Cleaning gear drives on the fly

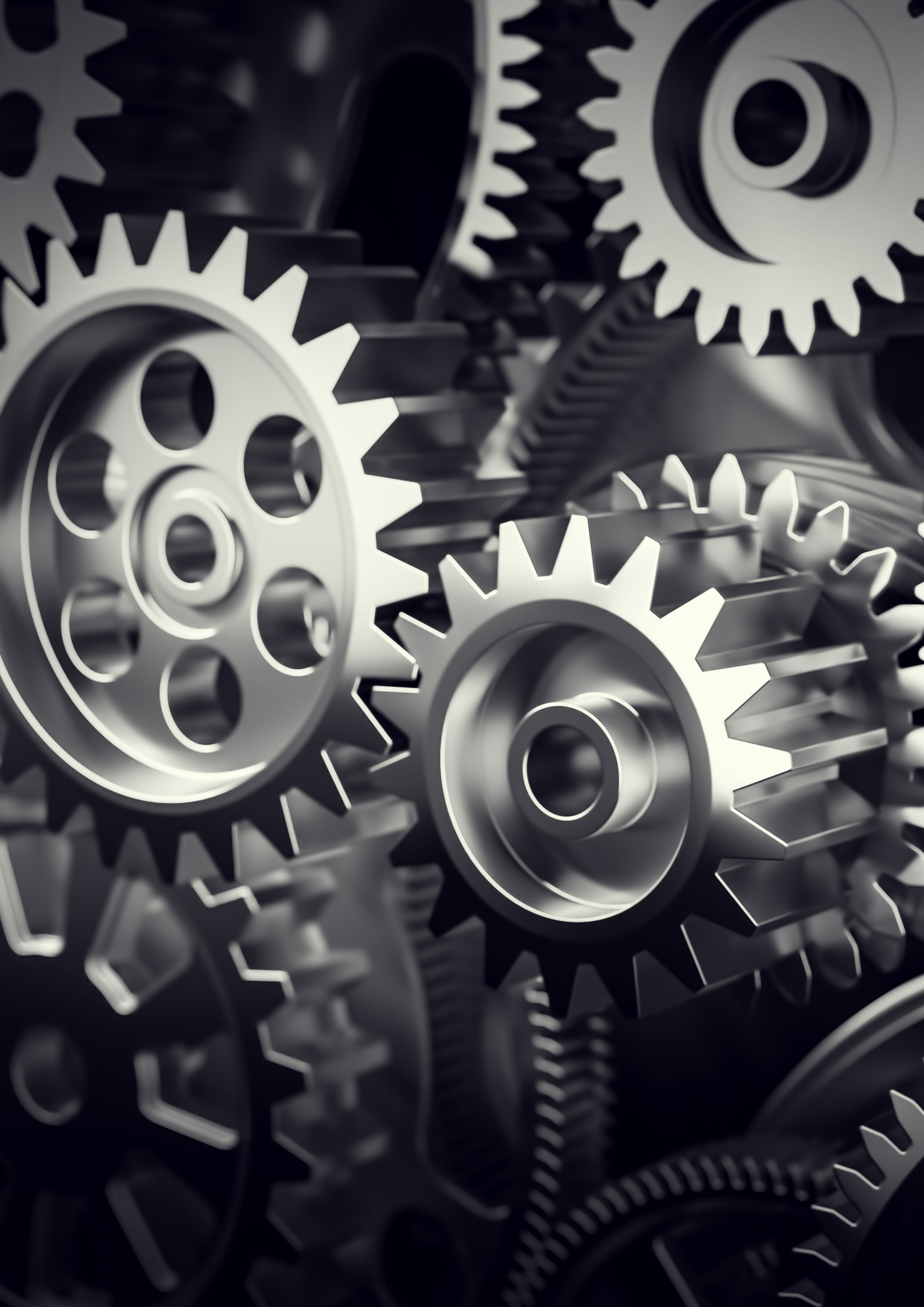
Rodion Rodionov, Klüber Lubrication, gives operators advice on how to clean open gear drives during operation.

When continuous operation is key, cleaning and maintaining open gear drives becomes a critical part of any operation. In the case of cement or mining plants, the reliability of open gear drives plays a crucial role in enabling the efficient operation of ball mills and rotary kilns. To ensure continuous production, effective lubrication and gear maintenance are vital. Klüber Lubrication has introduced a holistic five-step lubrication concept, offering a comprehensive solution for gear protection and cleaning, increasing the components' lifetimes, and reducing wear – while also reducing downtime required for maintenance.

Operators of ball mills and rotary kilns in cement factories need to balance several factors in the maintenance of their machines: How much time can operators spend on cleaning, repairs, and mandatory check-ups for insurance companies before the ensuing downtime becomes too costly? Klüber Lubrication has developed innovative lubricants that are changing this calculation, making machines more productive without sacrificing reliability.

Klübersustain EZ 2-46 is a potent cleaning lubricant. It helps to reduce the time required for open gear cleaning whenever a producer is forced to do it and make this procedure safer. For example, it prepares open gears for nondestructive testing (NDT) without dangerous and time-consuming manual cleaning procedures.

It not only has excellent cleaning properties, but it also works under full load while the machine is in operation, meaning that machines do not have to be stopped during cleaning procedures. The procedure is safe and unnecessary production losses due to mill or kiln downtime can be avoided. This cleaning solution reduces open gear cleaning time drastically from as much as 80 hrs (in case of manual cleaning) to 4 hrs or in some cases even to zero. This is made possible by the high load-carrying



capacity and protection against wear offered by Klübersustain EZ 2-46.

Furthermore, the lubricant is eco-friendly and manufactured with more than 70% renewable raw materials, making cleaning safer for users and the environment alike. As it is a biodegradable product, users will also have fewer worries associated with its disposal.

How the comprehensive lubrication concept works

The Klüber A-B-C-D-E approach contains five steps with different lubricants that fulfil important roles in the operation of a ball mill or rotating kiln driven by open gears. To deal with individual factors like the type of machine, stress, specific uses, and others, a variety of products made by Klüber are available for open gear operation or the cleaning needed for maintenance.

This starts – even before the gears have completed their first turn – with type A lubricants, which protect gears during equipment assembly and provide initial lubrication during start up, preventing damage to the tooth flanks. They also aid in assessing the load-carrying area and serve as a contrast lubricant for evaluating the dynamic contact pattern.

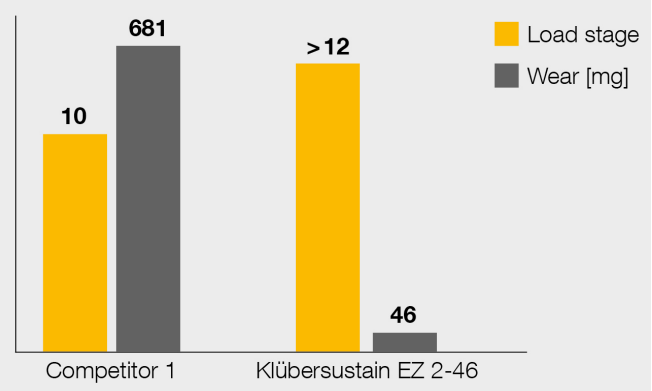
The type B lubricant, e.g. Klüberfluid B-F 2 Ultra, quickly optimises the load-carrying area and surface roughness of new gears, and can also relieve scuffing damage resulting from inadequate lubricant supply during operation. It ensures efficient operation during the running-in process, aiming for a load-carrying area of at least 80% of the tooth surface. Added special solids have a smoothing effect on the tooth flanks by targeted physical-mechanical material removal. The same principle can be used for gear drives that have been in operation for some time, correcting the roughness of the surfaces to enhance the contact area and to reduce friction in the long term.

A number of different lubricants can be used for stage C, which is actual equipment operation. The type C lubricant is the recommended operating lubricant after the running-in process, and its selection is based on factors such as operating temperature, ambient temperature, and application method. Today, high-viscosity transparent fluids are also used as operating lubricants. Klüber offers several types of synthetic lubricants that can be used for this task, taking advantage of the strengths of this new generation of synthetic fluids. They show good adhesion and the lubricant film has an enormous load-carrying capacity. These characteristics assure the lubricant offers high wear protection and can be used in high-temperature environments.

The type D reconditioning lubricant offers an alternative to mechanical treatments like grinding and milling for damaged tooth flank surfaces if the damage is not too severe. The advantage of this way of reconditioning gears is that it can be carried out during operation and can therefore extend the gear life without causing production losses due to lengthy downtimes for manual treatment.

A	Priming	– GRAFLOSCON A-G 1 ULTRA – Klüberplex AG 11-462
B	Running-in	– Klüberfluid B-F 2 Ultra
C	Operational	– GRAFLOSCON C-SG ULTRA Series – Klüberfluid C-F Ultra Series – Klübersynth OA 98-15000 – Klüberfluid C-PG 17 Ultra
D	Reconditioning	– Klüberfluid D-F 1 Ultra
E	Cleaning	– Klübersustain EZ 2-46

Klüber Lubrication´s A-B-C-D-E approach at a glance.



FZG results according to DIN 51354-1 (A/8.3/90).

Open gear cleaning without losing production

The last step in this approach is where innovation meets the needs of operators. Type E, Klübersustain EZ 2-46, is a specially designed lubricating oil for cleaning large open gears found in the mining and cement industries. It has an excellent cleaning effect when applied to highly adhesive open gear lubricants such as asphaltic greases, black graphite-containing greases, or high-viscosity transparent fluids. It will clean the operating lubricant off the teeth and provide visibility for convenient inspection of the gear wheels without stopping production for an extended period of time due to manual cleaning actions – in order to properly assess possible damage, many operators clean their gears manually, resulting in long downtime periods. It is also hazardous work that can lead to injuries.

This is why cleaning with the help of a special lubricant without production stoppages is well suited for any situation where operators need to have open gears cleaned, including to aid nondestructive testing for the detection of cracks that may have formed.

Gear protection and downtime reduction also under high loads

With Klübersustain EZ 2-46, customers can clean their gears while the machine is in the last hour of operation. After shutdown, the open gear is clean and can be quickly and easily wiped down with a rag to remove any residual lubricant. Now, the nondestructive testing can proceed, taking a shorter period of time overall. This means the ball mill or kiln is back in operation sooner. The timesaving can be significant.

It differs from other products on the market as it protects gears while cleaning them, even under high working loads. Therefore, the load does not need to be reduced during operation, increasing overall productivity of the machine even further.

The lubricant offers versatile applications in addition to gear cleaning for NDT purposes. It can be used to address gear contamination issues, for example immediate emergency cleaning action when the open gear is severely contaminated by dust because of liner bolt failures and inadequate gear guard sealing. Clogging of the lubricant drainage system can also be mitigated. It ensures clean and well-maintained gears, promoting optimal gear performance. This synthetic lubricant is also able to clean the gears to prepare the machine for manual repairs, where spotless tooth flanks are required for proper servicing.

It is also ideal for transitioning from black lubricants to transparent lubricants. Due to its cleaning effect, Klübersustain EZ 2-46 makes the gear surfaces visible and helps operators to benefit from using transparent high-viscosity operational lubricants by providing a clean and visible environment where they are able to quickly evaluate the condition of gears while the mill is running without stoppage. This avoids the need to wait for half a year while transparent operating lubricants replace the black ones over time.

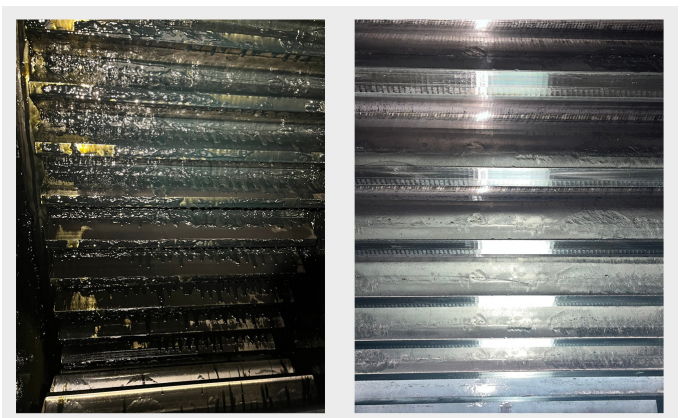
Use the best equipment for the job

To get the best cleaning results, the lubricant needs to be applied while the open gear is in motion. The movement plays a big part in the desired cleaning effect and the product is designed to deal with working loads. It contains a special extreme-pressure additive and a low-viscosity base oil that provide great solvency to remove hydrocarbons and asphaltic compounds.

The spray system plays an important role in how effectively Klübersustain EZ 2-46 works. High pressure and minimum flow rate yield the best results. This allows operators to use the lubricant economically without jeopardising the cleaning effect. High pressure helps to push dirt and old lubricant out of the gear mesh. The recommended volume of one to four litres per minute depends on the number of pinions and will provide a sufficient protection film to avoid premature wear on the gears. For really large open gear systems it is possible to go as far as five to six litres per minute to properly clean the machine.

Following the recommended cleaning procedure is essential when using Klübersustain EZ 2-46. In cooperation with Graco, Klüber Lubrication offers the right tool for the job: a FireBall portable spraying system that can be adjusted to spray the right amount of lubricant.

A variable nozzle allows the initial wetting of the gear with a large cone or flat pattern to prepare the gear for further cleaning. The system is complemented by an additional, more precise and focused jet, which enables thorough cleaning. Spraying approximately 80% on the girth gear and 20% on the pinions helps distribute the product evenly and effectively.



Cleaning result. 200 l of Klübersustain EZ 2-46 for 4 hrs.

Summary

Klübersustain EZ 2-46 is an effective lubricating oil that offers a range of benefits for open gear cleaning in the cement and mining industries. Due to its wear protection properties it enables gear cleaning during operation, thus saving time and minimising manual labour.

The cost savings are significant, because operators can reduce equipment downtime for cleaning tremendously. The product's eco-friendly formulation, with over 70% renewable raw materials, reduces environmental impact.

Furthermore, the effective cleaning without gear stoppage enables prompt servicing of the gears, leading to the longevity and optimal performance of gears, prolonging the life of machines.

Optimised maintenance also helps companies to reduce their footprint on the environment because materials and resources that went into these machines are used more efficiently.

When applied in accordance with recommended procedures, this lubricant provides efficient gear cleaning and contributes to the overall efficiency and cost-effectiveness of cement plant operations. ■

About the author

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