arrive at the invention, industry acquiescence and recognition of the invention, initial skepticism of the invention by others in the field, the extent to which the inventors proceeded in a direction contrary to the accepted wisdom of those of ordinary skill in the art, and licensing of the patent. However, U.S. Laws do not support having a valid patent when the invention is obvious in view of prior art.

It is well settled that secondary considerations of non-obviousness cannot overcome this strong prima facie case of obviousness. *Sundance, Inc. v. Demonte Fabricating Ltd.*, 550 F.3d 1356, 2008 U.S. App. LEXIS 26082, 89 U.S.P.Q.2D (BNA) 1535, 78 Fed. R. Evid. Serv. (Callaghan) 320 (citing to *Agrizap, Inc. v. Woodstream Corp.*, 520 F.3d 1337, 1344 (Fed. Cir. 2008); *see also Anderson's-Black Rock, Inc. v. Pavement Salvage Co.*, 396 U.S. 57, 61, 90 S. Ct. 305, 24 L. Ed. 2d 258 (1969) (considering argument of secondary considerations but holding

that "those matters without invention will not make patentability"); *Leapfrog Enters., Inc. v. Fisher-Price, Inc.*, 485 F.3d 1157, 1162 (Fed. Cir. 2007) (holding that the objective considerations of nonobviousness presented, including substantial evidence of commercial success, praise, and long-felt need, were inadequate to overcome a strong showing of primary considerations that rendered the claims at issue invalid); *Dystar Textilfarben GMBH & Co. Deutschland KG v. C.H. Patrick Co.*, 464 F.3d 1356, 1371 (Fed. Cir. 2006) ("The presence of certain secondary considerations of non-obviousness are insufficient as a matter of law to overcome our conclusion that the evidence only supports a legal conclusion that claim 1 would have been obvious.").

VI. CONCLUSION

For all of the reasons stated above, the substitute claims of the '090 Patent are obvious by prior art under 35 U.S.C. § 103, according to a person of ordinary skill in the art.

Date: January 7, 2026

/Terry M. Sanks/
Terry M. Sanks, Esquire
Reg. No. 45,069
BEUSSE SANKS, PLLC
612 E. Colonial Drive, Suite 250
Orlando, Florida 32803
Tel: (407) 644-8888
tsanks@firstiniplaw.com
litigation@firstiniplaw.com

CERTIFICATE OF SERVICE

I hereby certify that, on January 7, 2026, a true and correct copy of the foregoing Petition (and accompanying exhibits) was served on the Patent Owner via electronic means (by agreement of the parties) at the addresses listed below:

Mehran Arjomand
MArjomand@mofo.com
Alex S. Yap
AYap@mofo.com
MORRISON & FOERSTER LLP
707 Wilshire Blvd., Suite 6000 Los Angeles, CA 90017
Tel: 213-892-5200

- and -

Aaron G. Fountain
afountain@mofo.com
MORRISON & FOERSTER LLP
200 Clarendon Street, 21st Floor
Boston, MA 02116
Tel: 617-648-4700

-and-

Jeffrey G. Young
JeffreyYoung@mofo.com
MORRISON & FOERSTER LLP
2100 L Street, NW Suite 900
Washington, DC 20037
Tel: 202-877-1500

Attorneys for Patent Owner
Sandvik Intellectual Property AB

/Terry M. Sanks/

Terry M. Sanks

Reg. No. 45,069