

Exhibit 1023

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

FlSmidth Inc.,

Petitioner,

v.

Metso Outotec (Finland) Oy,

Patent Owner.

Patent 9,518,604 B2

Inter Partes Review: To be assigned

DECLARATION OF EDWARD WIPF

I, Edward Wipf, declare as follows:

1. I am over 21 years of age and otherwise competent to make this declaration. I make this declaration based upon facts and matters within my own knowledge and on information provided to me by others.

2. I have been retained as an expert witness to provide testimony on behalf of FLSmidth Inc. (“FLSmidth”) as part of the above-captioned *inter partes* review proceeding (“IPR”).

3. I have previously worked for companies associated with Metso (formerly known as Outotec) and/or FLSmidth in different roles and am acquainted with current and former employees of FLSmidth and Metso who are primary suppliers of mineral processing equipment in the United States.

4. I understand that Metso is listed as the owner U.S. Patent No. 9,518,604 (“the ’604 Patent”), entitled FLUID BEARINGS,” the validity of which FLSmidth challenges.

5. I have reviewed and am familiar with the ’604 Patent.

6. I am familiar with the technology at issue at the time the ’604 Patent was filed. I understand that date to be June 28, 2012.

QUALIFICATIONS

7. I am an accomplished Senior Executive and Consultant with 45 years of experience in the mining, mineral, industrial manufacturing, and equipment buying industries. Throughout my career, I have held leadership positions with organizations including Weir Minerals, Aerosion Ltd., Polysius Corporation, Nordberg, Inc. and Metso Minerals.

8. I am currently the Owner and President of EdRockMan IV LLC, a mining engineering consulting firm.

9. I served as the Vice President of Process and Business Development for Weir Minerals from 2010 to 2016 and was responsible for the Global Comminution product introductions. During my tenure, I secured over \$1 billion in processing equipment sales, including milling equipment. I also presented a new machine to the company that squeezes rock in order to extract the minerals from them.

10. I served as Vice President of Sales and Marketing for Aerosion Ltd. from 2009 to 2010, and was responsible for all technology, engineering, sales and marketing for the start-up organization.

11. I served as Manager of the Minerals Group for Polysius, a ThyssenKrupp company, from 2001 to 2008.

12. I served as General Manager and Global Project Manager of Mills for various companies associated with Metso Minerals from 1994 to 2001, including Nordberg, Inc. I oversaw teams of engineers charged with designing, operating and maintaining various milling equipment, including horizontal ball and rod mills with fluid bearings.

13. I served as Technical Sales and Process Manager for Svedela and its predecessors including Hardinge, MPSI, 1980 to 1994.

14. I earned Bachelor of Science degrees in Chemical Engineering and Power Plant Energetics from the University of Wisconsin in 1972.

15. Based on the above credentials, and as further documented in my curriculum vitae (attached as Ex. A), I believe I have the necessary education, training, and practical experience to analyze the technology disclosed in the '604 Patent and provide opinions on what the person of ordinary skill in this art or

technology (as further defined below) would have understood before the date the '604 Patent was filed.

PRINCIPLES OF ANALYSIS

16. I believe that I am a person ordinary skill in the art related to the '604 Patent. The technology of the '604 Patent is a not overly complicated mechanical engineering technology.

MATERIALS CONSIDERED

17. In addition to the '604 Patent, I have reviewed the following materials.

Exhibit	Description
1005	DE102007039364 English Translation
1006	Metso Brochure No. 2060 02-02
1007	US4,025,133
1009	Trygg, et al. CIM Article
1012	Higgins, R.A. Textbook
1016	US2,744,799
1019	US4,320,926

OPINIONS AND ANALYSIS

18. Part of my assignment includes discussing what was generally known by a person of ordinary skill in the art as it relates to the '604 Patent.

BACKGROUND OF '604 PATENT

19. I understand the '604 Patent is based on an earlier patent application filed on June 28, 2012. While I do not understand all of the legal aspects of the

earlier filing, I understand that I am to limit discussion of general knowledge to what was known to a person of ordinary skill before that date.

20. The '604 Patent is titled "Fluid Bearings" and is related to fluid bearings for use in milling operations.

21. The Background of the '604 Patent discusses technology that was known to me prior to its filing in June of 2012. In that Background, the '604 Patent describes a "typical" grinding mill and the use of bearings in a mill. *See* Ex. 1001, 1:58-64. Figure 1 of the '604 Patent shows what a typical grinding mill might look like, though there are many different versions. Some of the members are identified as they are identified in the '604 Patent.

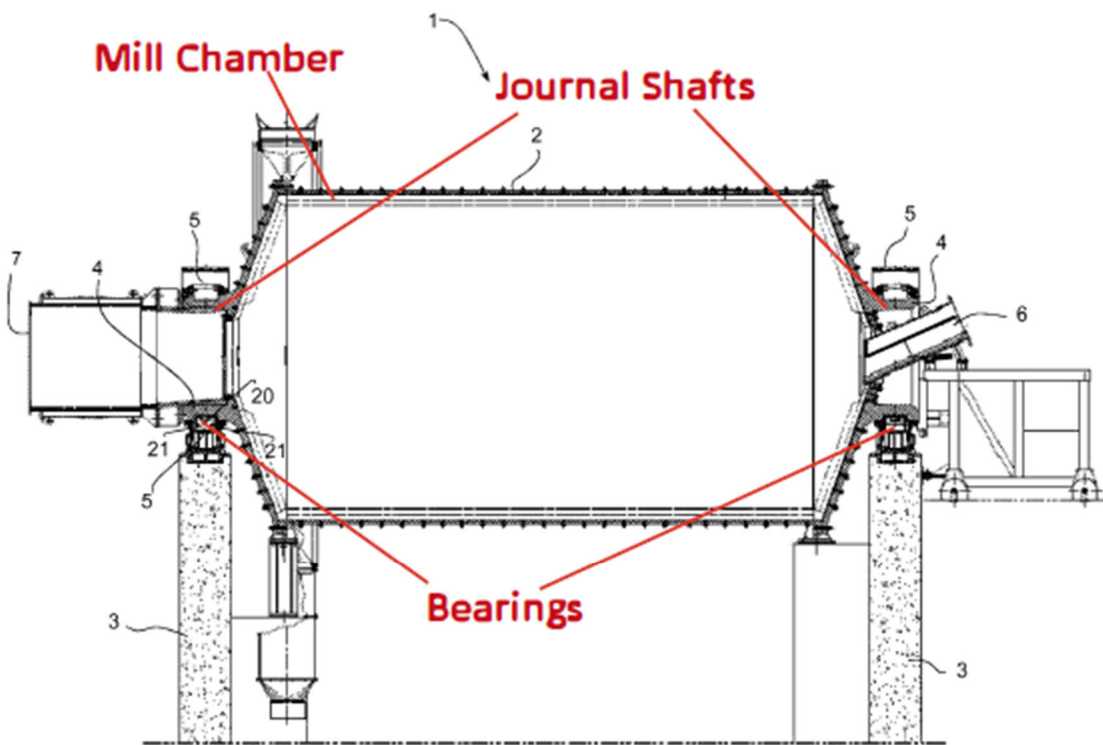


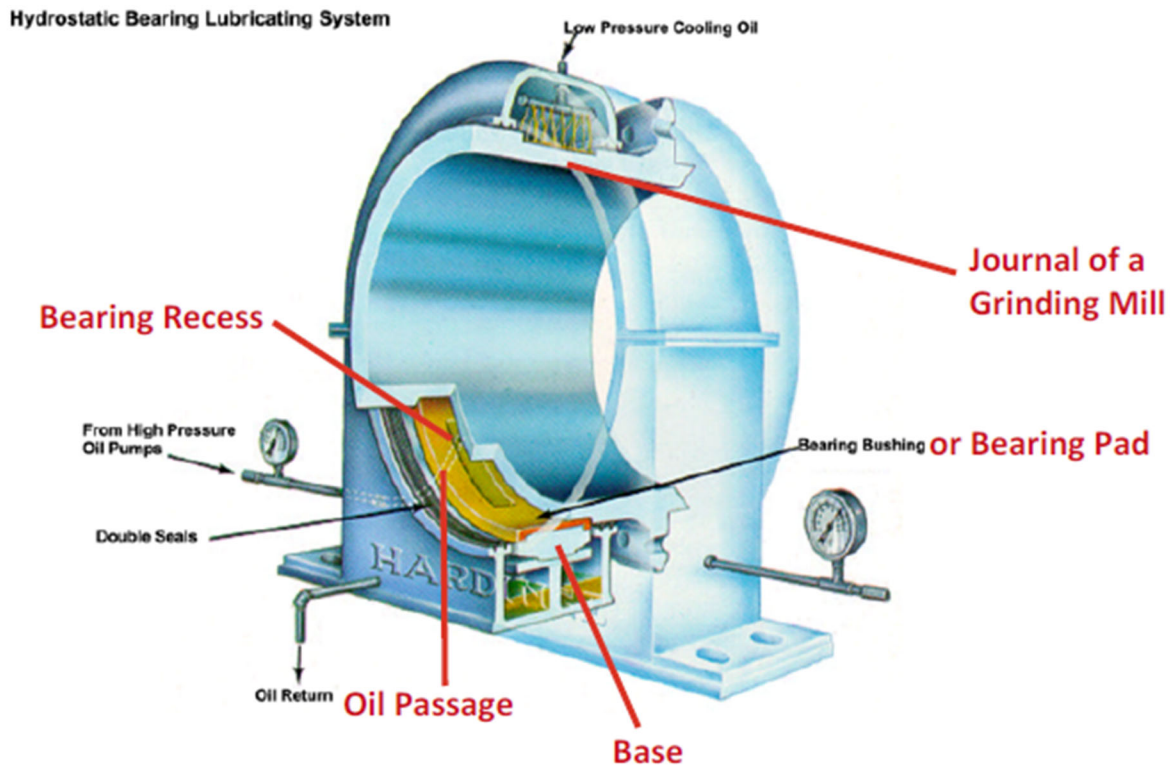
Fig. 1

22. The Background also describes hydrostatic fluid bearing pads that were "currently in use." *See* Ex. 1001, 1:66. I am personally aware of this

technology and its existence prior to the filing of the patent and was involved with its operation. In sum, the hydrostatic fluid bearing pads use “an external oil supply system [that] pumps high-pressure oil to recesses machined into the bearing so that the oil forms a thin film on the bearing pad surface.” The resulting hydraulic pressure “lift[s] the mill journal off the hydrostatic pads and separate[s] the sliding surfaces.” *See* Ex. 1001, 1:65 – 2:1-13.

23. An example of this type of technology is found in a Metso Brochure, attached hereto as Ex. 1006. This brochure is something that persons like me or others interested in understanding Metso’s grinding mills would have looked for on Metso’s website at www.metso.com/miningandconstruction.

24. Specifically, this brochure shows a hydrostatic mill journal that includes a fluid bearing with a bearing pad (orange in image below referred to as a “bearing bushing”). The bearing pad has a recess that is connected through an opening to a fluid passageway (shown by dotted white lines) for oil (yellow) to flow to the wear surface of the bearing pad.



25. The Metso Brochure shows a hydrostatic bearing system that provides oil to an opening disposed within a recess located on the face of the bearing pad. This allows the journal mill to “float” on the top of the bearing pad and self-align. The liner or bearing pad covers the face of the bearing and makes a fluid tight seal to permit the “float”. If it didn’t have a fluid tight seal, the system would continually leak lubrication fluid and lessen the effectiveness of the system. This type of system was generally known to those of us working in this industry.

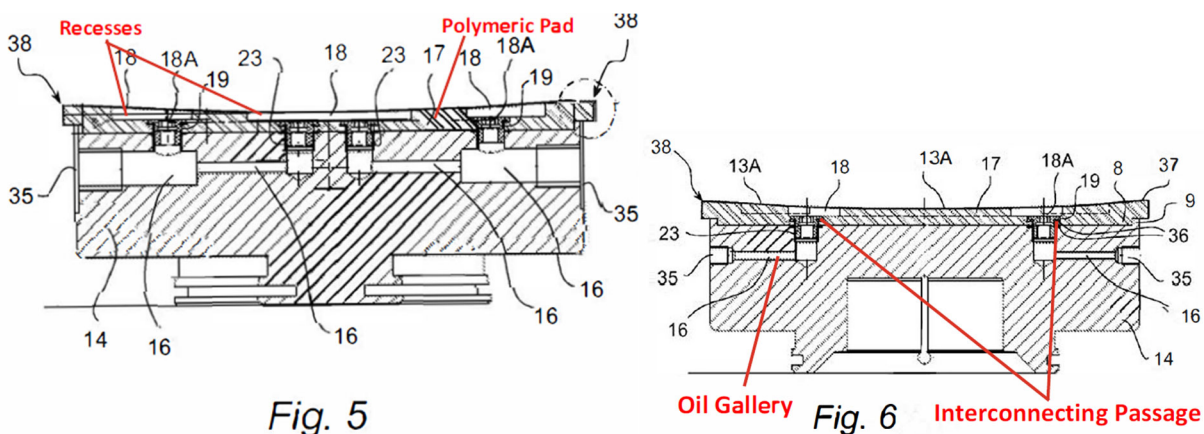
26. The next paragraph of the Background part of the ’604 Patent notes some of the disadvantages of bearing systems that were in use at the time of the filing of the ’604 Patent. *See* Ex. 1001; 2:13-25. In short, if there is no oil pressure, the bearing pads can be damaged by “direct metal to metal contact.” Repair and maintenance of the bearing pads can be difficult. *See* Ex. 1001; 2:13-25.

27. The Background provides information about how fluid bearings were designed prior to the filing of the '604 Patent and problems with the design related to maintenance. "Typically, to manufacture hydrostatic bearings, the recesses are machined into the steel base and then the oil supply ports for delivering high pressure oil to the recesses are then drilled into the base. Bronze is spray welded or cast onto the relevant parts of the steel base to form the bearing pad or lining. Spray welding enables the bronze metal to form a seal with the base." *See* Ex. 1001; 2:35-52. This construction makes it more difficult to service the bearing pads. This was a problem that was generally known at the time of the '604 Patent.

28. The Background states that one of the purposes of the invention was to overcome this disadvantage. *See* Ex. 1001, 2:56-62. The "improved fluid bearings" in the patent effectively swap out the bronze or metal bearing pad for a polymer bearing pad. The '604 Patent discussed different ways of attaching or designing the polymer pad which I discuss more below.

ADDITIONAL INFORMATION ABOUT THE '604 PATENT

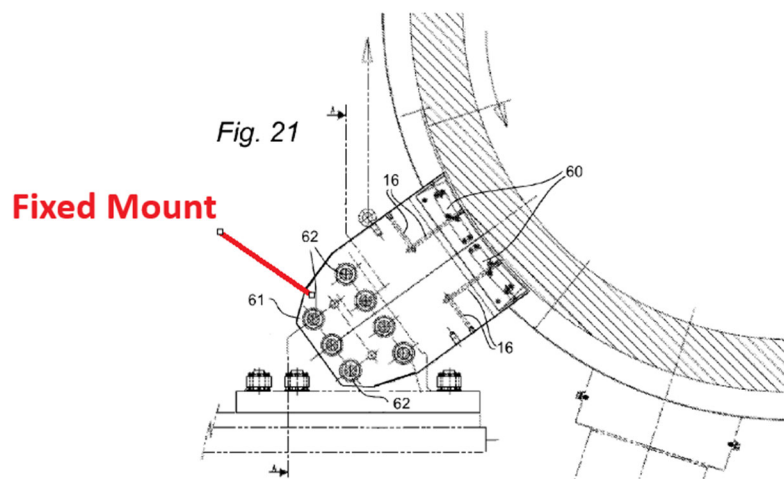
29. Figures 5 and 6 of the '604 Patent show cross-sectional views of a radial hydrostatic bearing 11 which are shown in the drawings below. Ex. 1001, 8:34-39, 9:40-42.



30. Figure 6 shows “[a] polymer pad 17 is mountable to the base 14 of each radial hydrostatic bearing 11 via a mounting portion 8.” Ex. 1001, 9:54-55. “The polymer bearing pad 17 has at least one recess 18 for receiving oil from the oil gallery 16 and distributing it to the outer surface 13A to act as a lubricating fluid between the radial hydrostatic bearing 11 and the journal shafts 4.” Ex. 1001, 10:3-6. The “recess 18 is fluidly connected to the oil gallery 16 via interconnecting passage 19.” Ex. 1001, 10:7-8. Also, the “oil gallery 16” is “in fluid communication with the oil supply port 15.” Ex. 1001, 9:44-45.

31. The '604 Patent also explains that the base 14 may “self adjust” to any changes in the angular position of the journals 4 during operation of the mill 1 using “spherical seat.” Ex. 1001, 9:45-51. None of the figures in the patent show any structure that provides a self-adjusting feature, including the alleged “spherical seat.” Ex. 1001, 9:45-51. But as I note below, fluid bearing systems that pivoted or tilted around a spherical seat were well known before the '604 Patent was filed.

32. The '604 Patent states that the base 14 may also be “fixedly mounted.” Ex. 1001, 16:15-19. Figure 21, below, shows a fluid bearing with a fixed mount.



GENERAL KNOWLEDGE

33. One of my assignments is to provide background about the general knowledge that one of ordinary skill in the art possessed at the time the '604 Patent was filed. In its Background, the '604 Patent talks about existing general knowledge for fluid bearings used in mills and the use of bronze as an anti-friction surface. The '604 Patent discusses that a bearing pad liner covers the entire upper surface of the bearing pad, forming a fluid tight seal (Ex. 1001, 3:54-56) so that the oil (or other fluid) used as a lubricant is efficiently distributed over the upper surface of the bearing pad. *See* my discussion above at ¶¶22-25 where the Metso Brochure supports the general knowledge of those features to persons of ordinary skill.

34. There are also many other things described in the '604 Patent that were known to me and other persons that were familiar with this technology before the '604 Patent was filed.

Polymers are a Low Friction Material

35. Using a polymer as a low friction material, including the material properties of polymer, was general knowledge before the filing of the '604 Patent. This includes using a polymer as an alternative to a bronze or an alloy liner. While those properties were generally known, I note two examples below to support my statement.

36. Higgins, R.A. *Materials for Engineers and Technicians*. 4th ed., Elsevier, 2006 ("Higgins") is an engineering textbook published in 2006. Ex. 1012, copyright page. I understand that Higgins is a publication can be found in a number of public locations such as libraries, including university engineering libraries. I believe that Higgins would have been cataloged and available in such libraries before the filing of the patent application. Those designing fluid bearings,

including persons in the mining engineering field such as myself, would have been aware of such resources in libraries, and would have searched for and looked to such resources, including Higgins, for knowledge in this field.

37. Higgins discloses the desirability of using polymer materials as bearing surfaces. For example, Higgins teaches that PTFE (“Teflon”), a polymer, may be used as a bearing surface due to its “very low coefficient of friction.” Ex. 1012, p. 255. Higgins further teaches that “bearing surfaces coated with PTFE can be used without lubrication...” Ex. 1012, p. 255. Higgins also teaches that, due to its low coefficient of friction, “PTFE is widely used as a bearing material...” Ex. 1012, p. 282. Higgins also notes that nylon, homo-polymers, and polyimides are other polymers suitable for use as a bearing. Ex. 1012, p. 257, 259, 261, 267.

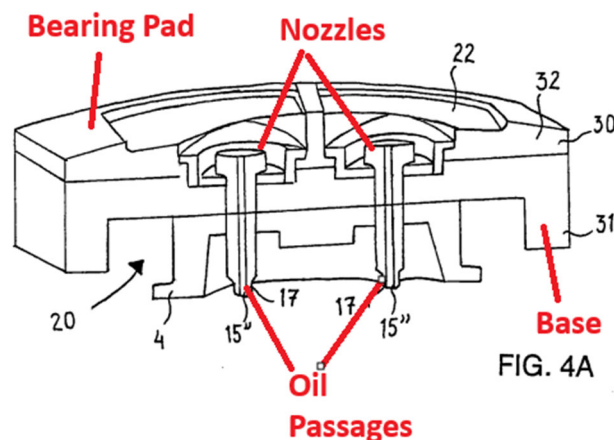
38. DE102007039364 (“DE364”) states that the bearing pad 30 is formed of a polymer. For example, DE364 notes that the bearing is “an advanced engineering plastic, for example polyetherketone (PEEK) polyamide-imide (PAI) or polyimide (PI), which is preferably supplemented with a small amount of polytetrafluoroethylene (PTFE) and/or graphite to improve the sliding properties, is used as the bearing material.” Ex. 1005, ¶ [0011].

Common Fasteners

39. Using bolts and screws to mount a pad to a base is also general knowledge that a person of ordinary skill would have had prior to the filing of the '604 patent. Pre-drilling or manufacturing holes in the pad prior to placing the screw or the bolt is a known method of preparing a device to be mounted onto a base. The use of hollow bolts, bolt plugs, liquid screws, lock washers, and bolt covers are all well-known temporary fastening devices in many mechanical areas including those related to fluid bearings. For example, bolts are commonly used on a device that one may wish to remove at some future date due to normal wear or

breakage. The use of a lock washer or a liquid tightener is well known to help keep bolts from prematurely loosening.

40. As support for what was generally known, DE364 teaches that a polymer bearing pad and a base “are attached to each other, for example by screws, adhesive, or rivets.” Ex. 1005, ¶ [0011]. As shown in annotated Figure 4A, DE364 discloses a bearing assembly 20 having a bearing pad 30 mounted on a base 31 using hollow bolts 17. All of these options were known to designers (i.e., persons of ordinary skill) of fluid bearings and would be considered as available to use as a solution to temporarily securing a bearing pad to the bearing.

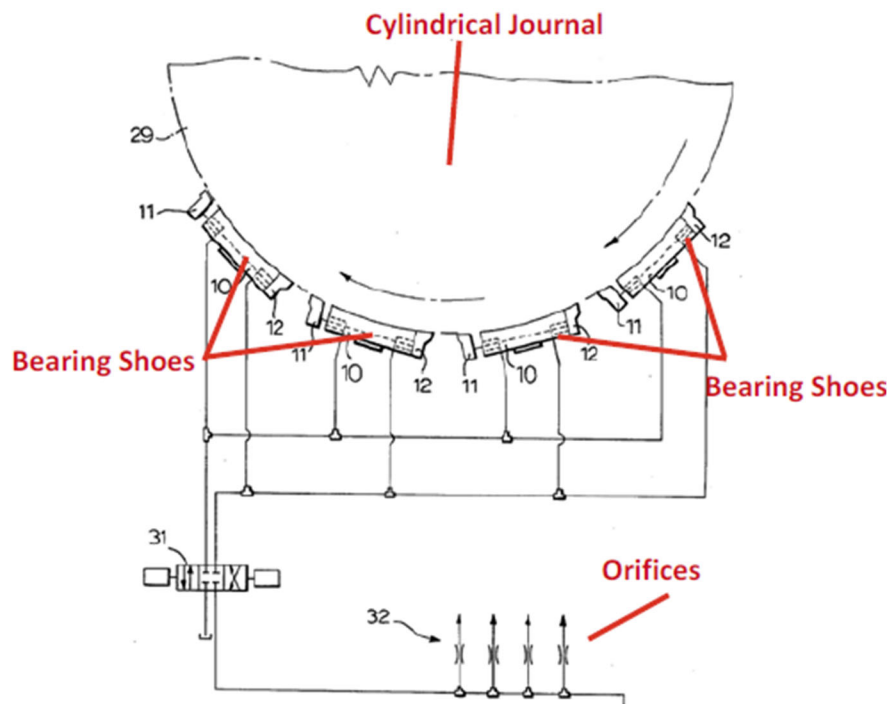


One Bearing Or Numerous Bearings

41. It was also common knowledge to use a plurality of bearings in connection with a journal mill. Historically, two points of contact on a rotating cylindrical mill can be used to support the mill as it rotates. One could use a large single bearing across an entire bottom surface, and those types of systems have been used, but those systems can be unnecessarily costly because of the increased surface area of the bearing to extend from one side to the other. It can also be more difficult to service as you would have to effectively lift the entire mill up, whereas separate bearing pads can be serviced individually. In other words, there

are situations where a single bearing might be applicable but others where use of more than one bearing would be desirable. Both are options available to a designer when considering a fluid bearing design.

42. Examples of a plurality of bearings in support of the general knowledge of this principle to one of ordinary skill are shown in US4,025,133 to Cornford issued on May 24, 1977. Ex. 1007. *See, e.g.*, Figure 3 below, with multiple bearing shoes 10 supporting a cylindrical journal 29.



Self Aligning vs. Fixed Bearings

43. The use of both “self-aligning” or “fixed” fluid bearings is well known general knowledge to one of skill in the art before the filing date of the '604 Patent. Fixed fluid bearings are fixed to a frame and do not move (substantially) when placed under a load. Self-aligning fluid bearings are typically engineered to pivot to account for changes in axial, radial, or circumferential loads. With respect

to the use of fluid bearings in connection with rolling surfaces, the person of ordinary skill in the art may use one or the other depending on a specific engineering need. If the rotating system is encountering relatively low-weight or even loads, a fixed fluid bearing would be a viable option. The self-aligning bearing uses more parts that can break or wear out over time. However, in a system with relatively heavy or uneven loads, a self-aligning system might be desirable. Heavier rolling loads can have asymmetric weight distribution during operation causing variable radial and circumferential loads on the fluid bearing. Those variable loads can cause fixed fluid bearings to fail. The person of ordinary skill in the art would look to understand these general engineering needs and then apply the proper known engineering solution to that need.

44. Examples of self-aligning fluid bearings are found in Trygg et al., *Hydrostatic Shoe Bearing Eliminates Problems for Large Mills*, CIM (Canadian Institute of Mining, Metallurgy and Petroleum), Vol. 75, No. 841, 1982. Ex. 1009. Trygg is an article published in 1982 in a publication known as Canadian Institute of Mining, Metallurgy and Petroleum. Those persons interested in the mining industry and/or fluid bearings, such as myself, would have been aware of this publication and looked to it for knowledge in this field. I personally subscribed to the CIM publication at various periods in my career, and would have been aware of the articles in the publication, including reading and/or searching for articles relevant to fluid bearings.

45. Trygg shows both fixed-mounted and self-aligning fluid bearings for journals of grinding mills. Trygg discloses “hydrostatic shoe bearings” for use with “grinding mills.” Ex. 1009, p.105. Trygg also shows that when using hydrostatic shoe bearings, “the sliding surfaces are completely separated by means of oil under pressure.” Ex. 1009, p.105.

46. Annotated Figure 1 of Trygg, reproduced below, shows a bearing assembly for supporting a journal (girth ring) of a grinding mill body with two fluid bearings (hydrostatic shoes) mounted to a frame.

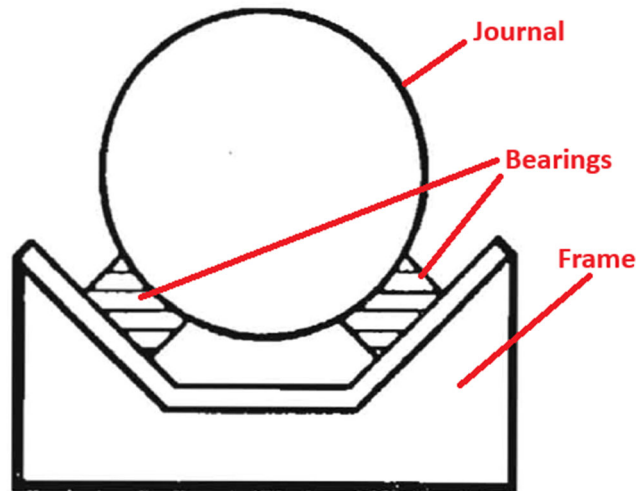


FIGURE 1. Radial position of girth ring.

47. Annotated Figure 2 of Trygg, reproduced below, shows one of the options for the fluid bearings in Figure 1, above. This fluid bearing includes a base, an outer surface, an oil passage, at least one recess for receiving lubricating fluid, and a lubricating fluid supply port in fluid communication with the oil passage. The base of the fluid bearing is fixed to the frame.

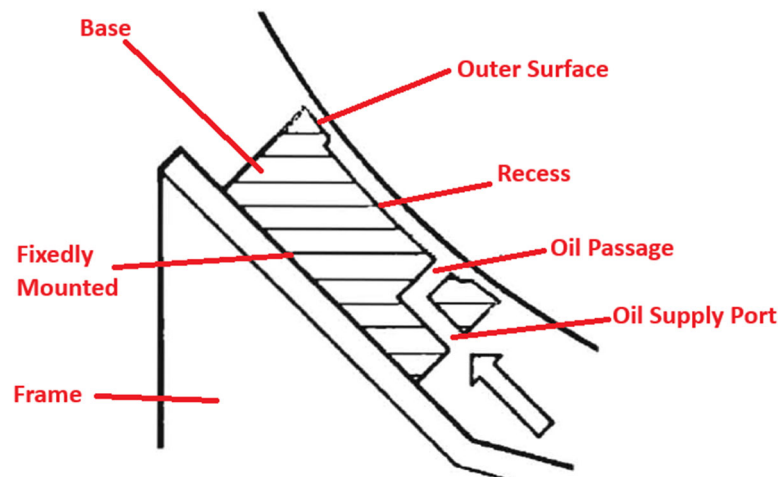


FIGURE 2. Separation of surfaces by oil film.

48. Annotated Figure 4 of Trygg, reproduced below, shows a fluid bearing that is “self-adjusting.”

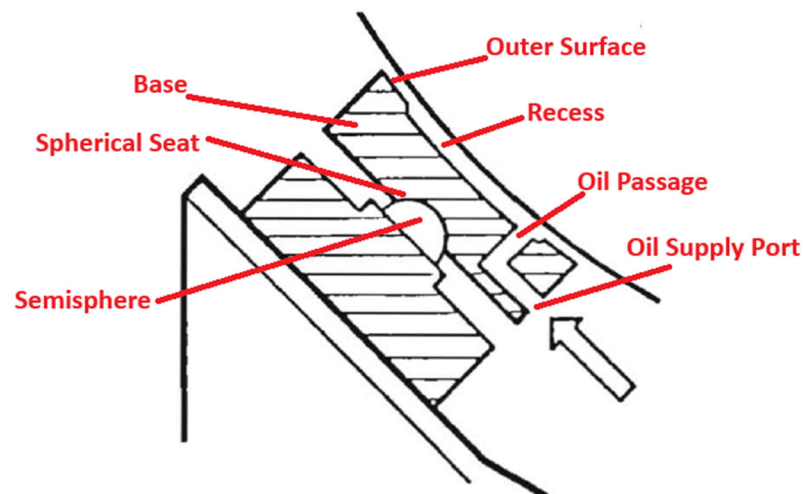


FIGURE 4. Articulated shoes.

49. This fluid bearing includes a base, an outer surface, an oil passage, at least one recess for receiving lubricating fluid, and a lubricating fluid supply port in fluid communication with the oil passage. The base of the fluid bearing has a

spherical seat formed in its bottom surface that is mounted on a semisphere. Ex. 1009, p. 106. The spherical seat and the semisphere allow the base (sliding shoe) to self-adjust, i.e., to “be able to tilt and turn in all directions” to compensate for “errors of form and misalignment of the girth ring.” Ex. 1005, p. 106.

50. In short, Trygg teaches fluid bearings with both a “fixedly mounted” base (Ex. 1005, Figure 2) and a base that can “self adjust” to changes in the angular position of a journal during mill operation. Ex. 1005, Figure 4.

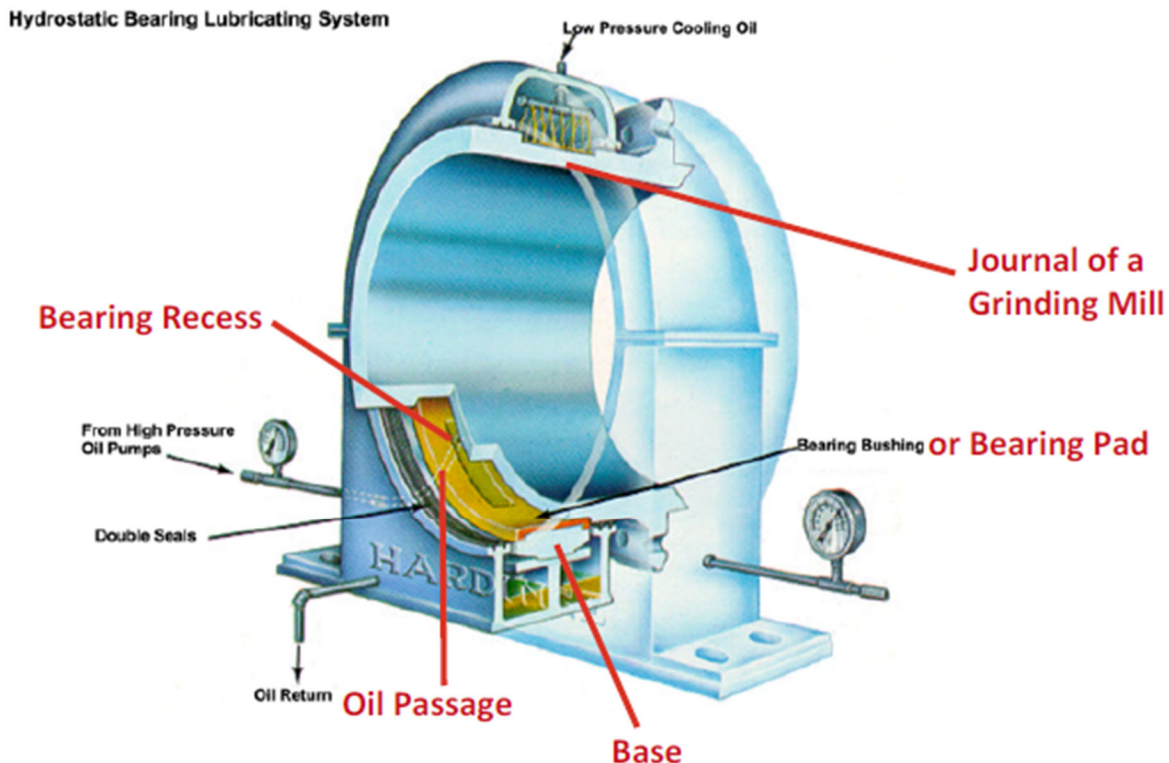
51. I believe a variation of a fixed fluid bearing is shown in the Metso Brochure. Ex. 1006.

Fluid Passages in Bearing Shoes

52. The use of one or more fluid passages to distribute a fluid to recesses on the fluid bearing is also within the general knowledge of one of ordinary skill at the time the '604 Patent was filed. Hydraulic fluid bearings were a mature technology when the '604 Patent was filed. The '604 Patent itself notes the hydrostatic bearing system “currently in use” had recesses machined into a bearing to receive high pressure oil. That high pressure oil is delivered to the recess in many ways, including enclosed passageways through the shoe and the bearing pad itself. It was known that one passageway or multiple passageways could be used to distribute fluid to a recess in a bearing, depending on a number of considerations. For example, the number of recesses that existed on a bearing pad, the amount of pressure that would be encountered on the bearing pad surface, and how a designer wanted to distribute the oil pressure profile about the surface of the bearing all have an impact on the fluid bearing design. Generally speaking, if there are multiple recesses in a bearing pad, (e.g., separated on opposite sides of a bearing pad) it is within the general knowledge of one of ordinary skill to use

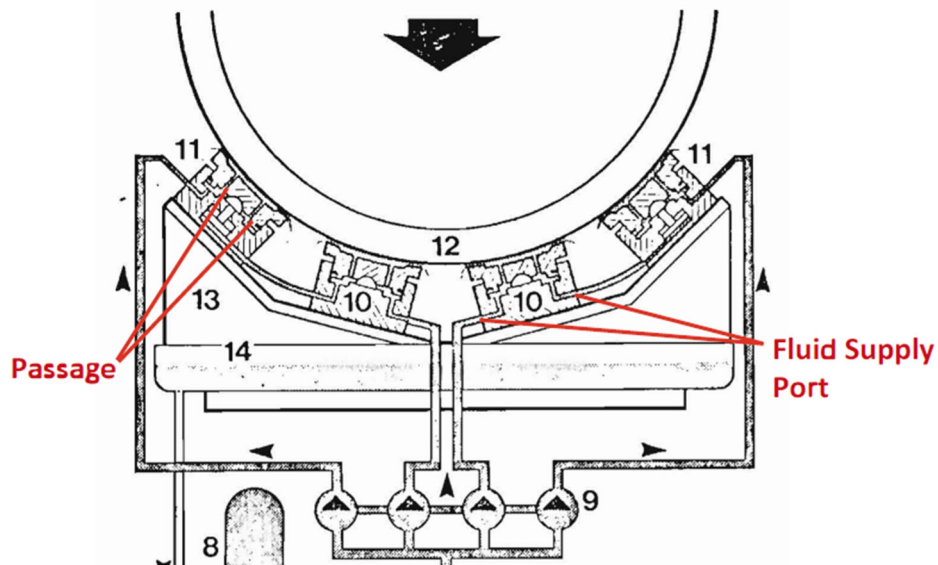
multiple fluid passages to supply the multiple recesses. It may not always be necessary to do so, but it is a known option to designers of fluid bearings to do so.

53. For example, the Metso Brochure shows two fluid passageways, one each to each recess in the bearing pad, though one of the passageways is only partway shown due to a cutaway in the image. Despite the cutaway, the Metso Brochure shows a gauge on the second passageway, opposite the first passageway. I have personal knowledge of the HARDINGE mill shown in the Metso brochure from my time in the industry, and I know that such mills included at least a second recess in the bearing pad opposite the recess shown in the Metso Brochure, and that fluid was supplied to the recess through a separate fluid passage.

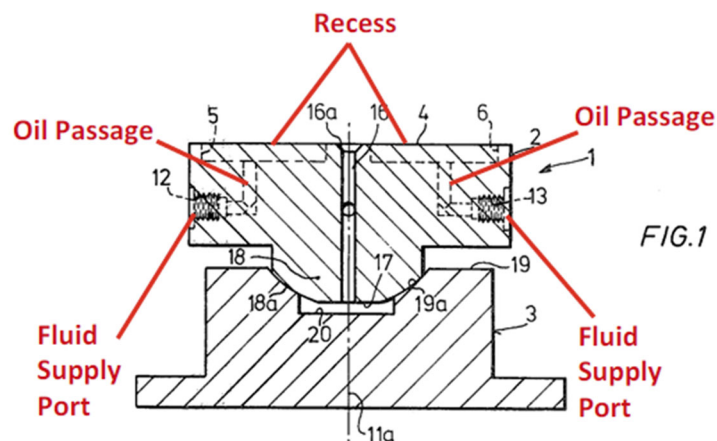


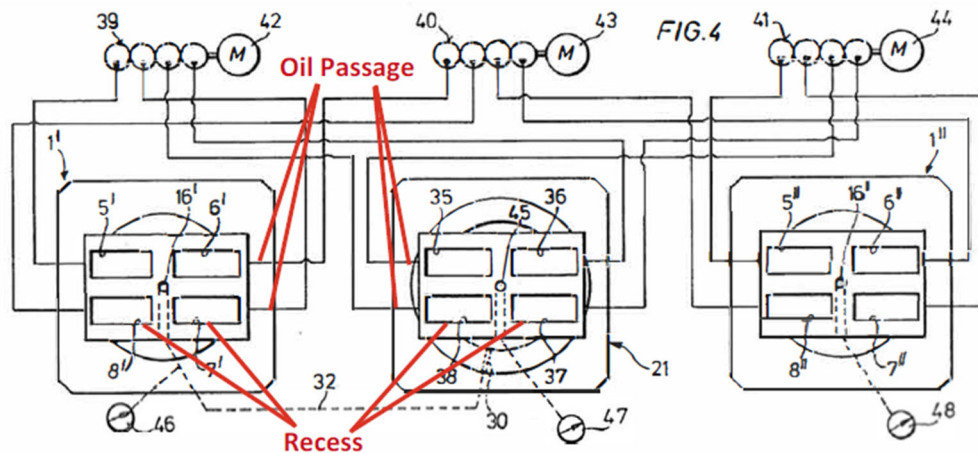
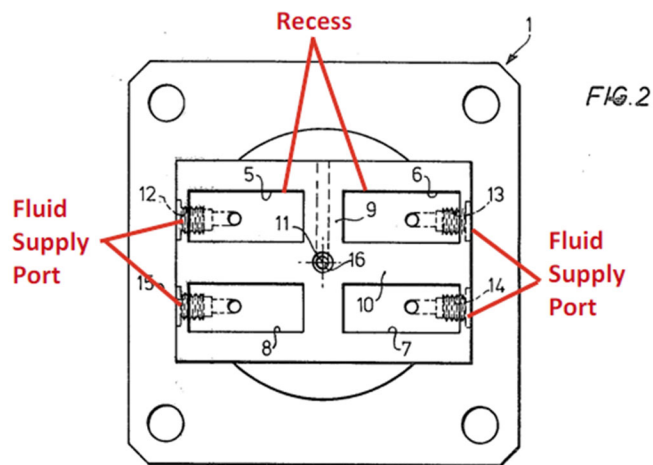
54. As another example, Trygg shows a hydraulic pressure system that includes multiple passages, including in Figure 10 shown below with separate

passages extending to and between each of a plurality of bearings. It stands to reason that the designer would use multiple passageways to supply oil to those multiple recesses.



55. Also, U.S. Patent No. 4,430,926 shows a bearing with multiple recesses connected to multiple oil passages with fluid supply ports. Specifically, Figs. 1 and 2 below show recesses 4, 5, 6 and 7 with oil passages 12, 13, 14 and 15. Each oil passage has an inlet or outlet port, as also shown. Fig. 4 of the '926 patent further shows multiple oil passages leading to multiple recesses.



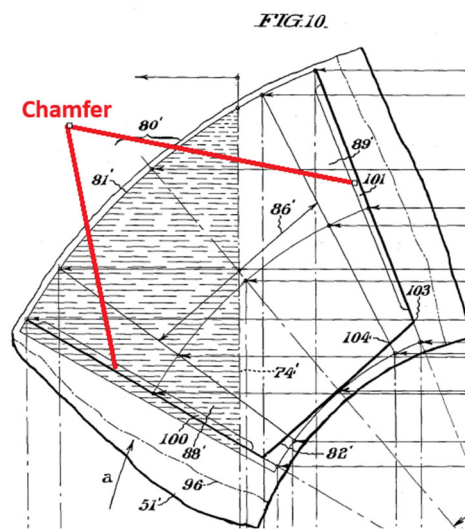


Chamfers on Bearings

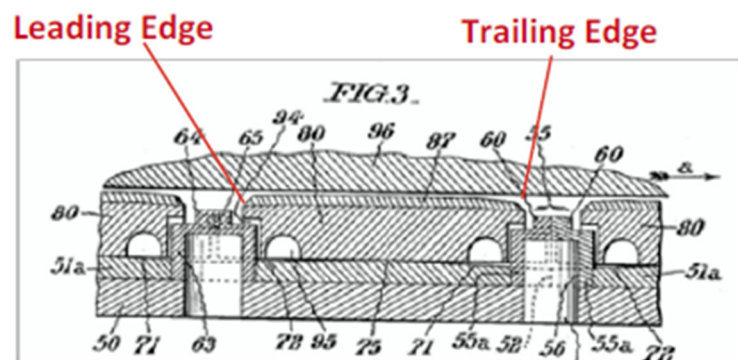
56. The use of a chamfer at an outer edge of a bearing pad to retain lubricating fluid at the outer edge and transfer lubricating fluid to the journal is within the general knowledge of one of ordinary skill at the time the '604 Patent was filed. A chamfer is well-understood by those of ordinary skill to be a transitional surface between two faces of an object. Generally speaking, a side surface and a top surface of a bearing can adjoin at an edge that forms a right angle. A chamfer may instead provide a sloped edge or rounded corner transition between the side surface and the top surface. In the context of a bearing pad, one

of ordinary skill would understand that at least two edges of the bearing pad may include a chamfer: the leading edge (or the edge of the pad first encountered by a point on the spinning surface of the mill) and a trailing edge (or the opposite edge of the pad that is last touched by the point on the spinning surface of the mill). A right angle on either the leading or trailing edge of a bearing pad will contribute to lubricating fluid or oil being “scraped” off by the sharp edge of the right angle. Those of ordinary skill at the time the '604 Patent was filed, understand that a chamfered edge helps minimize the amount of lubricating fluid that is removed from the bearing pad, while also providing additional space for the film of lubricating fluid to build up and be distributed across the bearing pad. The use of a chamfer is not required in a fluid bearing application, but it is an option that would have been a well-known option to any designer of fluid bearings to consider.

57. U.S. Patent No. 2,744,799 to Howarth, issued on April 23, 1952, supports the general understanding of this principle to those skilled in the art. Ex. 1016, cover page. As shown in annotated Figure 10, below, Howarth discloses a bearing with a leading-edge chamfer 100 and a trailing edge chamfer 101. Ex. 1016, 7:26-34.



58. The chamfer of Howarth is further described as forming “a face angled about 45 degree” and configured “to receive the impact pressure of lubricant in a high speed bearing.” As shown below, where the “runner” 96 is moving in the direction pointed by arrow “a,” the cross-sectional view of the pad of Howarth further illustrates the leading edge chamfer and the trailing edge chamfer.



Declaration of Edward Wipf
Patent 9,518,604 B2

In signing this declaration, I recognize that the declaration will be filed as evidence in a contested case before the Patent Trial and Appeal Board of the United States Patent and Trademark Office. I also recognize that I may be subject to cross-examination in the case and that cross-examination may take place within the United States. If cross-examination is required of me, I will appear during a designated time allotted for such.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

Executed this 06 day of May 2025

A handwritten signature in black ink, appearing to read "Edward Wipf", written over a horizontal line.

Edward Wipf

Exhibit A

Edward H.Wipf EdRockMan IV. Ltd.

Summary Fully Seasoned Consultant with powerful Technical skills, sales, marketing, engineering and management background with a solid track record.

Experience January 01, 2016 President and Founder of EdRockManIV LLC, which is a multi-member global consulting firm.
We specialize in Comminution Circuits, Heap Leach Circuits, Hydro-cyclones, Screens, Air Classification Circuits, Pyro Processing Systems and Specialized Professional Training

Current Main Comminution consultant to Gold – Mt Todd. Project in Australia. Process and testing ores, equipment sizing and complete review of all Vendors, interface to Proteus, Tetra Tech and Vista Gold. Comminution Consultant to John T Boyd. We reviewed Collahaussi, Los Bronces, Quellaveco and other projects.

Mill Circuit review and plant expansion of KGHM of Cerro Gorda, Chile.

Dry Circuit HPGR consulting to KCA and MMM.

Global studies on HPGR's, HPGR wear components, screens, Stirred Mills and Crushers.

EdRockMan IV LLC Consulting Services Group Expertise

Interfacing with you we can:

- Act as a client representative to provide technical and commercial interface to your EPCM contractor/engineering company
- Do comparison studies between HPGR and SAG/ball mill circuits
- Provide technical help in studies to compare conventional crusher technology against HPGR
- Evaluate capacity increases with pre-crushing and pebble crushing with and without HPGR in the

circuit

- Optimize mill circuit performance through total circuit parameter reviews including: hydro-cyclones, screens, pumps, liner design, media, etc.
- Assist in scoping studies, pre-feasibilities, feasibilities, engineering phase and equipment purchase
- Analysis of your major vendors (e.g. all the HPGR vendors)
- Review existing operations to optimize performance and advise how to increase circuit tonnages

We have influenced a selection of many of the major HPGR and mill installations. Our team is experienced in installing crushers and HPGR's into existing SAG Mill/ball mill circuits both to balance the power split between the SAG Mill and ball mill and to increase the overall circuit tonnage and performance.

Comminution

We have nearly a thousand years of comminution experience in our group. We have four of the top HPGR specialists located throughout the world that are recently entering into a consultant phase of their careers. We also have some of the best crusher circuit people in the mining industry. We have designed, sold, installed, implemented start-up and optimized many of the existing circuits around the world.

Pyro Processing

Our team has four of the leading experts in pyro processing. EdRockMan provides rotary kiln and dryer process consultation including; overall process consultation, refractory selection, burner performance, production increases, energy reduction, training and start-up services. We also represent the FEECO product line so we have access to all their technical experts in testing, designing and optimizing a pyro processing operation. We also have people on our team experienced in pressure hydrometallurgy, including Pressure Oxidation POX for refractory gold and HPAL for nickel cobalt laterites.

Metallurgical

Expert metallurgical experience to studies, EPCM, commissioning of processing facilities, production ramp up, operations, closure, and acting as the owner's representative at the consultant site. We have people in the group that are a QP under NI43-101.

Project Management

Our group can provide project management of mining projects at various stages of their development. We have members in the group that are certified Project Management Professional (PMP) under the PMI and Certified Cost Professional (CCP) under the AACEI.

M&A

Edward Wipf and other members have been deeply involved in the technical aspects of mergers and acquisitions. While at Nordberg Edward Wipf lead the technical acquisition of Scamac Mills and Morgashammer Mills group. At Weir, Edward Wipf was involved in evaluating multiple crusher companies. This led to the partnership with Minyu and the purchase of Trio.

- Multiple degrees and 45 years of Comminution experience
- VP and Company Officer at Aerosion ultrafine dry circuit comminution.
- Consulted on numerous Comminution circuits Including a 150,000 tpd circuit review of Cerro Casale; installed and operated both SAG and Ball Mill Circuits; Optimize circuit performance on dozens of circuits
- Optimized performance of over 50 FGD Lime and Limestone circuits
- Process designed World's largest Slaker system.
- Installed and operated first HPGR into Hard rock (Newmont Lone Tree) plus intimately involved in most of the Global HPGR installations

Jan 4, 2009 – Present Aerosion Ltd., Calgary, AB **V.P. Technical Sales and Marketing**

Responsible for all Technology, Engineering, Sales and Marketing for a Start Up organization. Involved with CEO, CFO and our Board in our Vision Creation and Business Plan to create a \$100,000,000 business in three years and \$500 million business through growth and acquisitions in five years. It is our plan to be the Leader in Fine and Ultrafine Comminution and Disintegrator Reactor Technology.

In the first three months I have created a Marketing distribution system with five agents and four partner organizations.

March 10, 2010 – 12/31/2016 Weir Minerals **V.P. Process and Business Development N.A.**

Responsible for the introduction of the Comminution products into Weir. I was involved in training of the global team in HPGR technology. I was involved in the M&A of multiple crushing companies that resulted in the acquisition of the Trio product line.

- According to Weir, Ed has been a significant part of the recent changes in Weir Minerals, globally, showing us how to step into the comminution side of the mining

business, providing a tremendous amount of technical support and know-how for our customers, creating access to high level contacts within many of the global mining groups and most importantly providing mentoring and education to our younger processing and product support personnel

2001- Oct 2008

Polysius Corporation, Atlanta, GA

Manager of Minerals Dept. and Sales Mgr of Minerals

Sales and management responsibility for the Mineral Processing business line which includes all markets (except cement) for all Polysius Corporation product lines (Utility FGD systems, HPGR, Wet and Dry Grinding Systems, Pyro Process & Systems, and aftermarket) in Canada, USA, and Mexico.

Successfully changed the hard rock mining market with a \$34,000,000 order for four HPGR/Ball Mills versus the old Sag

Mill technology. This is the very first order in the world in hard rock for this technology. A second order for Freeport was obtained for two HPGR's at \$12,000,000 These two orders led to 6 more orders globally. There are at least 10 active projects that will follow this technology advancement. Increased Sales volume to \$170,000,000 with the largest mills ever sold by Polysius in 2008 with Sales of three Sag mills, five ball mills and three of largest HPGR's in Polysius' history.

Consulted to Kinross and Barrick for the Cerro Casale Gold Project. Reviewed Mark Richardson and other consultant's work for operational practicality. I'm one of the leading Process specialists on the HPGR technology versus other comminution systems.

Obtained first order for our new PSC process service group \$1,400,000. Obtained first order for Polysius in the Utility Market in the USA at \$4,000,000. TVA has since placed a second order for \$4,200,000 and planning four more orders with Polysius. Southern Co. has ordered four systems for \$5,500,000 and they have 16 more projects.

Negotiated Licensee agreement for a new product line (Tower Mill)

Evaluated the acquisition of a multiple product line company.

Successfully negotiated a new technology reference installation in gold industry for HPGR.

Integral part of strategic global planning for the Minerals product line.

1994–Sept. 2001 **Nordberg (Metso), Milwaukee, WI**
General Manager (Americas) & Global Product Manager (Mills)

- 1994-96 - Responsible to establish Nordberg as a viable Mill supplier. Started with product sales volume less than \$400,000. Initiated Global training and marketing for the mill product line.
- 1994-96 - Instrumental in getting first mill order since 1988 within two months of start date. Six mills were sold in first two years as the infrastructure could not handle a higher volume. Spare & revamp volume increased to over \$1,000,000 per year.
- 1996 - Involved with the entire technical interface on the Due Diligence Process for the successful acquisition of two foreign competitors.
- 1997-2000 - Global Mill Business was grown to an average annual volume of \$25 - 30,000,000 with the sales of over 75 mills in these three years.
- 2001 Provided technical support on mills in acquisition of Svedala and for the divestiture of the Nordberg Mill Group to Outokumpu. Primary contact with Federal Trade Commission.

1980–1994 **Svedala (Koppers/MPSI), York, PA**
Product Manager & Sales Manager

- Regional Sales Mgr. For 1980-82 covering (19 states territory), I doubled the targeted sales volume in 1980 and 1981.
- Sales Manager Agents, Technical Sales Specialist, Customer Service Specialist, Sr. Process & Application Specialist.
- Product Manager for three product lines (Kilns & Dryers, Flotation, Special Rotating Products).
- Recognized for superior blend of technical, marketing, sales and management achievements.
- Responsible for numerous FDG Systems orders exceeding \$50,000,000.

1975–1980 **Allis Chalmers, Milwaukee, WI**
Product & Project Manager (Application Engineer)

- Personally involved in sales of \$37,000,000 of grinding equipment.
- Assigned all technical sales interface with six foreign subsidiaries.
- Project management and technical Sales through equipment startup for multiple \$100,000 to \$8,000,000 projects.

1973–1974
Process Engineer

The Clorox Co., Chicago, IL

- Liquid Bleach Production Manager
- Responsible for Q.A/Q.C., maintenance, and inventory control

1972–1973
Assistant Plant Manager

Allied Kelite Chem. Co., Chicago, IL

- Three promotional steps in first year.
- Tested in top 1% of all new employees.
- Involved in relocation of plant from Chicago to Detroit.

Education

Nordberg (Rauma's Business School) 14 days for Sr. Management

Nordberg (Rauma's Business School) 10 days Product Management

Management & Supervision Courses (6) Penn State, AMA, Lehigh, Colorado School of Mines (1981-88)

Sales / Marketing Courses (8) Penn State, Koppers, AMA

Value Analysis, Engineering, Technical Courses(5) Allis Chalmers, Center for Professional Advancement (1977-80)

Technical Symposiums (50+) American Institute of Mining Engineers

M.S. Chemical Engineering University of Wisconsin (Incomplete)

B.S. Chemical Engineering University of Wisconsin (Graduated 1972)

B.S. Energetics (Power) University of Wisconsin (Graduated 1972)

Professional

2007 - Industry Expert (Instructor) for a Professional Development Seminar at McGill University, Montreal. Instructor CO School of Mines.

2006 – Chairman of S.M.E. “Crushing & Grinding”. 2005- Co-Chair. Instructor to graduating class of metallurgist for Colorado School of Mines.

2003 / 2004 – Chairman of S.M.E. “Crushing & Grinding”. MMSA Member. Randol Conference instructor, Perth, Australia.

2003 – Elected to MMSA (Mining & Metallurgical Society of America). Session Chair Operators symposium and Chairman of S.M.E. “Crushing and Grinding” Denver.

2000 – Session Chair S.M.E. Salt Lake City. Industry Expert (Instructor) for a Professional Development Seminar at McGill University, Montreal.

1999 – Technical presentations at “WORKSAG 99 in Chile” and “XXIII World Mining” Congress in Mexico, S.M.E. National Session Chair and member S.M.E. committee.

1998 – Chairman of S.M.E. “Crushing & Grinding Sub-section”, Chairman of “Crushing & Grinding section” Orlando National S.M.E. Conference.

1997 – S.M.E. Co-chairman National Section, presented opening paper at “The Sag Conference” in Vancouver.

1996 – S.M.E. Chairman / President of Wisconsin Section A.I.M.E. / S.M.E.

1996 – S.M.E. Chairman / President of Wisconsin Section A.I.M.E. / S.M.E.

Personal

Excellent Health, Free to continue extensive travel (65 countries). Published and presented numerous (30 plus) technical papers and presided as chairmen of various technical gatherings.