ARO®

MINIMIZING WASTE IN HIGH-COST LUBRICATION APPLICATIONS

LUBRICANT COSTS AND EXTENDING PUMP SERVICE LIFE

PISTON PUMP PROBLEM SOLVER

Cutting Your Customer's Lubricant Costs

Ingersoll Rand

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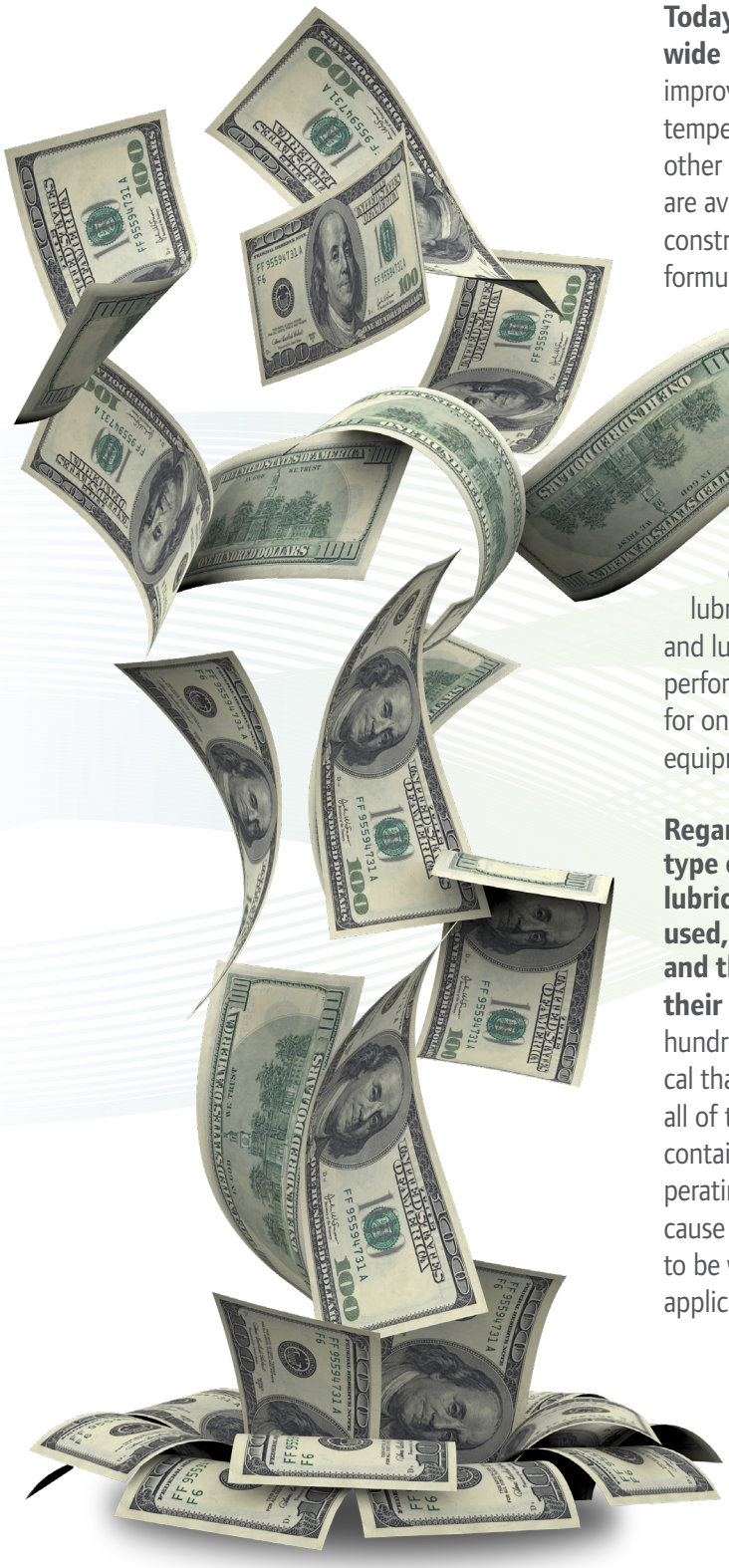


Today, your customers and end users can access a wide range of specialized, high-tech lubricants to improve performance and extend service life in extreme temperatures, harsh environments, heavy duty service, and other adverse operating conditions. These new lubricants are available for every manufacturing, product, mining, construction, and service application in virtually unlimited formulations.

For example, a manufacturer of industrial equipment can apply a custom-formulated advanced synthetic grease to fittings and key wear points in order to provide extended wear life and longer service intervals, or even no service intervals required for lubrication. Mining operators with truck-mounted mobile lubrication systems also use greases and lubricants specially designed to perform in hostile environments for on-site mining equipment service.

Regardless of the type of advanced lubricant being used, he common denominators are their higher cost and the need to eliminate s much waste as ossible in their use. With specialized lubricants costing several hundreds of dollars or more for a single container, it is critical that OEM-designed lubricant application systems utilize all of the lubricant in each container, as well as avoid perating conditions that could cause any of the lubricant to be wasted during the application process.

PUMP SELECTION FOR LUBRICATION APPLICATIONS:

Internal Wear is Not the Issue

The type of lubricant and its viscosity will determine whether two-ball, four-ball, or chop-check reciprocating piston pumps will be specified for use in OEM lubrication application systems. Lubricants usually do not contain materials that cause premature pump wear, such as abrasives or solids, so OEM system designers do not face these challenges in specifying pumps for these applications. In fact, pumps used in lubrication systems generally wear less because they are always coated with the lubricant they are dispensing during operation and they use lip seals instead of packings to seal for displacement and pressure. Higher viscosity greases generally require use of chop-check pumps, and/or follower plates, which can be powered either pneumatically or by gravity. With these thicker materials, special consideration also needs to be given to selecting a ram system and follower plate powerful enough to move the specified lubricant at the desired rate.

> The main challenge for lubrication applications is to save ongoing costs by eliminating excess material waste

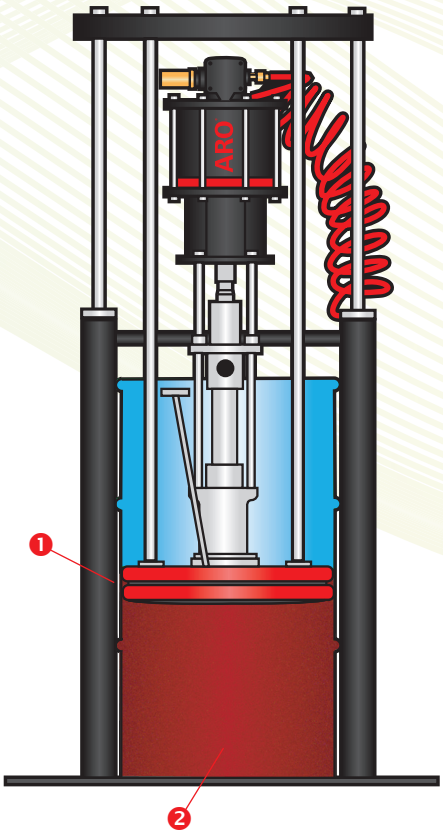
OPTIMIZING LUBRICATION PUMP SYSTEMS TO ELIMINATE WASTE

However, the main challenge in configuring piston pump systems for lubrication applications is to save ongoing costs for the OEM's customer in their lubrication material use. For an expensive lubricant product, even a small amount of wasted material remaining in a container can run into many thousands of dollars in wasted material when multiplied over hundreds of these containers used by a customer each year. In a pump system, the main areas where lubricant material loss can occur during pump operation are:

> Due to the risk of contamination by airborne dust or grit, any excess lubricant left in the container of a pumping system is wasted material and cannot be recycled

1. **Along the follower plate seal:** Lubricant can escape between the follower plate seal and inner container surface during operation, resulting in excess lubricant being left either along the sides of the container or flowing over and accumulating on the top of the follower plate as it is being pushed down by the ram;

2. **At the bottom of the material container:** Excess lubricant can be left at the bottom of the container at the end of an application cycle, preventing all of the material in the container from being utilized in the lubrication process



It's important to note that due to airborne dust, grit, or other contaminants in many facilities, excess lubricant that escapes from its original container that is exposed to air in these environments becomes contaminated itself, so it cannot be manually collected and recycled for use in a new container of lubricant. As such, lubricant that remains in the nearly-empty container or escapes from the pump lower to the top or sides of the follower plate represents lost money to your OEM customer. This added cost does not include the additional labor costs required to clean this excess lubricant from pumps during busy production hours to prevent it from contaminating new lubricant containers during refills.

ASSURING PRECISE FOLLOWER PLATE SEALING DURING OPERATION

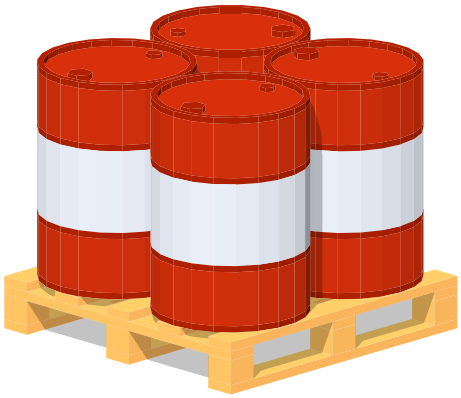
To prevent lubricant from escaping along the seal of the follower plate during operation or curling up and over the seal to the top of the follower plate, it is important to work with your pump manufacturer to specify a follower plate and seal that is sized and configured to match the exact dimensions of the container for the lubricant used by your customer. Follower plates made from steel or aluminum plate and coated with various materials are available for all U.S. and European standard containers and sizes, and can also be custom-made to match the geometry of non-standard containers.

Follower plate seals can be specified from PTFE, EPR, or other materials, depending on the viscosity and formulation of the lubricant being used. For certain types of lubricants, backers can also be added to follower plate seals and attached to standard follower plates to stiffen the seal material and improve the sealing action between the follower seal and the container.

> Make sure to specify the right follower seal material composition and type to avoid lubricant material loss during system operation

ELIMINATING LUBRICANT WASTE IN THE CONTAINER

Excess lubricant can collect at the bottom of the product container at the end of the application cycle when moving higher-viscosity lubricants in a pump system. The small amount of material left in each container, when multiplied over hundreds or thousands of containers each year by a single customer, can add up to significant costs in wasted material, especially when expensive, highly engineered or synthetic lubricants are used.



In these instances, a flat-bottomed follower plate can be used to ensure that all of the material available in the container is being pushed into the pump

SPECIFY A CORRECTLY-SIZED PUMP TO MAXIMIZE PUMP SERVICE LIFE IN LUBRICATION APPLICATIONS

> Regardless of the brand or manufacturer of the pump being used, select a pump that can meet your system's fluid delivery requirements without running continuously at its maximum cycle rate to maximize piston pump performance and service life

A very important consideration when configuring pumps for use in lubrication applications is specifying a pump that can operate at the correct speed, and not at an overly fast cycle rate, to maximize service life and keep lifetime service costs to a minimum. This applies to any piston pump produced by any manufacturer.

For example, using a smaller pump that must operate at a higher cycle rate to generate adequate flow for the application may require more frequent service, resulting in higher ongoing maintenance costs. And a pump that must continuously run at its maximum cycle rate to provide the fluid transfer rate needed for the application will ultimately have a shorter operating life. Higher cycle rates can also create problems with some shear-sensitive lubricants containing detergents or other additives by causing foaming of the lubricant during application.

"Overspec" the piston pump to prevent excessive cycle rate operation for your specific OEM application: The key to extending operating life and keeping service costs low for any type of piston pump, regardless of its manufacturer, is to select a pump that is capable of meeting your system's fluid delivery requirements below its maximum speed in cycles per minute. For example, if a transfer rate of 5 GPM is required for the application, specifying a pump with a 10 GPM transfer rate will allow this pump to run below its maximum cycle rate, ensuring maximum service life. In general, for lubrication applications, a guideline is to specify a pump that can deliver the required flow rate and volume while operating at around 30 cycles per minute. This approach results in the best overall combination of low ongoing service costs, longer service intervals, and longer operating lifetime for the pump used in the application system.

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www.AROzone.com arotechsupport@irco.com youtube.com/aropumps (800) 495-0276

About Ingersoll Rand

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