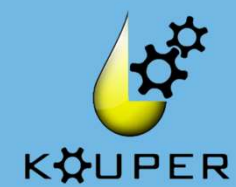




# KOUPER LUBRICANTS



“ENHANCED LUBRICATION”

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# **JOURNAL BEARINGS AND THEIR LUBRICATION**

## **SUGAR PLANT CRUSHING MILL**

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## JOURNAL BEARINGS & APPLICATION

### **Journal Bearing**

Journal bearings have been used in rotating equipment since the invention of the wheel. Journal or plain bearings consist of a shaft also called journal which rotates freely in a supporting metal sleeve or shell. There are no rolling elements in these bearings. Their design and construction may be relatively simple, but the theory and operation of these bearings can be complex. To reduce wear of the surfaces, the clearance is filled with a lubricant which allows the contact to operate in the mixed or hydrodynamic regime

### **Application**

Journal bearings are used for high radial loads (perpendicular to the axis of the shaft) and low to high speeds.

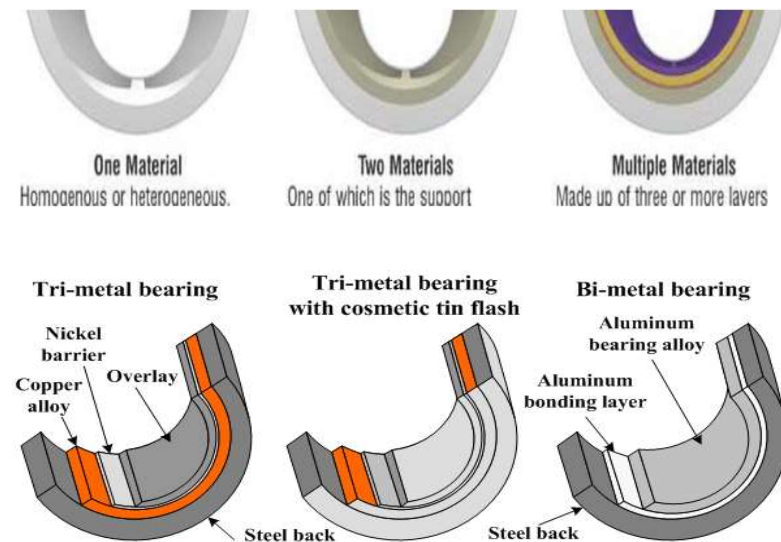
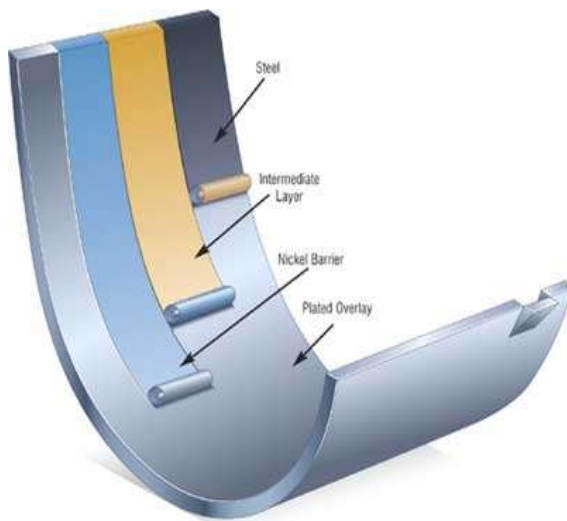
Typical applications include turbines, large milling systems, engine cranks, compressors, sugar mills, gearboxes, shaft bearing supports, etc.

## JOURNAL BEARINGS MOC

Journal bearings are meant to include sleeve, plain, shell and babbitt bearings. The term babbitt actually refers to the layers of softer metals (lead, tin and copper) which form the metal contact surface of the bearing shell. These softer metals overlay a stronger steel support shell and are needed to cushion the shell from the harder rotating shaft

### Types

- Gun Metal
- Bronze
- White Metal



## JOURNAL BEARINGS FRICTION CONDITION & FACTORS FOR USE OF GREASE & OIL IN JOURNAL BEARING

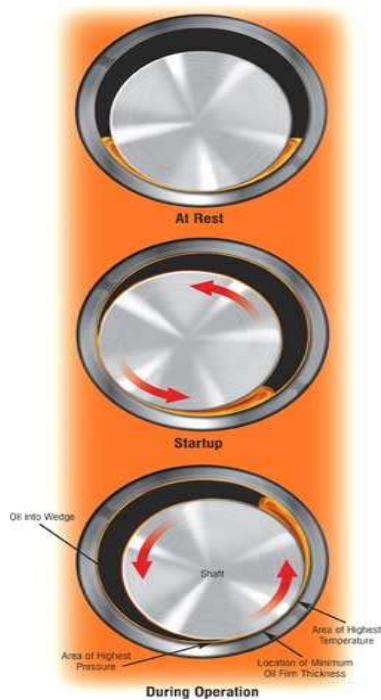


Fig. Shaft Motion During Start-up

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### Operation

Journal bearings operate in the boundary regime (metal-to-metal contact) only during the start-up and shutdown of the equipment when the rotational speed of the shaft (journal) is insufficient to create an oil film. It is during start-up and shutdown when almost all of the damage to the bearing occurs. Shock loading and water and dirt contamination are often major factors in their lubrication.

### Factors

- Cooling not a factor due to radiation temperature
- Shock Loading
- Start & Stops
- Sealing ability
- Low Speed

## JOURNAL BEARINGS LUBRICATION

A lubricated contact at rest is most often in the boundary or mixed lubrication regime in which the surface contours (asperities) of the two surfaces are well interconnected resulting in high friction. At the onset of relative motion between the two surfaces, pressure begins to build in the lubricant.

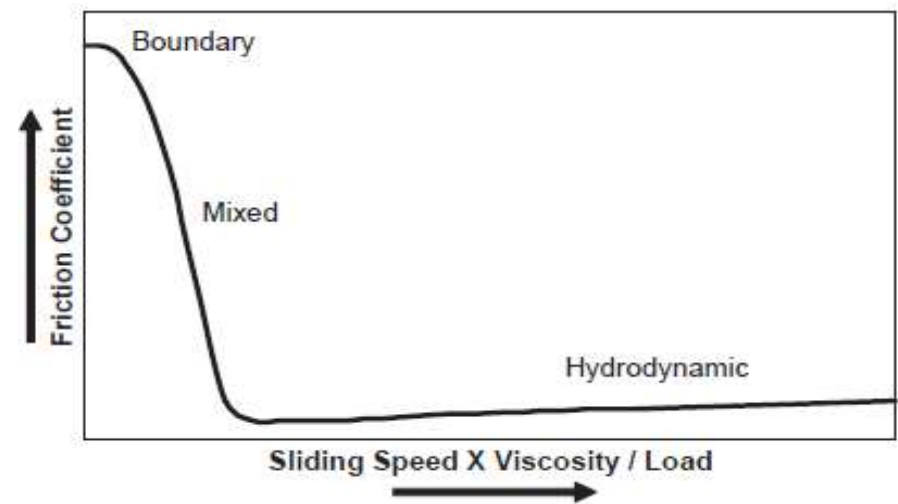


Figure 1. The Stribeck curve showing the transition from boundary to mixed and finally to hydrodynamic lubrication regimes with changing speed, viscosity or load on the contact.

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## JOURNAL BEARINGS LUBRICATION

When the bearing operates in the hydrodynamic regime, a fluid pressure builds up in the bearing by a converging geometry effect in the lower portion of the bearing, shown in Fig. 1.2. Following the minimum clearance portion of the bearing, the clearance increases (the surfaces diverge). This diversion results in a pressure drop in the lubricant that leads to cavitation (this portion of the bearing is often referred to as the 'cavitation zone'). Because of the pressure imbalance between the inlet side and the outlet side of the bearing, the shaft shifts towards the outlet side which allows the pressure profile to balance with a resulting total force in the vertical direction

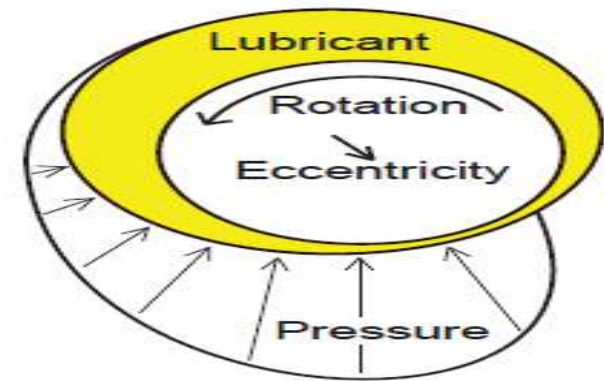


Figure 1.2: Hydro-dynamic pressure build up in a journal bearing. Lubricant is normally supplied to these bearings from the sides or top when the bearing operates with a horizontal shaft. With a vertical turbine, the bearing is often partly immersed in an oil bath and the pressure field rotates around the bearing with the shaft's motion.

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## JOURNAL BEARING SLIDING SPEED & PRESSURE

### Sliding Speed

Permissible sliding speed (v) for grease lubrication for Journal Bearing: 0.01 to 2.5 m/s.

Typical Example:

- A. Bearing Dia.: 530mm
- B. Bearing Speed: 4 RPM
- C. Bearing Material: Bronze (Cu 84%, Sn 10%, Pb 3%, Zn 3%)
- D. Sliding Speed:  $\pi \times d \times n/60$  m/s,  $3.14 \times 0.530 \times 4/60 = 0.11$  m/s

### Bearing Pressures

The maximum pressure that a bearing can withstand is mainly a function of the bearing material. The bronzes that are common in sugar mills have a recommended maximum bearing pressures of up to 100 MPa for phosphor bronze and 50 MPa for tin-bronzes. Standard tin sugar mill practice limits the bearing pressure to about 10 MPa



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## METHODS OF LUBRICATION & EXISTING LUBRICATION PRACTICES:

### Methods

- Individual lubricator (chain/sprocket or motorized)
- Centralized lubrication system
  - Grease system
  - Oil system

### Existing Lubrication Practices:

- 1) Bituminous lubricants (Sugar Oil)
- 2) Non Bituminous oil (low temperature environment)

### New Trends:

- 1) Grease (Normal & semi fluid nature)
- 2) High Viscous fluids (7000- 15,000 cst.)

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## EXISTING LUBRICATION PRACTICES & RECOMMENDATION

### Existing Lubrication Practices: Bituminous & Non Bituminous oil lubricants (Sugar Oil)

- High consumption of oil
- Oil escaping from bearings
- Increase Load on ETP
- Environmentally aggressive
- House keeping
- High inventory

### Recommendation

- Tailor made product for Sugar Mill Journal Bearing application -
- High viscous fluids flow-ability & pump-ability is better than any Bitumen base sugar oil.
- Suitable with all lubrication system: manual, lubricators, centralized oil system, & centralized grease system.
- Clean Technology

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## CHARACTERISTIC DATA & PROPERTIES

### Characteristic

- Base oil : Semi synthetic ,
- Base oil viscosity without active content @ 40 Deg.C : 10000 mm<sup>2</sup>/s
- Base oil viscosity with active content @ 40 Deg.C 7500 cst.
- Viscosity Index : < 170
- Pour Point : -12°C
- Density at 20 °C : 0.90 g/cm<sup>3</sup>
- Weld Load Capacity: 8000 N

### Properties:

- Operating Temp Range: Up to 200°C
- Extremely good adherence due to formation of an extreme thick lubricating film
- High Lubricant film pressure resistance
- Good sealing properties
- Excellent wear and corrosion resistance
- No hardening or brittling of lubricating film
- Good pump-ability without choking of tubes
- Reduced consumption in comparison to conventional graphite based, non graphite based , Bituminous & Non Bituminous oil lubricants .
- Contains no bituminous ingredients

## COMPARISON WITH CONVENTIONAL GREASE & OIL.

### ADVANTAGES:

Properties	Normal Grease	Open gear	Bituminous oil	PROVIC 100 H
Thickener	Lithium	Aluminium Complex	No	No
Consistency	2 (semi solid)	0/00 ( semi fluid)	-	-
Base oil viscosity	100-120 cst.	1000-2000 cst.	1000 cst.	10000 cst.
Solid Lubricants	Nil	Graphite – 5 to10%	Nil	Nil
Weld Load	1800 N (general)	4000 to 5000 N	2000 N	8000N
Pump-ability	Poor	Fair	Poor	Excellent
Sealing Ability	Fair	Fair	Poor	Excellent

### Advantages:

- Reduced consumption (12:1 to 8:1).
- Reduced load on ETP due to non presence of metal thickener & solid contents.
- Avoids excessive bearing temperature.
- External water cooling could be avoided
- Extended bearing life.
- Good Housekeeping.

## OTHER APPLICATIONS

- Open gear drives of rotary kilns,
- Ball mills
- Rod mills
- Autogenous mills
- Dryers and mixing drums



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## ABOUT KOUPER LUBRICANTS PVT. LTD.

Kouper Lubricants Private Limited is a lubricant manufacturing company. The manufacturing facility is at Kumbalagudu-Bangalore. The plant has been set up in the year 2017 and is involved in the manufacturing of specialty Lubricants. We have Production capacity of 1200TPA. The facility has been catering to the Indian Market and will subsequently look for carter to the other parts of the world.

Kouper Lubricants India Pvt limited has a strong commitment towards the Ecology and Environment system; we comply with all the necessary environmental regulations and standards.

KOUPER is passionate about developing & manufacturing products, processes and solutions that make a difference in the industry. At the same time we are committed to environmental responsibility and Personal safety.

KOUPER Products are derived with innovative formulations and technology with the re-defined tribological solution to all industrial applications.



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## MILESTONES



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# MANUFACTURES OF

- ❖ WATER SOLUBLE FLUIDS (COOLANTS)
- ❖ NEAT CUTTING OIL, HONING OIL, GEAR HOBGING
- ❖ EDM Oils
- ❖ GEAR OIL
- ❖ COMPRESSOR OIL
- ❖ RUST PREVENTION OIL
- ❖ LUBE OIL
- ❖ SPINDLE OIL
- ❖ HYDRAULIC OIL
- ❖ KNITTING OIL & CONING OIL
- ❖ INDUSTRIAL CLEANERS (WATER BASED & NON-WATER BASED)
- ❖ DRAWING OILS
- ❖ HIGH TEMPERATURE CHAIN OILS
- ❖ HIGH VISCOUS OILS/JOURNOL BEARING LUBRICANTS
- ❖ HOT ROLLING OILS

Tailor made solutions for special requirements & Also we deal with specialty Greases

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## HOW DO WE WORK

- Understanding customers requirements
- Suggesting suitable Product
- Trial at customer place on **Pay By Performance**
- Trail conclusion & report
- Techno commercial negotiations
- Serving the customer at highest level

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## WHY KOUPER LUBRICANTS

- Highest quality
- Unmatched price competitiveness
- Less Consumption
- Environment friendly production process
- Ontime delivery with very less lead time
- Round the clock service & availability

Our novel liquid engineering technology allows us to sell solutions to customers, add value to their business and work with them through a consultative approach.

## OUR VALUED CUSTOMERS

**HIKUWA**

**ADVIK**

**Rane**



**YUKEN**  
*Depend On us*

PAMS ENGINEERING  
We Make Microns.



**SREE SGK**



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# THANK YOU VERY MUCH FOR YOUR ATTENTION !



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