Customised lubricant formulations for critical applications

Lubrication Engineers' MD Colin Ford and his son Gavin, talk about advanced, niche and customised lubricant formulations, based on key proprietary additives, and their successful and cost effective application, most notably in the mining and railway sectors.

Started in 1975, Lubrication Engineers (LE) is the Authorised African Distributor for US-based Lubrication Engineers Inc, begins Gavin Ford, the company's facilities and marketing manager. "So for nearly 50 years, we have been offering premium quality, niche lubrication solutions to meet critical and heavy duty equipment protection needs.

He cites the large ball and rod mills used for the milling ore in our mining industries, where LE has a good reputation in the gold and platinum sectors. "Another of our key customers is Transnet, particularly right now with the older locomotives, which need to be kept running until the new ones are delivered and working as expected," he tells *MechChem Africa*.

LE supplies a custom designed gearbox lubricant for these locomotives, on a contract that has been running for over 12 years now – and another five year contract has just been signed. "This is a critical application and our carefully formulated lubricant ticks all of the boxes. Even though our specialist lubricant is slightly more expensive than competing products, ours has been purpose designed, tested and proved to offer best possible protection for these critical gearboxes," continues the company's MD Colin Ford.

Another customer that LE has started to look at supporting is Transnet Port Terminals, which also has uptime as a key requirement. "The port to ship and ship to port transfers systems desperately need better lubricants and care to enable the port authorities to avoid expensive shipping delays. Many of the solutions we offer are ideally suited to these applications," he says.

He cites the company's experience with wire ropes in the mining industry: "A rope failure caused fatalities at a shaft of a major mining company, recently, which alerted the whole industry to the need look after the wire ropes used for hoisting.

Corrosion on wire ropes generally starts on the inside and works its way out, so it cannot always be seen and it makes a failure unpredictable, he explains. To prevent corrosion, wire rope lubricants need a corrosion inhibitor and they need to be able to penetrate into the inner strands of the rope. Also, though, as the rope flexes, the inner strands rub against one other, so the whole body of the rope needs to be impregnated with lubricant to enable strands to slide over each other, preventing metal to metal contact and associated wear.

With a friction winder, though, the outer surface of the rope needs to prevent slipping between the rope and the winder. So while the lubricant must penetrate the rope, it must not sit on the surface. LE's rope lubricant solution is formulated to leave a dry coating on the surface to retain the necessary levels of friction between the rope and the winder or sheave wheel.

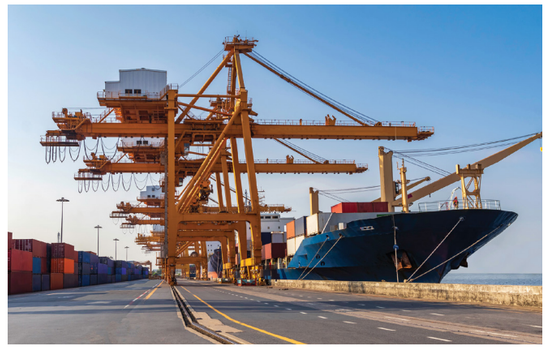
"Due to several recent rope failures and accidents, the industry is now alerted to these issue and are now much more inclined to seek out a properly engineered lubrication solution to overcome the problem," he adds.

Lubrication Engineers (LE) offers specialist lubricants that cater specifically to the application needs such as high temperatures, high speeds and high loading.

Unique formulations and additives

LE offers specialist lubricants that cater specifically to the application needs: high temperatures, high speeds, high loading. "Or low speeds and low temperatures, for freezers, for example. Maintenance managers should not look to use one lubricant to do everything in a plant. All critical equipment should be given special attention when it comes to choosing or formulating a lubrication solution," Colin Ford continues.

"We have the ability to customise lubricants to meet the needs of small niche markets. We can manufacture batches of around 12 t of a special formation for a single client, which multinational oil producers can never do," he says. LE first develops small batches for testing on the application. If the customer is happy with the results, full batches start to be manufactured for continuous supply,



Left: ***To prevent corrosion, wire rope lubricants need a corrosion inhibitor and they need to be able to penetrate into the inner strands of the rope.*** *Right:* ***All critical equipment should be given special attention when it comes to choosing or formulating a lubrication solution, says Colin Ford.***

with a unique formulation customised to the client's application needs.

"We have just completed a new development for the rail industry in Australia, for example," adds Gavin Ford. "We took what we were doing in South Africa for the railway gearboxes and converted it into a grease. The new product was then produced in LE Inc's Wichita plant in Kansas and shipped to Australia.

Lubrication Engineers, he says, was first established as the lubricant manufacturers for NASA's Space Shuttle Programme. A set of highly specialised lubricant additives was developed to meet the safety critical and extreme needs involved, and these proprietary additives remain the building blocks for LE's high end customised solutions.

Describing the background to the formulation of LE's heavy duty gear oil for Transnet gearboxes, Colin Ford explains that the lubricant used in the doors of the Space Shuttle was impregnated with a proprietary LE additive called Almasol®, a wear reducing solid additive that can withstand extremely heavy loads, chemical attack and temperatures of over 1 000 °C. This made it an ideal additive in lubricants for heavy duty use at extreme temperatures, such as grinding mills and locomotive gearboxes.

But as filtration technology got better and better, LE found that the Almasol®, a very fine solid powder, could be removed by state-of-the-art filtration units for decontaminating oil. So about 20 years ago, LE developed a liquid additive called the Duolec® that is now used for LE gearbox oil formulations.

Duolec® is a dual acting additive that, on startup and at slow speeds, reduces friction between the gears, and then at high speed when the gearbox is fully loaded, it creates an extreme pressure and temperature capability in the lubricant formulation. And because it is a liquid, it cannot be filtered out by a cleaning cycle.

"It is this Duolec® additive that gives many of our customers significantly extended life from its aging gearboxes," notes Colin Ford.

For less arduous applications, he says the LE uses an additive called Monolec®, another liquid additive that is ideally suited to sliding applications, such as in engine oils that need to promote piston movement while preventing metal-to-metal contact. Monolec®, also a liquid, creates a single molecular lubricating film on metal surfaces, imparting significantly increased oil film strengths to the lubricant without affecting clearances. "This is our go-to LE additive for oil and grease formulations for big machinery stampers, hydraulic presses and any machine that slides up and down on rails," he says.

A third key proprietary LE additive available for formulating advanced lubricants is Quinplex®, which is a tackifier. This additive goes into many of LE's food grade greases used at abattoirs or bread making plants, etc, wherever equipment needs to be regularly washed down. Quinplex® helps to prevent the lubricant from being washed off a chain by a high-pressure hose, for example, explains Colin Ford.

In addition, lubricant formulations all use several commercially available additives to ensure the lubricant meets required API standards. Where there are two or three manufacturers of the same additive, LE always chooses the best quality available. "Particularly in the US, there are many manufacturers of different defoaming and cleaning agents that need to be added, particularly into engine oils, and we always use the best of the best in our formulations," he point out.

In terms of pricing, he says that LE lubricant formulations are not the most expensive on the market, but they are more expensive than most. "What we always look at, particularly in the mining and rail industries, is the cost per year of our premium lubricants compared to the alternatives. And we do that calculation based purely on the amount of a unique LE lubricant formulation used per year compared to a competing product.

"The open gears of big ball mills, for example are typically lubricated by pulse spraying a product onto the girth and pinion gears. If we can fully protect the mill drive using 10 pulses every 20 minutes instead of 20 pulses every 20 minutes, then that mine will have to buy twice as much of the cheaper oil every year. We can routinely show savings of several millions rand per year by choosing to invest on our premium lubricants," the company's MD points out.

"This saving does not factor in avoiding unscheduled breakdowns, minimising downtime and the cost of repairs, either, which can result in huge unbudgeted expense. The LE-lubricated mills at a major platinum producer have run for over five years without a breakdown, compared to breakdowns at least once a year before we got involved. When the cost of ownership savings because of using our premium lubricants are taken into account, any price premium becomes completely irrelevant," he adds.

Gavin Ford adds: "From our perspective at the moment, training about fit-for purpose lubricants and proper lubrication management is essential right now. We are seeing young maintenance personnel coming through with no experience.

All our 'good old' engineers have either left the industry or left the country, so there are no longer any mentors for new young engineers

"So we have expanded our facility to accommodate training for our customers' engineers in correct the ways to choose application-specific lubrication concepts, to manage the lubricants and properly apply lubrication procedures.

"With respect plant maintenance, South African industry is really struggling right now. Lubrication technology is an essential part of overcoming these challenges," he concludes.

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