MicroPoly
The solid idea for lubrication

Applications of Solid Profiles Made from MicroPoly® Lubricants

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INTRODUCTION

Microporous Polymeric Lubricant (MPL) is produced in a solid form and is comprised of two major components, a sponge-like polymer containing a continuous microporous network, and oil contained within the pores. MicroPoly® is the proprietary MPL product of PhyMet, Inc. The oil migrates by capillary action to the MicroPoly surface and provides lubrication by transferring the oil to the surface that comes in contact with the MicroPoly. The application of MicroPoly to lubricate ball and roller bearings has been described in detail in published articles. [1, 2] In these applications, the bearings are filled with the MicroPoly and do not require re-lubrication, and therefore, reduce maintenance costs. Since the MicroPoly also acts as a sponge, the oil is reabsorbed and prevents dripping. This property of MicroPoly improves housekeeping and plant safety. MicroPoly can also be cast, injection molded and extruded into solid profiles (see Figure 1). These profiles are used to lubricate machine parts to reduce friction, decrease maintenance costs and eliminate housekeeping and safety issues. This article will discuss several of these applications and describe the improvements in lubrication that were obtained.

FIGURE 1: EXAMPLES OF EXTRUDED MICROPOLY SOLID PROFILES

LINEAR BEARINGS

During the design of the improved Thomson 500 Series Profile Rails, Danaher Motion was interested in a permanent lubrication system for their rail products. In response, PhyMet, Inc. extruded the MicroPoly wiper and Danaher Motion attached this wiper to both ends of the carriage, shown in Figure 2.

The wiper is kept in contact with the rail by a spring. The MicroPoly wiper transfers a thin oil film to the rail as the carriage moves along the rail. This oil is then transferred from the rail to the rolling elements. Danaher Motion has found that this wiper eliminates the need for expensive lubricating systems, provides maintenance-free operations, increases life, and eliminates environmental pollution associated with conventional oil lubrication processes. This self-lubricating piece enables the bearings to achieve their theoretical L10 lives. There is no need for maintenance during the life of the wiper. After exceeding 30,000 km of travel, it is recommended that the self-lube wipers be replaced. This is easily accomplished on-site.

FIGURE 2: MICROPOLY WIPER (SEE ARROWS) USED IN THOMSON 500 SERIES PROFILE RAILS

BALL SCREWS

Danaher Motion also used MicroPoly in the development of their self-lubricating ball screws. Extruded, round bars are machined at PhyMet into a lubrication element that is contained in the ball nut (see Figure 3). As the ball nut moves along the screw the oil is transferred to the screw from the MicroPoly. This self-lubricating ball screw has been successively tested for over 10,000 hours of continuous operation without replacement. Conventional ball screws require oil replenishment every 800-1000 hours. Danaher Motion cites that the benefits of the MicroPoly include reduced environmental pollution, reduced maintenance and extended product live. It is recommended the MicroPoly element be replaced after 10,000 hours and can be accomplished by the user in a simple operation.

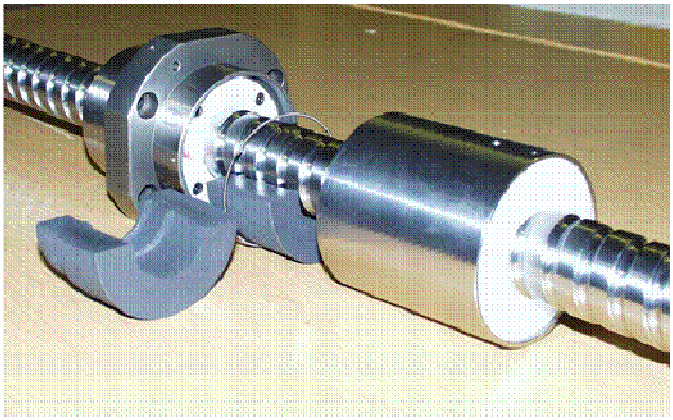

FIGURE 3: MICROPOLY INSERT FOR DANAHE MOTON'S SELF-LUBRICATING BALL SCREWS

CHAIN LUBRICATION

MicroPoly has been successfully used to lubricate chains. Several types of applicators have been developed. A sprocket was manufactured out of six segments of MicroPoly shown in Figure 4. These segments were held together using bolts to fasten them to a hub. The MPL gear segments were produced by casting in a mold. The MicroPoly sprocket acts as an idler sprocket and transfers oil from the MPL to chain as it rotates against the chain. The use of this MicroPoly sprocket has eliminated safety hazards, reduced maintenance and increased chain life.

FIGURE 4: MICROPOLY LARGE SPROCKET SEGMENT

Another method used to lubricate chains with MicroPoly is shown in Figure 5. The MicroPoly block is extruded or machined to the shape shown and block is pressed against the chain by the applicator. As the chain rubs against the MicroPoly block, oil is transferred to the chain. A conveyor system carrying 8,000-16,000 lb. pallets in a furniture manufacturing factory required lubrication every month using molybdenum disulphide grease. Excess grease dripped staining the furniture lumber and created safety hazards and housekeeping problems.

The use of 1" x 2 "x 18" MPL lubrication blocks have been in operation for over 6 years without replacement and have eliminated the problems caused by the dripping of the grease.

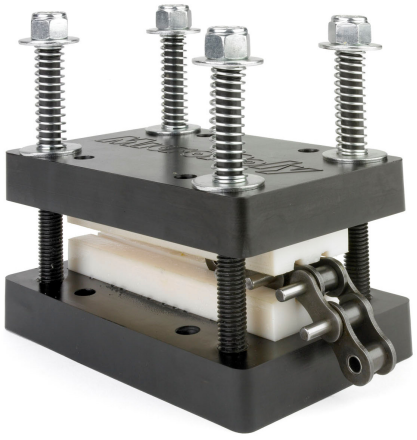

FIGURE 5: MICROPOLY BLOCK CHAIN LUBRICATING FIXTURE

SLIDES AND BUSHINGS

Slides and bushings are usually lubricated by injecting grease into holes and/or grooves. This requires significant maintenance time and the dripping of the excess grease causes housekeeping problems. Plugs made from extruded MicroPoly rods have been found to provide adequate lubrication to slides and bushings with significantly reduced maintenance time and elimination of the housekeeping issues. Plugs cut from the rods are installed in drilled and tapped holes (see Figure 6). Oil from the MPL spreads a film over the surface providing lubrication.

FIGURE 6: PLAIN BEARINGS AND BUSHINGS CONTAINING MICROPOLY INSERTS

As an example, in a forging machine, the lubrication holes and grooves in a slide would become clogged, resulting in inadequate lubrication of the slide surfaces. This required disassembly and rebuilding of the machine every 9 months. The installation of MicroPoly plugs in the slide increased the interval for rebuilding the machine to 28 months.

Bronze bushings, similar to those in Figure 6, employed in the development of a robotic automation machine, were lubricated using graphite plugs. The graphite was found to be incompatible with the coolant and failure occurred prematurely, within the desired warranty period. Using MicroPoly plugs instead of the graphite, the manufacturer is now able to meet the warranty period.

CRANE WHEELS

Inadequate lubrication of overhead crane wheel flanges has led to excessive wear and premature failure of the wheels. The flanges are difficult to lubricate since they are not readily accessible and, therefore, are frequently missed during routine maintenance. MicroPoly cast blocks are used to lubricate the flanges employing a specially designed applicator (patent pending – see Figure 7). The applicator keeps the MicroPoly blocks in contact with the flange. The oil from the MicroPoly flows onto the flange providing adequate lubrication. The service life of crane wheels have been increased 3 to 4 fold with the use of the MicroPoly applicator. Additionally, since wheel flange lubrication can be eliminated from the maintenance schedule, significant cost savings result.

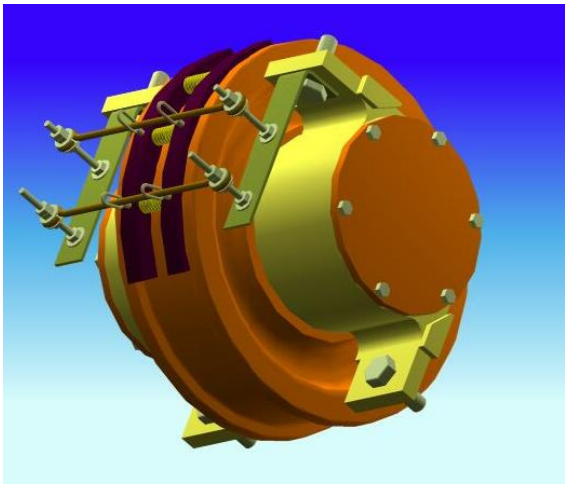

FIGURE 7: DRAWING OF A MICROPOLY CRANE WHEEL FLANGE LUBRICATING SYSTEM

SHAFT LUBRICATION

A business machine company was looking for a low maintenance, permanent system to lubricate a shaft in one of their machines. The small MicroPoly part shown in Figure 8 was extruded and cut to length. This part is spring loaded and pressed onto the shaft. The oil from the MicroPoly coats the shaft providing the required lubrication. This example demonstrates that complicated parts can be manufactured from MicroPoly to solve specific lubrication issues.

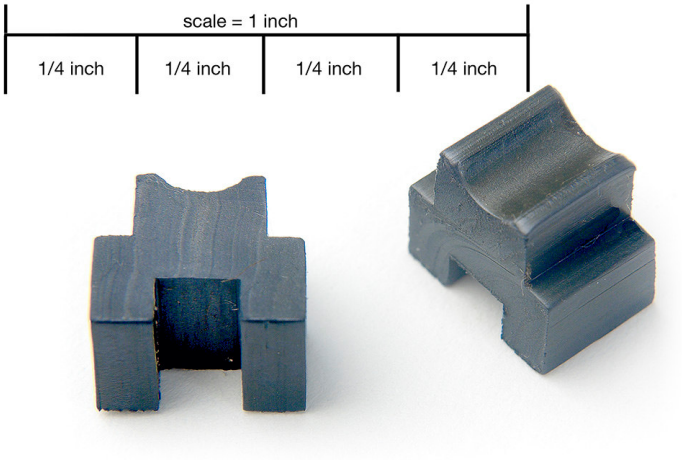

FIGURE 8: MICROPOLY SHAFT LUBRICATION DEVICE

GEAR LUBRICATION

Gears manufactured from MicroPoly can be used to lubricate mating gears. The MicroPoly gear transfers oil to the operating gears, thus providing lubrication. As an example, gears in an overhead crane in a steel mill are not readily accessible and, therefore, extremely difficult to lubricate. The gears failed and needed to be replaced every 35 to 40 days due to inadequate lubrication. A gear similar to the one shown in Figure 9 was made from MicroPoly and installed in contact with operating gear. Using the MicroPoly gear, the overhead crane continues to operate after 2 ½ years without requiring changing gears.

FIGURE 9: MICROPOLY GEAR FOR LUBRICATING METAL GEARS

CONCLUSIONS

Solid profiles of MicroPoly have been used to provide effective lubrication for many sliding and rotating machine applications. The ability to cast, extrude and injection mold these materials allow them to be manufactured into a variety of shapes. The examples described above are just a few of the successful applications.

REFERENCES:

1. Heckler, Alan. J. (2002). “Lubed-for-Life Using Microporous Polymeric Lubricants”. Machinery Lubrication, Vol. 2, No. 5, September-October 2002, Noria Publishing, p.48-52.
2. Heckler, Alan. J. (2004). “Bearings lubed-for-life”. Plant Engineering, Vol. 58, N0. 3, March 2004, p.44-45