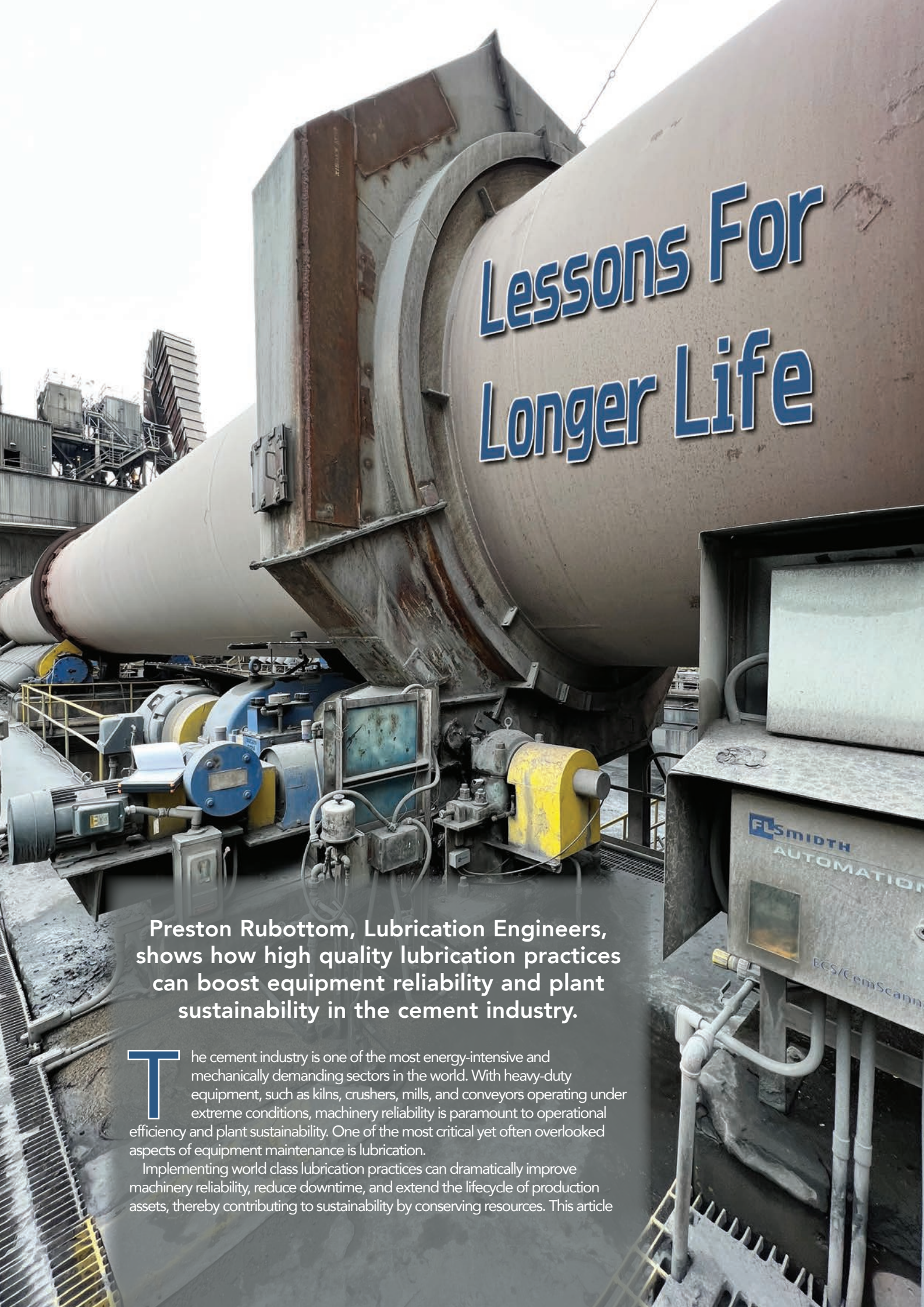
Lessons For Longer Life



Preston Rubottom, Lubrication Engineers, shows how high quality lubrication practices can boost equipment reliability and plant sustainability in the cement industry.

The cement industry is one of the most energy-intensive and mechanically demanding sectors in the world. With heavy-duty equipment, such as kilns, crushers, mills, and conveyors operating under extreme conditions, machinery reliability is paramount to operational efficiency and plant sustainability. One of the most critical yet often overlooked aspects of equipment maintenance is lubrication.

Implementing world class lubrication practices can dramatically improve machinery reliability, reduce downtime, and extend the lifecycle of production assets, thereby contributing to sustainability by conserving resources. This article

explores how adopting advanced lubrication strategies based on best practices can transform maintenance culture in the cement industry, leading to improved operational efficiency, reduced costs, and enhanced sustainability.

Cement kiln.

Cement mill.

Role of lubrication in cement manufacturing

The study of tribology would say that lubricants are formulated to create a film between moving surfaces, minimising direct contact and, consequently, reducing friction. This reduction in friction lowers energy consumption and wear, extending the lifespan of machine components. While most lubricants will offer some level of protection, it is important to keep in mind that not all lubricants are made the same. In high-impact, heavily contaminated applications such as those found in cement plants, a high-performance specialised lubricant can have a significant impact on reducing operating and maintenance costs. An added benefit of lower energy use, longer lasting lubricants, and longer lasting equipment is a reduction in overall environmental impact.

Current challenges in lubrication practices

Although lubrication is a critical component of maintaining production equipment, it is frequently overlooked or treated as a secondary priority within many facilities. Proper lubrication is essential for reducing friction, preventing wear and tear, flushing contamination ingression, and ensuring reliable performance of machinery. However, several persistent challenges undermine a lubricant's effectiveness, including over-lubrication and under-lubrication, both of which can lead to heat buildup, excessive wear, and insufficient lubrication resulting in increased metal-to-metal contact. The use of incorrect or poorly formulated commodity grade lubricants further compromises machinery by failing to provide adequate protection against friction and corrosion.

Given the harsh environments of the cement industry, the ongoing battle of contamination from dust and moisture makes its way into lubrication systems, leading to rust, corrosion, and accelerated component degradation. Additionally, with a significant shortage of skilled trades maintenance technicians, the mandatory lubrication routes simply do not get completed. Even when lube routes are completed, it is often the case that proper training has not been given to maintenance personnel, leading to inconsistent or incorrect procedures and improper application techniques.

Inadequate lubrication schedules, whether due to outdated planning or poor implementation, can cause either under-lubrication or over-lubrication, both of which stress equipment and reduce its lifespan. These issues across the cement industry contribute to premature equipment failure, increased maintenance costs, and unplanned downtime, ultimately hindering operational efficiency and profitability.

To mitigate these risks, it is imperative that cement plants prioritise comprehensive lubrication management strategies, emphasising proper training, precise scheduling, and the use of better formulated

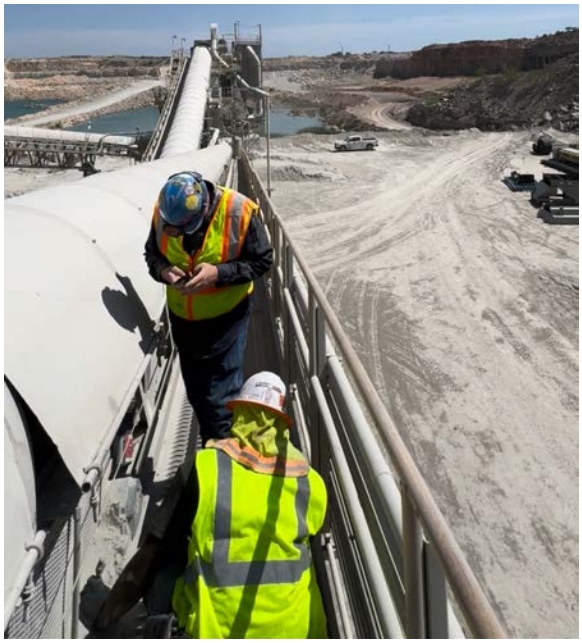
lubricants to extend equipment life, as well as enhance overall plant reliability, safety, and sustainability.

World-class lubrication programme

The primary goals of an effective lubrication programme include:

- Improving environmental health and safety (EHS) standards through the application of proper lubrication practices.
- Aiming for lubrication reliability excellence to ensure equipment performance.

Single point lubricator (SPL) in use in a dirty environment.



Cement plant audit.

- Increasing overall productivity by minimising equipment downtime and maximising efficiency.
- Maximising manpower efficiency through improving maintenance processes and reducing manual tasks.

A world-class lubrication programme encompasses several critical areas, and it is generally agreed upon that what gets measured gets improved; therefore, an audit is the recommended first step on the journey to lubrication excellence. A machinery lubrication audit involves a systematic review and evaluation of the lubrication practices within a facility to ensure optimal machinery performance, reliability, and lifespan.

The audit process typically includes the following seven key components.

Data collection and inspection

- Gathering information on all lubricated equipment.
- Inspecting lubrication points for cleanliness, condition, and accessibility.
- Recording current lubricant types, quantities, and lubrication intervals.

Lubricant selection and consolidation

Selecting the right lubricants for specific applications and reducing the number of different lubricants to minimise the risk of errors and simplify inventory management.

Colour-coded identification programme

Implementing visual indicators such as machine tags and wall posters to ensure correct lubricant selections are made for an application and to enable quick identification of any potential issues to prevent cross-contamination and ensure the correct lubricant is used for each component.

Contamination control

Conducting offline or kidney loop filtration, which involves the implementation of effective filtration systems to remove particulates and other contaminants from lubricants, and the use of high-quality breathers on machines' intake ports to prevent moisture and contaminants from entering the equipment.

Proper storage and handling

Maintaining a clean and organised lubricant storage room to prevent contamination and ensure lubricants are correctly stored, along with using appropriate containers and transfer methods to avoid contamination during lubricant handling.

Oil analysis

Condition-based lubrication approaches use oil analysis to accurately determine lubrication needs, moving away from the historical fixed schedules

that can lead to over- or under-lubrication. Regularly analysing oil samples to monitor lubricant condition enables early identification of any potential problems of machine wear or lubricant degradation and allows the optimisation of maintenance schedules.

Automatic lubrication systems (single- or multi-point)

Where applicable, it is ideal to automate lubrication tasks to ensure consistent and precise lubricant delivery to all critical components. Simple cost-effective options are available to lubricate a single grease point, or large-scale, high-pressure systems can be designed to effectively lubricate dozens of points at one time.

When looking to reduce the number of manual tasks from a plant's maintenance log, grease automation is a great way to reduce that demand.

Benefits of improved lubrication practices

Proper lubrication plays a vital role in enhancing equipment performance and operational efficiency. It reduces wear and tear, minimises friction, and prevents overheating, leading to fewer breakdowns, an increase in meantime between failures (MTBF), and improved overall equipment effectiveness (OEE). Additionally, effective lubrication extends the lifecycle of critical components, such as bearings, gears, shafts, and seals, by reducing mechanical stress and preventing contamination, which helps defer capital expenditures and enhances return on investment while overall lowering a facility's entire maintenance and repair budget. It also lowers maintenance costs by enabling predictive and condition-based lubrication strategies, thereby decreasing the need for emergency repairs and reducing spare parts inventory, which allows plants to shift from reactive to proactive maintenance.

Furthermore, proper lubrication reduces energy consumption – potentially by up to 10% – contributing to sustainability objectives. Finally, implementing world-class lubrication practices ensures proper handling, storage, and disposal of lubricants, thus reducing safety hazards and environmental risks, and ensuring compliance with environmental regulations.

Case study: lubrication optimisation in a cement plant

A mid-sized cement plant in North America had a high changeout rate of a commodity grade hydraulic oil:

Application

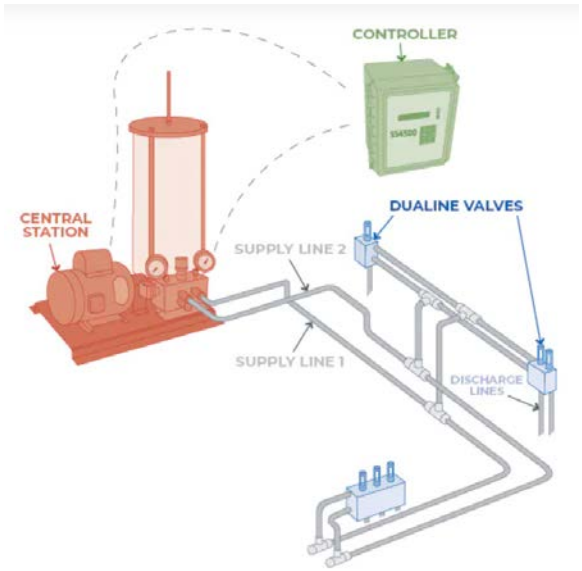
- IKN Schrage Rohrketten 400 gal. 75 HP clinker cooler hydraulic system.

Challenge

- Frequent hydraulic oil changes (every six months) due to oil degradation.
- High lubricant consumption and associated costs.
- Desire to reduce maintenance time.
- Need for faster lubricant delivery.

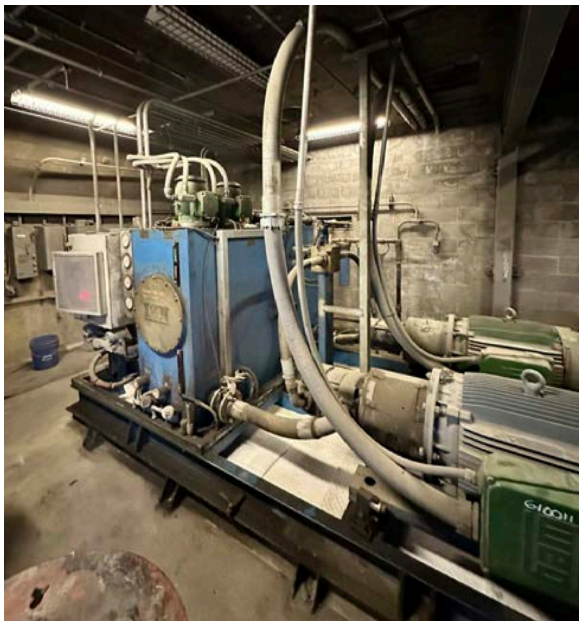
Filter cart with lubricant ID tag.

Multipoint auto lube system.



Bijur Delimon Dualine lubrication system.

Single point lubricators.



Clinker cooler hydraulic system.

Cement lube room with centralised lubrication system.

Solution

- Lubrication Engineers Equipower™ Hydraulic Oil (4934), an ISO VG 68 anti-wear hydraulic oil.
- Equipower oil is designed for extended life with select base oils, oxidation resistance, and an additive package offering rust protection, anti-wear properties, and thermal stability.
- Use of high-quality offline filtration to clean the oil based on routine oil analysis.

Results

- Extended oil drain intervals: increased from six months to five-plus years (900% increase).
- Cost savings: estimated savings of US$65 000+ in lubricant costs.
- Reduced maintenance: less maintenance time due to fewer oil changes.
- Environmental impact: avoided more than 12 000 gal. of waste oil disposal.
- Improved equipment protection: ensured proper protection of pumps, hoses, and cylinders.
- Faster delivery: Lubrication Engineers provided faster lubricant delivery compared to the previous supplier.

Key takeaways

- Strategic lubricant selection can drastically improve equipment performance and reduce costs.
- Oil analysis and filtration can further extend oil lifespan and optimise performance.
- Partnering with a reliable lubricant supplier ensures timely delivery and expert consultation.

By focusing on strategic lubrication practices, this one application allowed this plant to realise significant savings and achieve more production. The impact of this strategy implemented across an entire plant is substantially larger at scale.

Conclusion

In the cement industry, where equipment reliability directly impacts production, profitability, and sustainability, lubrication should be a strategic priority. By adopting world-class lubrication practices, cement plants can achieve:

- Greater reliability.
- Longer equipment life.
- Lower maintenance costs.
- Improved energy efficiency.
- Enhanced safety and compliance.
- Reduced environmental impact.

The path to lubrication excellence requires commitment, training, and investment – but the returns are substantial. As the industry continues to evolve, those who prioritise proactive maintenance and world-class lubrication practices will lead the way. ■