Speciality Lubricants for Processing Plants in the Mining Industry.
Owners and operators are constantly challenged to extract their target minerals or precious metals in the most cost-effective and reliable way and need to rely on the up to date knowledge, experience and expertise of specialists in the long-term care of their assets wherever that facility may be situated.

Internationally, Klüber Lubrication carry the endorsement of OEMs and operators alike especially on critical assets e.g. mill or kiln gear drives to not only assure their effective operation but also pushing back the boundaries of lubrication technology to bring state-of-the-art girth gear/pinion lubricants that dramatically reduce consumption (with spin-off benefits of reduced transportation costs, improved housekeeping, lower inventory levels, easy tooth flank inspection even during operation and lower disposal costs).

Reliability assurance is one thing but ease of maintenance at lower cost also adds value and so Klüber Lubrication offer a care programme (KlüberEfficiencySupport) primarily for large girth gear/pinion drives to help monitor system condition and thus provide plant engineers with trend data and an “early warning” of potential issues.

Speciality Lubricants from Klüber Lubrication – always a good choice

We use only trained and experienced lubrication engineers with IR, vibration, stroboscopy and analytical processes at their disposal. Your “healthcheck” is supported by a comprehensive report interpreted by specialists for any appropriate actions needed.

These same engineers offer a plant-wide service as required to also support the sustainability need or strategies of our customers, for example energy usage, CO₂ emissions, life cycle cost reductions etc. on all rotating equipment from general conveyors to air compressors and “workshop” products. Millions are spent every year on corrective and remedial engineering/maintenance actions that can be eliminated at source the proper consultation, which will often provide effective solutions that are yet simple to implement.

Service includes a running-in and repair service to increase the useful service life of girth gears and pinions by controlling and modifying tooth flank surface roughness, contact ratio, load distribution, removal of surface pittings and, ultimately, a tooth flank repair if possible.

KlüberEfficiencySupport

<table>
<thead>
<tr>
<th>KlüberEnergy</th>
<th>KlüberMaintain</th>
<th>KlüberMonitor</th>
<th>KlüberRenew</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consulting service to improve the energy efficiency of your equipment including energy measurements for verification and reporting of energy/cost savings.</td>
<td>Support for your lubrication management and maintenance programmes/TPM considering the necessary lubrication maintenance tasks</td>
<td>Diagnostic analyses of used lubricants enabling improved machine operation and enhanced production output. High-quality recommendations with trend analyses and test rigs</td>
<td>Services to increase the lifetime of your cost-intensive components such as large gear drives and chains including appropriate training</td>
</tr>
</tbody>
</table>

KlüberCollege – Increasing people efficiency

1) Total Productive Maintenance
**Crushing equipment**

We know how important it is to comply with production standards and meet the requirements of this type of machinery where shaft bearings are particularly under stress due to vibrations, shocks and possibly misalignment, all of which the lubricant has to compensate for.

Electric motors: Special lubricants can contribute considerably to proper bearing operation, extended equipment lifetime, reliability and a reduction of noise. Furthermore, they permit higher speeds and provide resistance against external influencing factors.

**Oils for crushers**

<table>
<thead>
<tr>
<th>Application</th>
<th>Product</th>
<th>Base Oil</th>
<th>Operational Temperature</th>
<th>Properties</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gears, Bushes, Shafts, Rolls</td>
<td>Klüberlub BE 41-1501</td>
<td>Mineral</td>
<td>−58 to 284 °F</td>
<td>Synthetic oil based on PAO, miscible with mineral oil, high scuffing load capacity and resistance to low temperatures.</td>
</tr>
<tr>
<td></td>
<td>Klüberlub BHM 71-461</td>
<td>Synthetic</td>
<td>−50 to 140 °C −58 to 284 °F</td>
<td>Synthetic oil based on PAO, miscible with mineral oil, high scuffing load capacity and resistance to low temperatures.</td>
</tr>
</tbody>
</table>

**Lubricants for crushing equipment**

For these applications, it is vital to bear in mind the bearing’s speed factor. It is for this reason that Klüber Lubrication has developed alternative lubricants for these machines, featuring a wide range of different viscosities so that the speeds and loads of any machine can be handled.

**Stationary equipment**

We offer a wide range of high-quality products for the lubrication of plant equipment.

- Crushing equipment: We know how important it is to comply with production standards and meet the requirements of this type of machinery where shaft bearings are particularly under stress due to vibrations, shocks and possibly misalignment, all of which the lubricant has to compensate for.
- Electric motors: Special lubricants can contribute considerably to proper bearing operation, extended equipment lifetime, reliability and a reduction of noise. Furthermore, they permit higher speeds and provide resistance against external influencing factors.

---

**Large open gear drives**

Our range of lubricants cover startup procedures, service or repair and are specially developed for large gear drive applications. They assure good adhesion, resistance to high load and protection against wear. The major OEMs of tube mills and rotary kilns for heavy industry, as well as the leading gear drive manufacturers, have included Klüber Lubrication in their lubrication charts. These lubricants can be applied by spraying, enabling a reduction of consumption quantities by up to 50 % compared with the adhesive lubricants used so far. Where immersion or circulation lubrication is used, lube change intervals can be as long as 14,000 hours or even longer, depending on the operating conditions.

**Lubricants for process plant equipment**

**Application**

- Rolling bearings
- Shafts, Plain bearings, Gears

**Composition**

- Klüberlub BE 41-141: Lithium complex, mineral oil
- Klüberlub BE 41-542: Special lithium, mineral oil
- Klüberlub BE 31-502: Special calcium, mineral oil
- Klüberlub BE 41-1501: Special lithium, mineral oil
- Klüberlub BE 41-1002: Special lithium, mineral oil
- Klüberlub BHM 71-461: Polyurea, mineral oil

**Properties**

- Very good wear and corrosion protection, general application, low temperatures. Speed factor 350,000
- High load-carrying capacity and wear protection under extreme conditions. Speed factor 500,000
- Excellent protection against wear, corrosion, high temperatures and extreme humidity and high loads. Speed factor 200,000
- Excellent wear protection and resistance to extreme loads and low speeds. Speed factor 100,000
- Good wear protection, resistance to high temperatures and water and excellent pumpability especially for vibrating screens; approved by HÄFER & BOECKER. Speed factor 200,000

**Applications**

- Rolling bearings
- Shafts, Plain bearings, Gears

**Composition**

- Klüberlub BE 41-141: Lithium complex, mineral oil
- Klüberlub BE 41-542: Special lithium, mineral oil
- Klüberlub BE 31-502: Special calcium, mineral oil
- Klüberlub BE 41-1501: Special lithium, mineral oil
- Klüberlub BE 41-1002: Special lithium, mineral oil
- Klüberlub BHM 71-461: Polyurea, mineral oil

**Properties**

- Very good wear and corrosion protection, general application, low temperatures. Speed factor 350,000
- High load-carrying capacity and wear protection under extreme conditions. Speed factor 500,000
- Excellent protection against wear, corrosion, high temperatures and extreme humidity and high loads. Speed factor 200,000
- Excellent wear protection and resistance to extreme loads and low speeds. Speed factor 100,000
- Good wear protection, resistance to high temperatures and water and excellent pumpability especially for vibrating screens; approved by HÄFER & BOECKER. Speed factor 200,000

**Applications**

- Rolling bearings
- Shafts, Plain bearings, Gears
Lubricants for enclosed gearboxes

The KlüberComp Lube Technology concept combines all that is required for the needs of modern power transmission technology:

- Composition: Formulations for lubricants based on high-quality raw materials that are, for example, resistant to ageing, free of heavy metals and have a low tendency to form residues.
- Components: All lubricated components are taken into account, e.g. gear teeth, rolling bearings, radial shaft seals.
- Competitive: Maximum performance, standardised and application-related testing under extreme conditions.
- Competence: Consultation and tailored services, optimum product selection, wide range of lubricants, staff training.

<table>
<thead>
<tr>
<th>Application</th>
<th>Product</th>
<th>Base oil</th>
<th>Operational temperature</th>
<th>Properties</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gears</td>
<td>Klüberol GEM 1 N ISO VG 46 to 1000</td>
<td>Mineral</td>
<td>-15 to 100 °C 5 to 212 °F</td>
<td>Mineral oil with high scuffing load capacity, FZG ≥ 14, API GL4 - resistance to microspinning and medium temperatures</td>
</tr>
<tr>
<td>Rolling bearings</td>
<td>Klüberol GEM 2 ISO VG 220, 320</td>
<td>Synthetic</td>
<td>-30 to 130 °C -22 to 266 °F</td>
<td>BIODEGRADABLE synthetic oil based on ester, excellent wear protection, resistance to microspinning and high temperatures</td>
</tr>
<tr>
<td>Seals</td>
<td>Klüberol GEM 4 N ISO VG 32 to 680</td>
<td>Synthetic</td>
<td>-50 to 160 °C -58 to 284 °C</td>
<td>Synthetic oil based on PAO; high shearing load capacity F20 ≥ 14, resistance to microspinning, temperatures and extreme loads</td>
</tr>
<tr>
<td></td>
<td>Klüberol GH 6 ISO VG 22 to 1500</td>
<td>Synthetic</td>
<td>-55 to 160 °C -67 to 320 °F</td>
<td>Synthetic oil based on polyglycol; high shearing load capacity F20 ≥ 14, API GL5, resistance to microspinning, extreme temperatures, loads</td>
</tr>
</tbody>
</table>

Today, there are five specific requirements that are considered paramount when it comes to the lubrication of enclosed gear components:

- Scuffing load – determined in FZG scuffing load test
- Microspinning – determined in FVA microspinning test
- Rolling bearing life – determined in FAG FE 8 wear and service life test
- Wear behaviour in spur gears – determined according to DGMK slow speed wear test
- Premature failure of radial shaft seals – compatibility with elastomers in dynamic uses tested by Freudenberg

Our most recent development and testing activities have been focused on gear oils Klüberol GEM 1 N, Klüberol GEM 2, GEM 4 N and GH 6; these products have proven to be ideally suited for the requirements of both manufacturers and operators of such gears.
Klüber Lubrication – your global specialist

Innovative tribological solutions are our passion. Through personal contact and consultation, we help our customers to be successful worldwide, in all industries and markets. With our ambitious technical concepts and experienced, competent staff we have been fulfilling increasingly demanding requirements by manufacturing efficient high-performance lubricants for more than 80 years.