

Just Right Lubrication

Automatic Lubrication Systems are Getting Smarter, Easier to Use and Pushing Condition Monitoring into the Future

Matthew Jaster, Senior Editor

It's all about performance, reliability and service life when it comes to bearings. And in order to optimize these components, proper lubrication is essential. Bearings can be manually or automatically lubricated. However, science and engineering has made quite the technological advances to suggest automatic lubrication is worth considering in 2019. *PTE* spoke with representatives from Schaeffler and SKF on the merits of automated lubrication systems.

Solving Today's Lubrication Challenges

The greatest challenges in bearing lubrication vary with each individual application. There are several key concerns that need to be addressed in general, however, and one of the greatest challenges is making sure the right personnel is in place to do the job.

"Finding qualified people who know how to properly lubricate bearings is always a challenge—especially now when the labor pool is so small. Safety is also a huge concern. Bearing locations can require ladders and lifts in dangerous environments, which puts lubrication technicians in positions that could lead to accidents or injuries," said Robert Phillips, director of sales, ALS North America, SKF.

Phillips said another challenge is ensuring the applied grease is evenly distributed throughout the bearing or lubrication point. The best way to make this happen is to lubricate while the machine is running. This method also eliminates the need for lock-out/tag-out procedures that require machine downtime to apply lubrication.

"Number one is the upfront costs, not just for the equipment but also for training/education, installation, implementation and commissioning," said David French, associate product manager, Industry 4.0—Service



SKF has both single-point and multipoint automatic lubricators that can be either gas-driven or electro-mechanical and range from one to 1,000 points.

Solutions at Schaeffler Group USA Inc. “Companies can choose to research topics themselves or hire an external firm to consult. A benefit of partnering with an external firm is the ‘multiplier effect’ that results from speeding up the learning curve and providing recommendations that can reduce time to implementation.”

The number two challenge for French involves identifying and correcting the root cause of lubrication issues such as over-lubrication, lubricant starvation, improper lubricant delivery intervals, lubricant cross-contamination, etc.

“In addition, most maintenance departments are responsible for a large number of lubrication points that can run into the thousands, and there are always competing priorities. This is where having a structured lubrication program serviced by automatic lubricators can allow companies to reallocate valuable maintenance resources where they’re needed most—without sacrificing equipment integrity,” French added.

The Benefits of Automated Lubrication Systems

French said that bearing damage is a leading cause of equipment failure, and an astonishingly high 55-60% of bearing failures are lubrication-related (e.g., over-lubrication, lubricant starvation, improper lubricant delivery intervals, lubricant cross-contamination, etc.). Automated lubrication systems are a proven way to greatly reduce these common failure modes, in addition to adding significant value by extending bearing life.

“For example, let’s say you currently lubricate your bearings using a grease gun. A bearing in operation can have a lubricant film as thin as 1µm. (To put that into perspective, the average human hair is 75µm thick.) Typically, the smallest dirt particle visible to the human eye is 29µm, which means that even if your lubrication Zerk fitting or grease gun appears clean, manual lubrication could be introducing contaminants 29 times larger than the operating film thickness! Over time, this can lead to premature bearing failure. Connecting an automatic lubrication

system directly into the lubrication port eliminates this risk and helps extend bearing life,” French said.

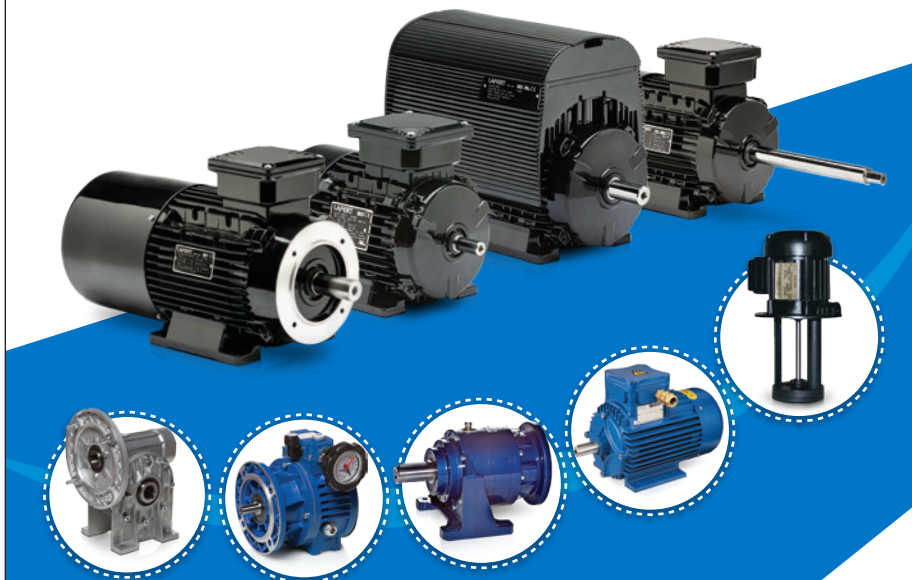
Phillips said that with manual lubrication, technicians tend to lubricate on schedule rather than when the bearing actually needs it. This can lead to a technician either over-lubricating or under-lubricating components. Automated lubrication provides lubricant in the right amount at the right time, allowing the bearing to operate optimally. When the bearing is properly lubricated in this

manner, it also helps to seal the bearing from contaminants.

“Automated lubrication can reduce annual bearing and lubricant costs, as well as the maintenance costs associated with unnecessary bearing replacement. It also allows machines to maximize uptime and, in turn, increase productivity and throughput. Automated lubrication can also address environmental concerns due to product spoilage from excess lubricant,” said Phillips.

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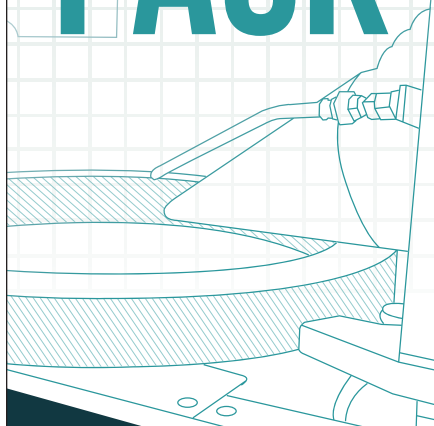
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An Evolving Technology

Phillips points to the fact that automated lubrication systems can now be remotely monitored and retrieve data. Workers can monitor lubrication systems in difficult-to-access locations and provide communication between the user and lubrication pump. “Having the ability to see if a system is functioning correctly or whether the reservoir is low or empty, has added tremendous value for our customers. Filtration and flow detection have also increased the effectiveness of these systems,” he added.

As they incorporate advances in technology, French agreed that lubrication systems are becoming “smarter,” which enable them to offer more value to the user. Features such as back pressure warnings, improvements in operating temperature range, the ability to input/output PLC control signals, integration with the cloud and analysis systems are just a few of the features maintenance engineers have at their disposal.

“Another evolution is the ability to program multi-point lubrication systems via software, instead of the old method of dip switches or manipulating mechanical ports. It’s important to ensure that each improvement provides not only functional value, but also improves the customer’s overall product experience,” French said.

Smart Data & the New Manufacturing Norm

This IIoT and smart manufacturing push is providing greater advancements in lubrication today. Additionally, robotics and automation are playing a significant role, according to Phillips.

“Approximately 90% of systems we sell today are automated. We will soon be launching a new digitalization product that can be controlled remotely—and we do have semi-robotic systems that can detect and grease chains and bearings while in motion. In the near future, we will be able to communicate directly with the pumps from a remote location to manage and operate the system,” Phillips said.

French said believes that automatic lubricators keep automation and robotics systems—including CNC machines, linear rail, gearboxes, cooling fans, robotic handlers, conveyor belts, etc.—operating at peak condition. All of these systems require regular lubrication.

But it’s data management that will certainly change lubrication long-term.

Phillips said that data is the key to the future of automated lubrication systems. Now, data is everywhere—and knowing what data to look at, how to use it and when to take action is imperative. Analysis of data will better educate us on the lubrication needs of machines, resulting in better systems to meet these needs.

Lubrication systems are becoming smarter which provides greater value to the user (photo courtesy of Schaeffler).



For example, Phillips said that demand lubrication based on real-time heat and vibration analysis will help drive additional efficiencies. As system recognition increases in motor amps and bearing stress indicators, it automatically increases the amount of lubrication events to manage these damaging factors through predictive maintenance.

Smart manufacturing integrates various monitoring and maintenance technologies (torque sensors, vibration monitoring, speed sensors, etc.) and uploads their data to the cloud (IIoT) where it can be analyzed to detect trends, track emerging faults and allow maintenance planners to efficiently schedule repairs.

“This same feedback is used to drive advancements in lubricator technology,” French said. “An example would be “demand-driven” lubrication, whereby inputs from sensors on the operating equipment (or from the cloud analysis software) detect subtle changes in equipment operating condition and signal the lubricator when the machine needs grease.”

Future Considerations

The new digital world is here — and it is important to advance with it. Phillips said that data and data analytics will play a major role in how we deliver innovation to our products and processes. Adoption of automated lubrication systems will continue to rise in order to increase bearing life while reducing maintenance costs.

“The ability to track data and receive live performance updates with connected and wireless automated lubrication systems will drive demand. These increased efficiencies through data analysis will allow companies to remain competitive in today’s global marketplace,” Phillips said.

Long-term environmental sustainability is very important; as such, it is receiving renewed industrial focus.

“We see it with the development of more environmentally friendly lubricants and lubricant waste reduction programs,” French said. “By delivering the *right amount* of the *right lubricant* at the *right interval*, automatic lubrication systems play a key role in reducing

waste and helping to achieve these vitally important goals.”

Furthermore, French said that continued integration with other predictive maintenance devices, cloud computing and analysis techniques will continue to drive the change from “smart machines” to smarter, greener “factories.” **PTE**

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Product Spotlight: Automatic Lubrication Systems

Schaeffler

Schaeffler offers two types of lubrication systems, single- and multi-point. Single-point devices thread directly into the lubrication port and are very versatile, as they can seamlessly enhance or replace manual lubrication programs. Highly suitable for typical drivetrain equipment (electric motors, pumps, fans, blowers and gearboxes), they can also be deployed to reliably lubricate hard-to-reach, elevated or safety risk areas. Available in gas or motor-driven versions, they are easy to install, easy to maintain and extremely reliable.

The multi-point systems can lubricate eight or more points from a central source. Each point receives the precise amount of lubrication at pre-programmed intervals. Both single- and multi-point systems can operate as stand-alone units, or they can be connected and controlled via PLC.

The process of looking into an

automatic lubrication system starts with a meeting.

First, we meet with clients to discuss their objectives, their current lubrication program as well as what products we bring to the table to make sure we're a good fit. Next, we gather information and survey the application to ensure our technical solution meets the customer's goals. From there, we build a customer-specific proposal that we discuss together. This gives the customers the opportunity to ask questions before we agree on the scope of supply," French said. "The last step is order acceptance and implementation, including hardware delivery and commissioning—either by the customer or Schaeffler staff as agreed during the proposal."

The cost savings that are achieved depend on a variety of factors such as the number of lubricators installed, downtime cost per hour, personnel cost per hour, component replacement



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Schaeffler customers that implement automatic lubrication programs benefit from longer bearing life and fewer failures.

costs, just to name a few. All are used to calculate the potential return on investment for the customer. Of course, each situation is unique.

“Customers who implement automatic lubrication programs typically enjoy many benefits,” French added. “On the mechanical side, customers typically benefit from longer bearing life as well fewer catastrophic failures. This allows customers to reduce their spare parts inventory. On the personnel side, workplace safety is enhanced, the number of unexpected shutdowns declines (which frees up resources), and planned maintenance is executed more efficiently. It’s a cascade effect of positive benefits, all of which are associated to overall cost reduction.”

SKF

SKF has both single-point and multi-point automatic lubricators that can be either gas-driven or electro-mechanical and range from one to 1,000



points. The systems offer oil circulation with temperature control/water and sediment removal. Typically, PT applications are highly specific and require engineered, custom-designed solutions. This can include a range of different controls, from local systems controls to programmable logic controllers (PLCs).

A successful lubrication program at SKF begins by assessing the plant’s daily workflow and business strategy for plant or machine maintenance. SKF then performs both a lubrication audit and needs assessment followed by a consultation that explains the program’s ROI. Some of the key factors to consider when formulating a lubrication strategy include proper lubricant selection, environmental factors, regulatory issues, storage and handling, training and performance and monitoring and assessment.

“Automated lubrication can lead to a 50% decrease in bearing failures and the maintenance time required to install them. It can also reduce the number of workers who run “lube routes” by walking through the plant and lubricating hundreds of points per shift,” Phillips said. “Manual lubrication also raises safety concerns, since lubrication may require a lift or ladder. Since machines typically need to be shut down during lubrication, it can also reduce productivity. Savings to the customer in a power transmission plant can be significant with an automated lubrication system.” **PTE**



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