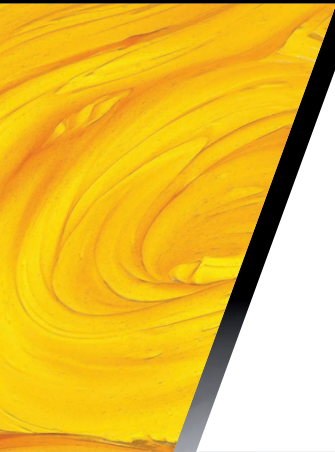


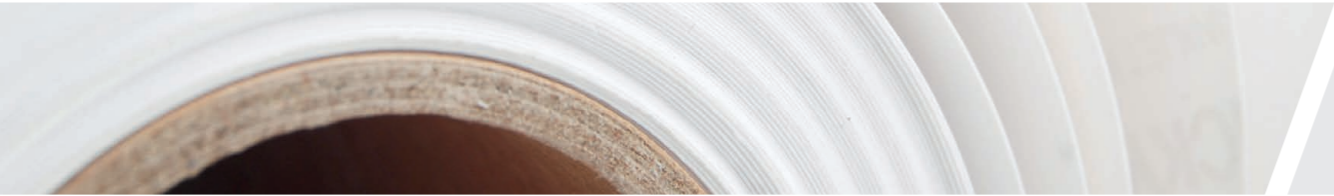
your global specialist

Industrial sector

Solutions for diversified production processes.

Speciality lubricants for the pulp and paper industry





Lubrication solutions for the next generation of the paper industry

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The pulp and paper industry is reinventing itself: many companies are evolving from mere paper making to integrated pulp processing, creating numerous new products like biodiesel fuels or advanced compound materials along the way. But like with all progress, those venturing into these new territories find themselves confronted with tough requirements. After all, more diversified production processes and varying operating conditions require the machinery used to deliver maximum efficiency and performance. And traditional pulp and paper makers are also faced with the need to increase their cost-effectiveness and productivity.

An element that can help you meet these challenges is the lubricant. While a lubricant is only a small investment, it can have far-reaching effects.

The manufacture of pulp and paper involves the following sub-processes:

- wood processing and mechanical pulp production
- chemical pulp production including recovery of chemicals
- paper recycling
- paper and cardboard production

Each of these production processes has its own specific requirements that call for corresponding lubrication solutions.

Today more than ever, operators are opting for preventive and cost-optimised maintenance to enable them to remain competitive in the face of stricter environmental regulations and mounting price pressure.

As the entire production process involves significant consumption of resources, you will be looking for solutions that facilitate efficient and cost-effective production. This is where Klüber Lubrication comes in with its comprehensive range of products and services offering maximum performance.

With our lubricants we focus primarily on special high-performance applications, as this is where the greatest potential for optimisation exists. Based on our extensive experience, we can offer you lubrication solutions that are tailored to your specific operating conditions. We will help you attain maximum operational reliability.

The predominant operating conditions your lubricants have to withstand are:

- high loads and vibration (wear)
- severe moisture and media effects (corrosion)
- thermal stress (steam temperatures up to > 200 °C)
- medium to high speeds (100 m/min to > 2 000 m/min)

Of course, we also supply products for standard applications and any additional components such as valves and fittings, hydraulic systems or gearboxes. A comprehensive range of speciality lubricants offering high performance is thus available for the operation of your paper-making machinery.

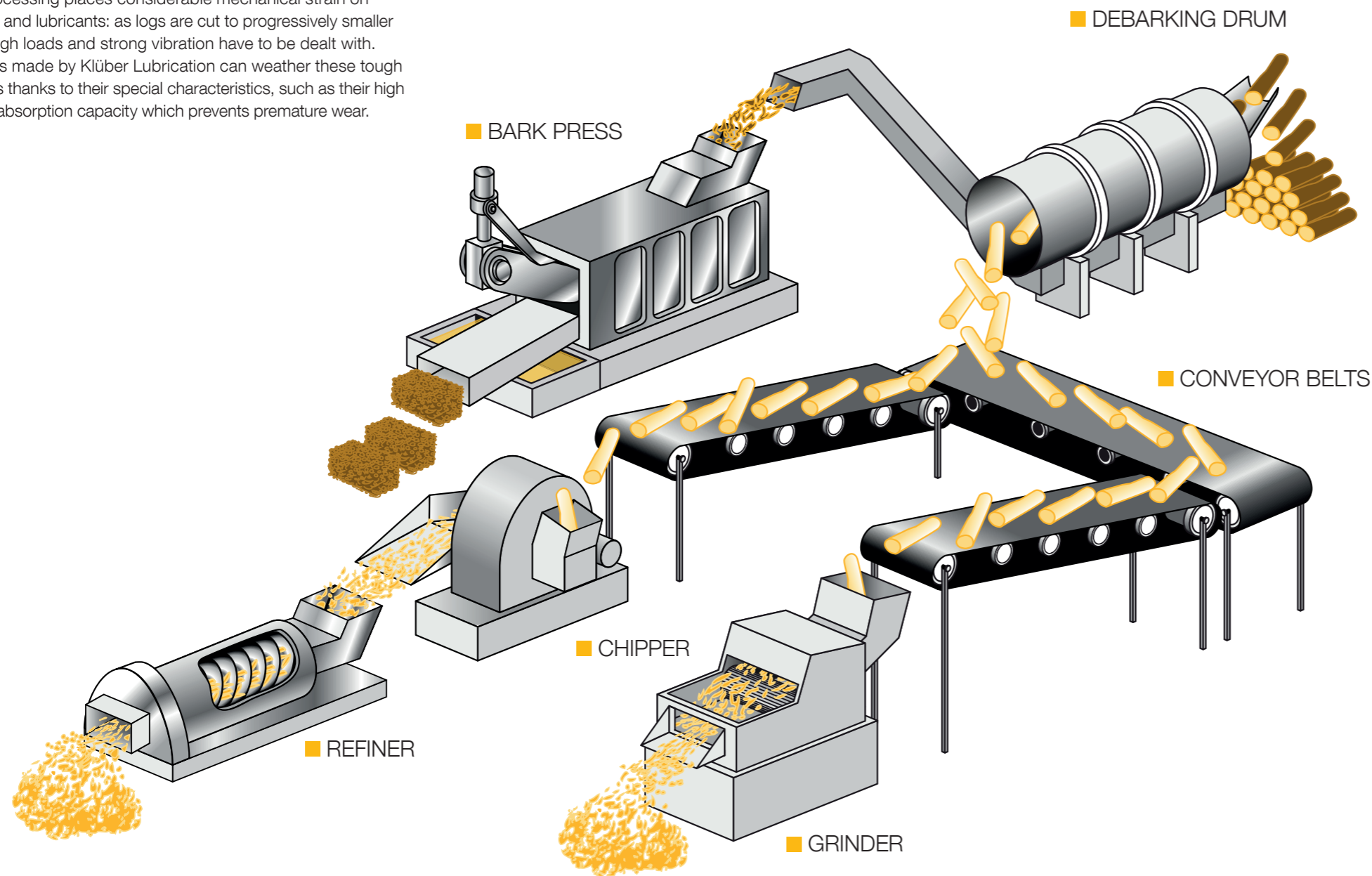
With our products, you will benefit from longer equipment life, lower lubricant consumption and many other advantages.

We are where you are

It is our aim to offer you high-quality speciality lubricants and services around the world along with the high technical competence Klüber Lubrication is known for. We meet this aim through our worldwide network of production and sales companies, competent dealers, and last but not least, through our highly specialised experts who are ready to respond to your individual requirements.

Wood processing and mechanical pulp production

Wood processing places considerable mechanical strain on machines and lubricants: as logs are cut to progressively smaller pieces, high loads and strong vibration have to be dealt with. Lubricants made by Klüber Lubrication can weather these tough conditions thanks to their special characteristics, such as their high pressure absorption capacity which prevents premature wear.



DEBARKING DRUM	
Open gear drive, riding rings and support rollers	Klüberfluid series GRAFLOSCON series Klübersustain LG 39 series
Bearings	Klüberlub BE 41-1501

BARK PRESS	
Bearings	ISOFLEX TOPAS NCA 52
Sliding guides	ALTEMP Q NB 50 Spray

CONVEYOR BELTS	
Bearings	Klüberplex BEM 41-132
Couplings	Klüberlub BE 41-1501

CHIPPER	
Bearings	Klüberplex BEM 41-132
Couplings	Klüberlub BE 41-1501

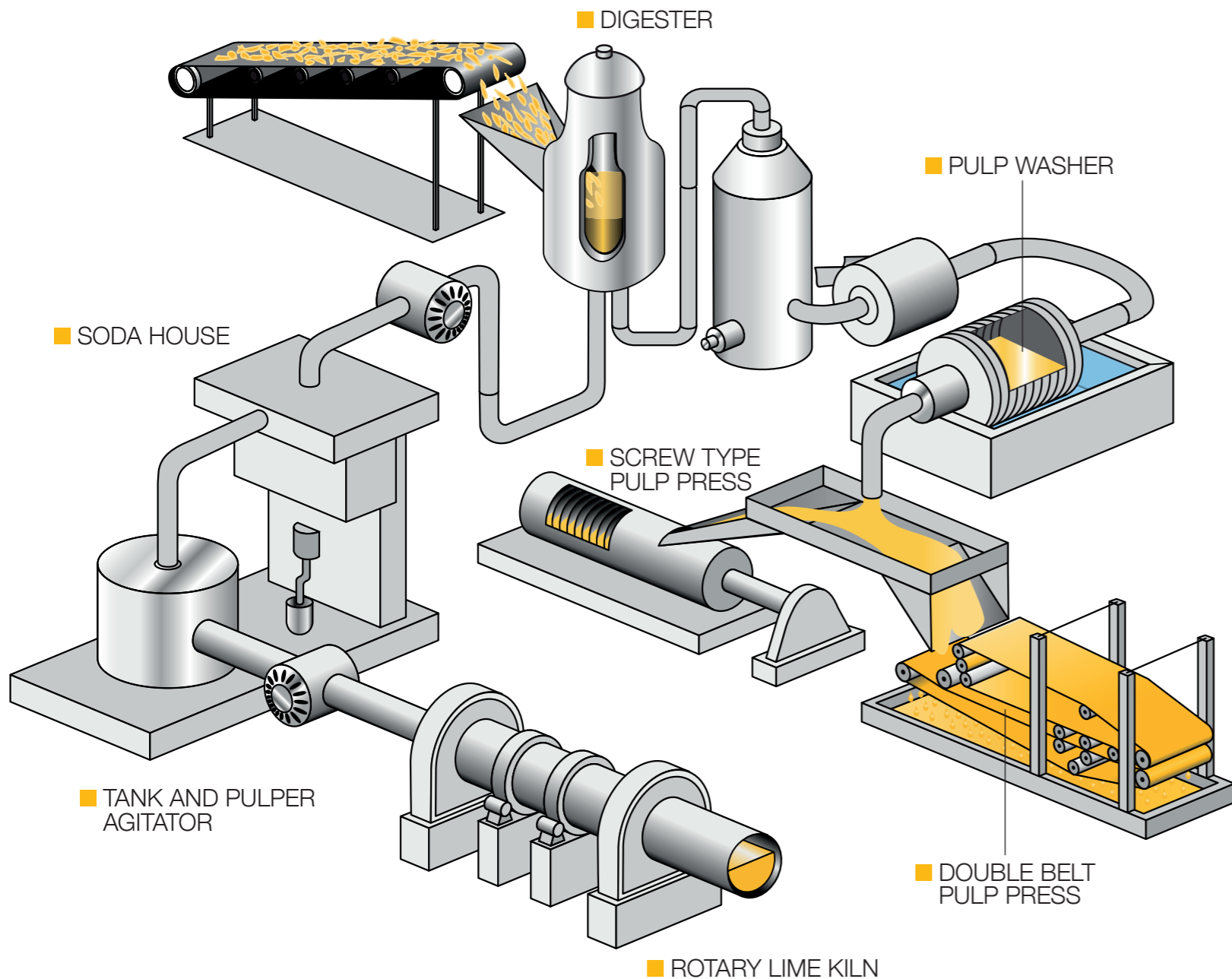
REFINER	
Bearings	Klüberplex BEM 41-132
Crowned teeth couplings	Klüberlub BE 41-1501

GRINDER	
Grinder chain	Klüberlub BVH 71-461 STABURAGS NBU 8 EP
Slide rails	Klüberbio CA 2-460

Chemical pulp production and recovery of chemicals

Operating conditions in these processes are marked by very high temperatures, aggressive chemicals and high loads. In chemical pulping processes, chemicals are added to the wood chips at high temperature to extract the fibres. The resulting pulp is washed and

sometimes bleached in several stages. This involves severe media effects combined with high loads. Extremely high temperatures are encountered in the rotary kiln. These conditions require maximum performance of the lubricants selected.



■ SODA HOUSE

Induced draft fan	Thrust ball bearings Plain bearings	Klübertemp GR AR 555 WOLFRAKOTE TOP PASTE
Flue-gas fan	Ball bearings	Klübertherm HB 88-182

■ DIGESTER

Bearings	Klüberlub BE 41-1501
Gears	Klübersynth GH 6 series

■ TANK AND PULPER AGITATOR

Bearings	STABURAGS NBU 30 Klüberplex BEM 41-132
Gears	Klübersynth GEM 4 N series

■ ROTARY LIME KILN

Open gear drive	Klüberfluid series GRAFLOSCON series
Floating tyre and slipper pads	WOLFRACOAT C FLUID
Bearings	Klüberlub BE 41-1501

■ PULP WASHER

Bearings	STABURAGS NBU 30 Klüberplex BEM 41-132
Oil lubricated bearings and gears	Klübersynth GEM 4 series

■ SCREW TYPE PULP PRESS

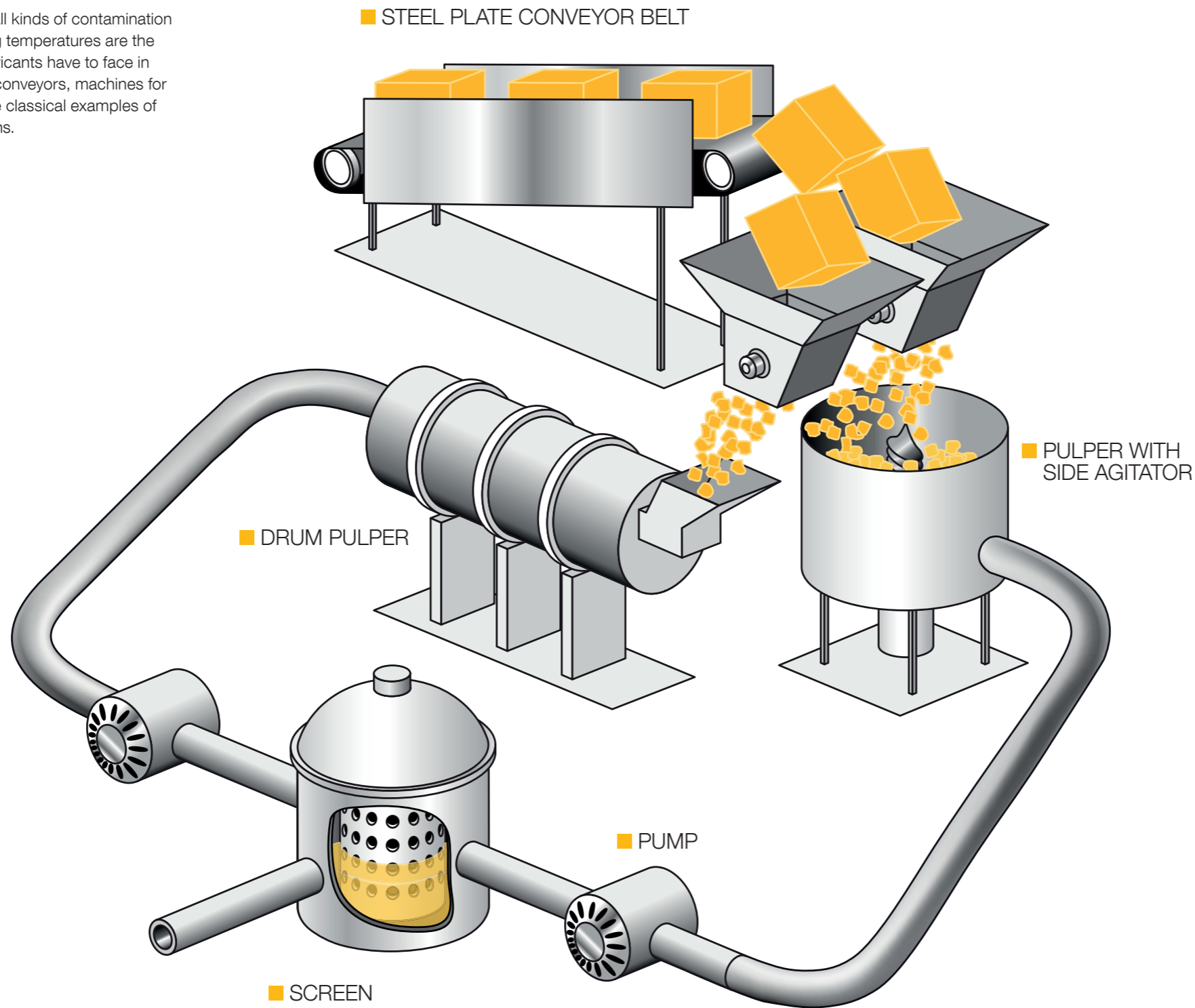
Bearings	Klüberlub BE 41-1501
Loose bearings	Klüberlub BE 71-501

■ DOUBLE BELT PULP PRESS

Bearings	Klüberlub BE 41-1501
Oil lubricated fixed bearings	Klübersynth GH 6 series

Paper recycling and pulp transport

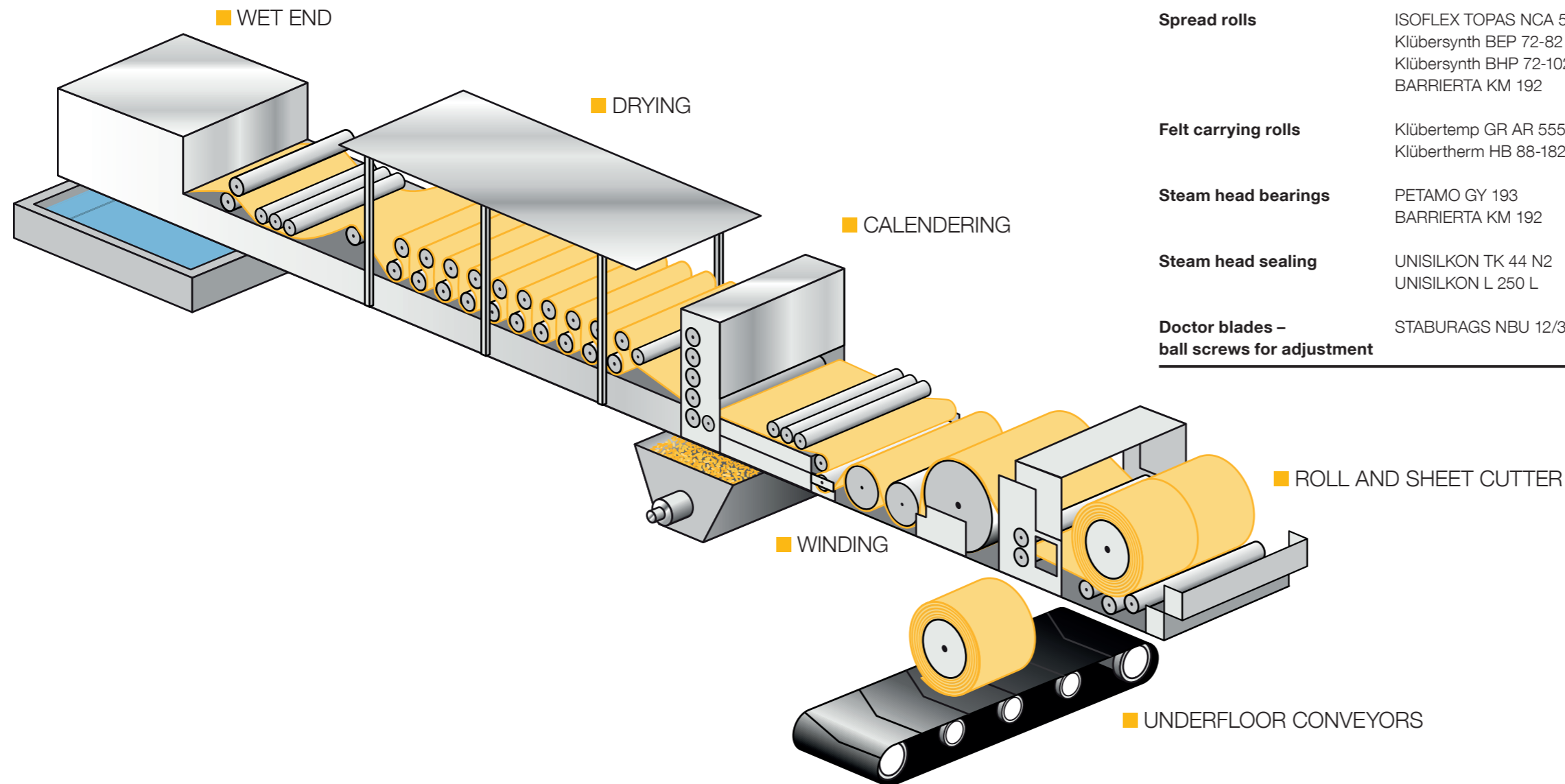
Severe moisture effects, high loads, all kinds of contamination from the recovered paper and varying temperatures are the particular requirements speciality lubricants have to face in this process. Alongside pulpers and conveyors, machines for transporting and suspending pulp are classical examples of high-performance lubricant applications.



STEEL PLATE CONVEYOR BELT	
Roller chains	STRUCTOVIS GHD Klübersynth GEM 4-32 N
DRUM PULPER	
Open gear drive, riding rings and support rollers	Klüberfluid series GRAFLOSCON series Klübersustain LG 39 series
Bearings	Klüberlub BE 41-542
PULPER WITH SIDE AGITATOR	
Bearings	PETAMO GHY 133 N with Klübermatic FLEX
PUMP	
Oil lubricated pump bearings	Klübersynth GEM 4 series
Couplings	Klüberlub BE 41-1501
SCREEN	
Screen bearings	STABURAGS NBU 30 Klüberplex BEM 41-132
Couplings	Klüberlub BE 41-1501

Paper, cardboard and pulp machinery

No matter what paper or cardboard quality you are producing: both sheeting and finishing are always performed by a paper machine. Lubricants have to face tough requirements in both the wet and the dry section. The factors to be considered when selecting lubricants include a heavy impact from moisture and other media, high loads, varying speeds and high temperatures in the dry section. Pumpability in centralised lubricating systems and single-point application by means of grease guns are also important factors.



WET END (WIRE AND PRESS)	
Grease lubricated bearings	Klüberplex BE 31-222 Klübergrease BE 71-461 STABURAGS NBU 30
Paper machine oil	Klüberoil GEM 1 series
DRYING (INCL. YANKEE CYLINDER)	
Paper machine oil	Klübersynth GEM 4 series
Spread rolls	ISOFLEX TOPAS NCA 52 Klübersynth BEP 72-82 Klübersynth BHP 72-102 BARRIERTA KM 192
Felt carrying rolls	Klübertemp GR AR 555 Klübertherm HB 88-182
Steam head bearings	PETAMO GY 193 BARRIERTA KM 192
Steam head sealing	UNISILKON TK 44 N2 UNISILKON L 250 L
Doctor blades – ball screws for adjustment	STABURAGS NBU 12/300 KP

CALENDERING	
Grease lubricated bearings	ISOFLEX TOPAS NCA 52
Oil lubricated bearings	Klübersynth GH 6 series
WINDING	
Bearings	ISOFLEX TOPAS NCA 52
Sliding guides	ALTEMP Q NB 50 Spray
ROLL AND SHEET CUTTER	
Roller bearings	ISOFLEX TOPAS NCA 52
UNDERFLOOR CONVEYORS	
Conveyor chain	Klüberbio CA 2-460

General applications

Application	Component	Product solution
Valves and fittings	Seal	UNISILKON L 250 L
Universal shafts	Ball bearings and needle bearings	STABURAGS NBU 30 Klüberplex BEM 41-132
Electric motors	Ball bearings and cylindrical roller bearings	PETAMO GHY 133 N Klüberplex BEM 41-132
Air circulation fans	Ball bearings	Klüberplex BEM 41-132
Hot air fans	Ball bearings	Klübersynth HB 74-401 Klübertherm HB 88-182 Klüberquiet BQH 72-102
Adjusting spindles	Vertical roll adjustment	GRAFLOSCON C-SG 0 ULTRA
Chains	Ambient temperature	STRUCTOVIS HD series Klüberbio CA 2-100
	High temperature	HOTEMP 2000 Spray Klübersynth CH 2 series
Underfloor conveyors	Conveyor chain	Klüberbio CA 2-460
Gear box	Gears up to 140 °C	Klübersynth GEM 4 N series
	Gears over 140 °C	Klübersynth GH 6 series
Open gear	Pinion drive	Klüberfluid series GRAFLOSCON series Klübersustain LG 39 series

Application	Component	Product solution
Hydraulic systems		Klüberfood 4 NH1 series LAMORA HLP series
Compressors	Rotary screws and bearings	Klüber Summit SH series
	Reciprocating and sliding vane	Klüber Summit DSL series
Test kit	for compressor oils	Klüber Summit T.A.N. Kit
Assembling pastes		ALTEMP Q NB 50 ALTEMP Q NB 50 Spray Klüberbio AG 39-602 Klüberpaste HEL 46-450
Multipurpose		MICROLUBE GB 0 MICROLUBE GB 00
Rust remover		Klübersynth MZ 4-17 Klüberbio Z 2-5
Scale remover		SUBLIME
Conditioning concentrate and cleaning solvent		Klüber Summit Varnasolv
Wood yard crane	Open gears	Klüberfluid series
Spraying device for rotary kilns	Floating tyres and slipper pads	Klübermatic KD

Additional equipment	Advantages
Klüber Summit T.A.N. Kit	Rapid qualitative test of level of ageing for mineral and synthetic compressor oils.
Klübermatic KD	Manual Spraying equipment for application of WOLFRACOAT C FLUID. Easy handling – no training required.
Klübermatic lubricant dispensers	Device for automatic regular relubrication. Preventive maintenance.

Details on selected lubricants (products in alphabetical order)

Lubricant	Advantages
ALTEMP Q NB 50	Excellent lubricating paste for surfaces exposed to high tribological stress.
BARRIERTA KM 192	Resistant to high speeds. Friction values are largely independent of temperatures.
GRAFLOSCON series	Excellent adhesion and back flow behaviour. Machine components stay clean.
HOTEMP 2000 Spray	Resistant to high temperatures. Good adhesion, long-term lubricating effect.
ISOFLEX TOPAS NCA 52	Reduces sliding wear. Bearing life is considerably longer.
Klüber Summit DSL series	Increased functional reliability because deposits are largely prevented.
Klüber Summit SH series	Stable lubricant film at high temperatures. High resistance to oxidation.
Klüber Summit Varnasolv	Reliably dissolves residues. No shut down for cleaning necessary.
Klüberbio CA 2-460	Rapidly biodegradable. Excellent viscosity-temperature ratio.
Klüberbio AG 39-602	Good water resistance, pressure absorption capacity. Prevents stick-slip.
Klüberbio Z 2-5	Rapidly biodegradable. Less cleaning required, because of no tendency to gum.
Klüberfluid series	Transparent lubricants for open gear drives for easy inspection. Reduce maintenance.
Klüberfood 4 NH1 series	Extended oil change intervals and reduced operating cost in hydraulic systems. NSF H1 registered.
Klüberlub BE 41-1501	Heavy-duty grease. Good pressure absorption capacity, low consumption.
Klüberlub BE 41-542	Heavy-duty grease. Good water resistance and excellent wear protection.
Klüberlub BE 71-501	Versatile grease for sealing and bearing lubrication. Good water resistance.
Klüberlub BVH 71-461	For extreme requirements. Good protection against wear. Anticorrosion properties.
Klüberoil GEM 1 series	Excellent ageing and oxidation resistance. Low foaming tendency. Good elastomer compatibility.
Klüberpaste HEL 46-450	Assembly paste for high temperatures > 150 °C.
Klüberplex BE 31 series	Good sealing effect and resistance to water and other media. Good pressure absorption capacity.
Klüberplex BEM 41-132	Versatile grease due to wide operating temperature range and optimised oil release.
Klüberquiet BQH 72-102	Wide service temperature range allows a variety of applications. Smooth running, low noise.
Klübersustain LG 39 series	Sustainable and free of graphite. Extremely good low-temperature behaviour.
Klübersynth BEP 72-82	Special antiwear additives protect against vibrations. For high temperatures and speeds.
Klübersynth BHP 72-102	Patented hybrid grease formulation. Wide service temperature range.
Klübersynth CH 2 series	Clean chains and easy relubrication due to low residue formation at temperatures > 200 °C.
Klübersynth GEM 4 N series	Excellent ageing and oxidation resistance. Good viscosity-temperature behaviour. Low foaming tendency.
Klübersynth GH 6 series	For high loads and high temperatures. Energy savings due to optimised friction behaviour.
Klübersynth HB 74-401	Longer relubrication intervals even at elevated temperatures.
Klübersynth MZ 4-17	No adhesions of paper dust. Fewer rejects by minimum quantity oil lubrication.
Klübertemp GR AR 555	For use at high operating temperatures up to 250 °C and aggressive media.
Klübertherm HB 88-182	Special grease concept for high loads and high temperatures without residue formation. Very economic and, therefore, attractive cost saving potentials.

Lubricant	Advantages
LAMORA HLP series	Good wear protection and wide service temperature range.
MICROLUBE GB 0	Universal high-performance lubricant with good anticorrosion behaviour.
MICROLUBE GB 00	Fluid gear grease with high pressure absorption capacity.
PETAMO GHY 133 N	Excellent protection against wear and corrosion, e.g. in water pump bearings.
PETAMO GHY 441, 443	High-temperature and long-term lubricants. Resistance to oxidation and ageing.
PETAMO GY 193	High-temperature and long-term lubricants. Resistance to oxidation and ageing.
STABURAGS NBU 12/300 KP	Long-term grease. Good corrosion protection, pressure absorption and resistant to water.
STABURAGS NBU 30	Good sealing behavior and resistance to water, steam, many alkaline and acidic solutions.
STABURAGS NBU 8 EP	High-pressure grease with very good adhesion. Resistant to water and aggressive media.
Klübergrease BE 71-461	High-temperature grease. Excellent water resistance. Trouble-free operation due to good pumpability in centralised lubrication systems.
STRUCTOVIS HD series	Adhesive lubricants for chains. Good wear and corrosion protection.
Klüberbio CA 2-100	Very adhesive and rapidly biodegradable multi-purpose oil.
SUBLIME	Water scale solvent / lime remover for boilers, piping systems and all types of evaporating equipment.
UNISILKON L 250 L	Long-term protection of seals and bearings. Good resistance to numerous media like cleaning agents, water and steam.
UNISILKON TK 44 N2	Versatile lubricating and sealing grease. Very good compatibility with many plastics and elastomers.
WOLFRACOAT C FLUID	High-temperature lubricating compound for floating tyres and slipper pads on rotary kiln riding rings.
WOLFRAKOTE TOP PASTE	High-temperature paste with reliable dry lubrication at high to extreme temperatures. Long lubricant life.

Additional equipment	Advantages
Klüber Summit T.A.N. Kit	Rapid qualitative test on level of ageing for mineral and synthetic compressor oils.
Klübermatic KD	Manual Spraying equipment for application of WOLFRACOAT C FLUID. Easy handling – no training required.
Klübermatic Lubricant Dispensers	Device for automatic regular relubrication. Preventive maintenance.

The right lubricant at the right place at the right time

KlüberEfficiencySupport

Services by Klüber Lubrication – your success from one tool box

Systems for automatic lubrication

We at Klüber Lubrication understand ourselves as a solution provider. We not only supply high-performance oils and greases, but also “intelligent packages” for automatic lubrication of your machines and components. Selected lubricants covering a wide range of typical applications are available in automatic lubricant dispensers for single-point lubrication. These tried-and-tested systems based on electromechanical or electrochemical

technology are available with standard, long-term or high-pressure greases, standard or high-temperature chain oils and special oils and greases for the food-processing industry. We are also able to supply other lubricants in automatic dispensers on request and for higher order volumes, provided they have been tested and approved for use – please contact your Klüber Lubrication consultant for details.

Your benefits at a glance

Profitability

Continuous production processes and predictable maintenance intervals reduce production losses to a minimum. Consistently high lubricant quality ensures continuous, maintenance-free long-term lubrication for high plant availability. Continuous supply of fresh lubricant to the lubrication points keeps friction low and reduces energy costs.

Lubrication with Klübermatic can reduce costs by up to 25 %

Safety

Longer lubrication intervals reduce the frequency of maintenance work and the need for your staff to work in danger zones. Lubrication systems from Klüber Lubrication can therefore considerably reduce occupational safety risks in work areas that are difficult to access.

Lubrication with Klübermatic can decrease the risk of accidents by up to 90 %

Reliability

Automatic lubrication systems from Klüber Lubrication ensure reliable, clean and precise lubrication around the clock. Plant availability is ensured by continuous relubrication of the application.

Lubrication with Klübermatic may help to prevent up to 55 % of rolling bearing failures

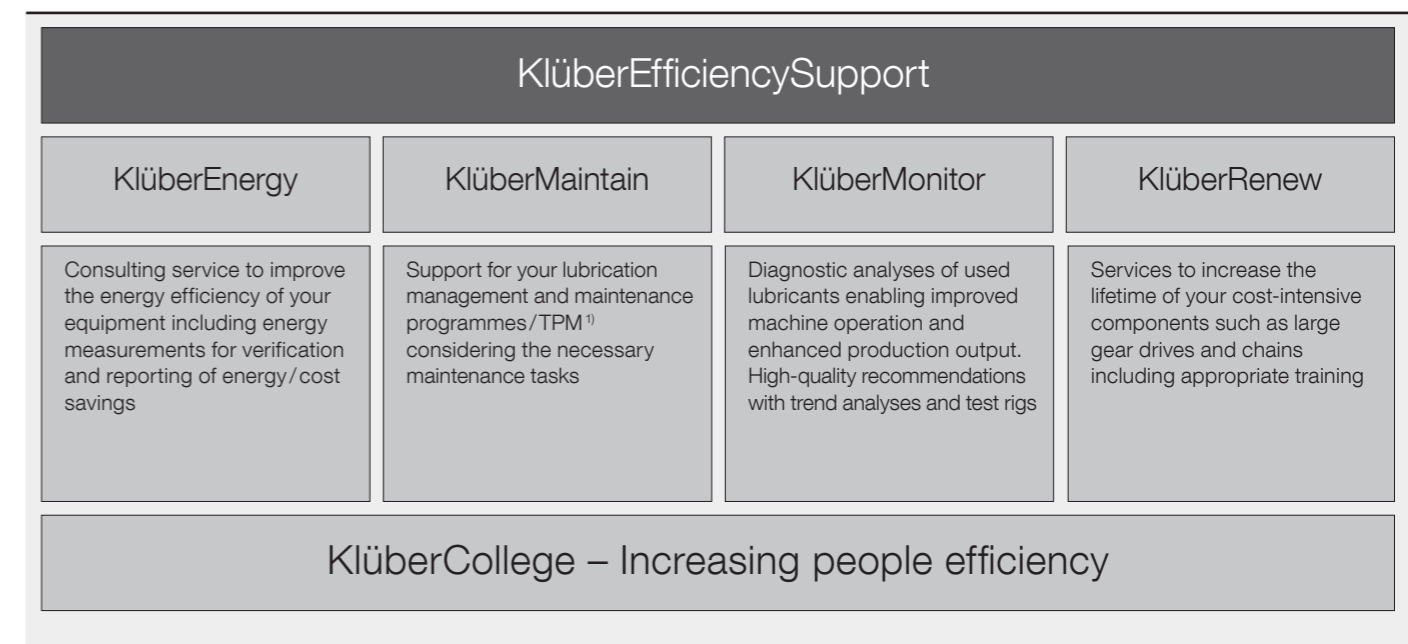
From low-cost to high-tech – automatic systems for all requirements

Klüber Lubrication offers you the following technological solutions:

- freely adjustable lubrication increments between 1 and 12 months
- range of speciality lubricants
- self-contained or machine-controlled lubrication systems (time control with programmable controller)
- combination of tried-and-tested Klüber Lubrication lubricants with proven automatic lubricant dispensers





Every manufacturer and operator in every industry wants his machinery to run reliably and efficiently to its design life and beyond. The right lubricants carry considerable potential to reduce energy costs, spare parts and labour while increasing productivity. Companies from many industries have been

using Klüber Lubrication's professional services in addition to its high-quality lubricants to benefit from considerable added value and the optimum solution for their needs. Our consulting and other services are put together under the umbrella of KlüberEfficiencySupport.



The methodology was developed by Klüber Lubrication, is tried-and-tested and consists of a multi-stage, systematic approach. We identify your requirements together with you at an early stage to discover potential for optimisation. From there, we develop solutions with you to improve the energy efficiency of your machinery or the efficiency of your maintenance and

production processes, machines or components, going well beyond a simple lubricant recommendation. We also verify the effects our measures have in practice. This provides you with everything you need to multiply improvements and develop your success.

Klübermatic FLEX	Klübermatic NOVA	Klübermatic STAR VARIO	Klübermatic STAR CONTROL
			
Flexible use – and for lubrication points with high requirements	For applications subject to wide temperature fluctuations	Precise and adjustable lubricant metering	Externally controlled single-point relubrication

1) TPM: Total Productive Maintenance

www.klueber.com

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.

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 **FREUDENBERG**

