




**Choose Lubricants Judiciously to
reduce down time & optimize production**

Carl Bechem Lubricants India

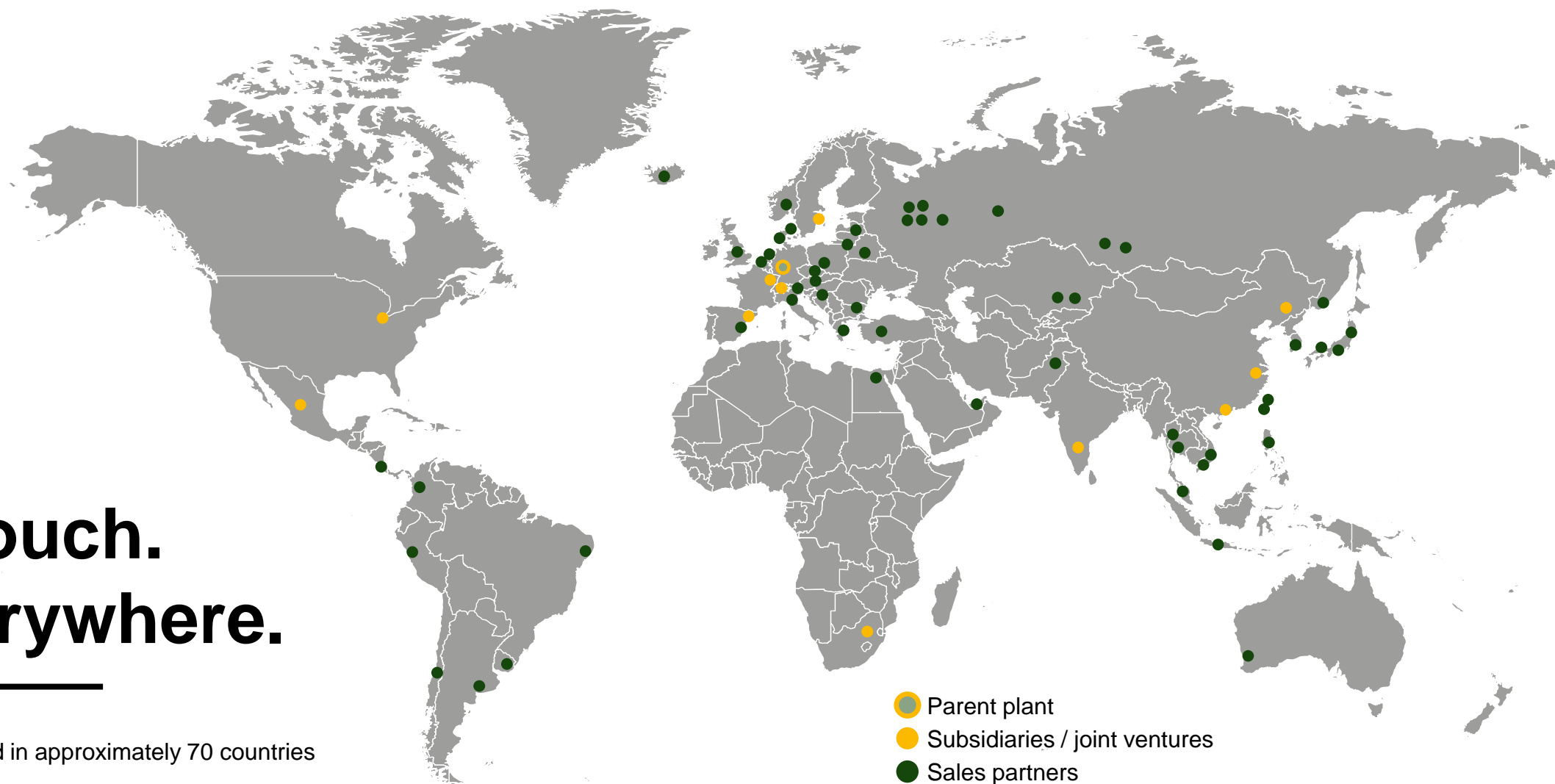


Over 180 years of lubricant history

In 1834, In Hagen, Carl Bechem founded the first German oil factory. In doing so he became the first German manufacturer of industrial lubricants.

In touch. Everywhere.

Represented in approximately 70 countries
worldwide.
Close to customers, and to their needs.



BECHEM – an overview.

Approximately 600 employees worldwide, of which 350 are in Germany.
Certified in accordance with IATF 16949, and DIN EN ISO 9001

Plants in Germany:
Hagen | Mieste | Kierspe

Plants worldwide:
China | India | USA

Carl Bechem - Overview

- **Global Presence**

- Manufacturing Plants in 6 Different Countries including one in India @Bengaluru
- Products reach in more than 100 Countries

- **India Operations Since 2004**

- Industries Catered – Paper, Steel, Cement, Sugar, Auto, Railways, Pharma, Food, Textile etc.

- **Product Range (For Paper Industry)**

- Greases - Synthetic / Mineral
- Gear Oils – Synthetic/Mineral
- Anti Friction Coatings
- Cleaners

BECHEM - Advantage

- German Technology
- Made in India at our plant in Bengaluru
 - ISO 9001 and IATF 16949 Certified Processes
- Pan India Sales Network
- Trained Application Engineers at Strategic locations across India
- We believe “ **there is a special tailor made solution for every problem**”

Our Approach & Application Engineering

- **Trained team of Application Engineers**
- **Lube Audits**
 - Meticulous Selection of Lubricants
 - Optimizing Consumption
 - Right Lubricant, Right Quantity, Right Interval
- **Wide range of greases (600 types) in different pack sizes**
- **Local Inventory & Timely Delivery**

Bechem - Advantage

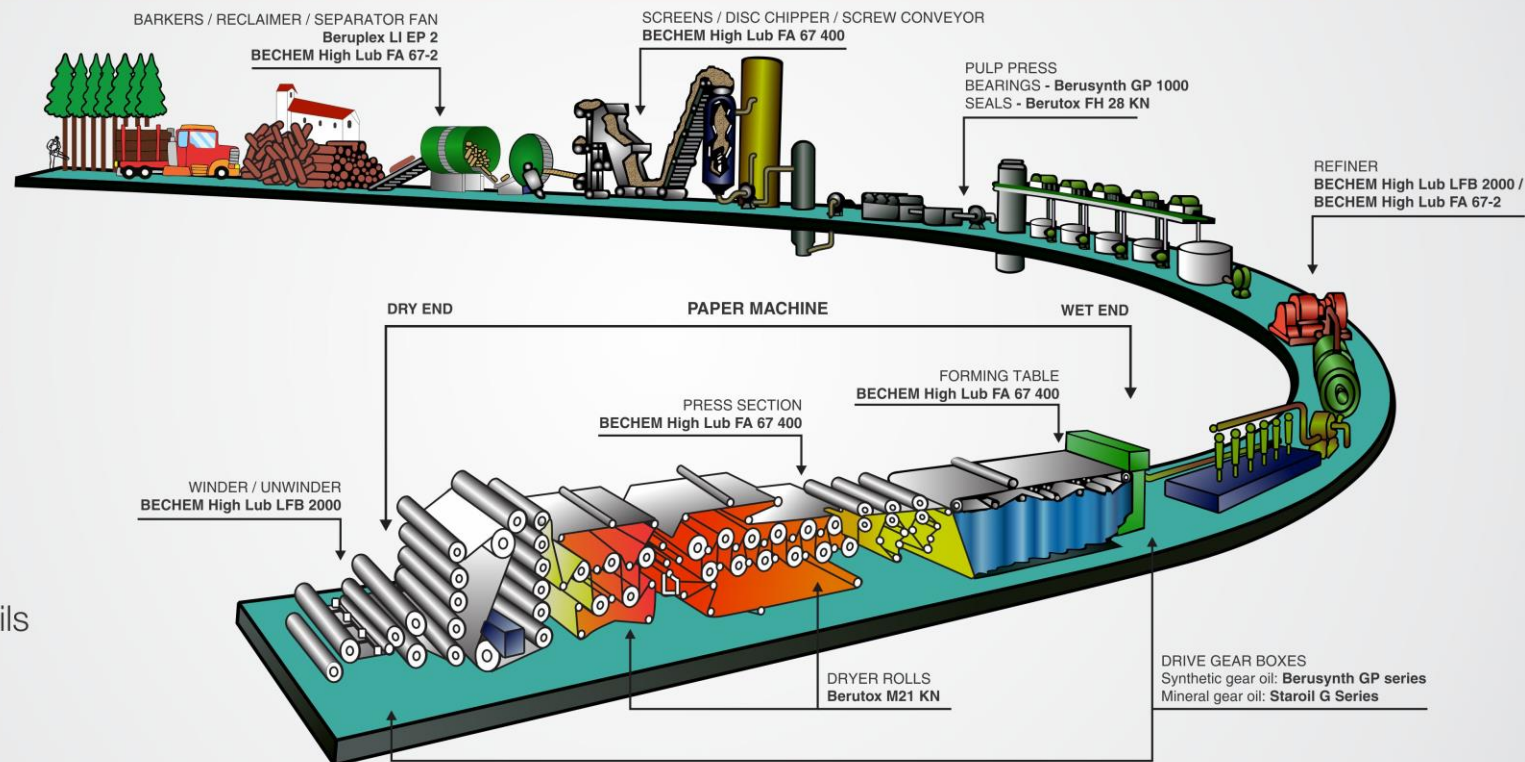
Complete Range of Lubricants for Paper Industry



High Performance Lubricants For Paper Processing

SINCE
1834

- Water resistant grease
- High temperature grease
- High load grease
- High speed grease
- High performance gear oils
- Open gear lubricants



Carl Bechem India - Glimpses



Carl Bechem India



Bechem India @ Bengaluru

The plant is equipped to manufacture:

- Lithium, Lithium calcium, Lithium complex greases
- Aluminum complex greases
- Urea greases (*First of it's kind in India*)
- Water miscible semi synthetic coolants
- Gear oils (*Synthetic /Mineral*)



Bechem India @ Bengaluru



Bechem India @ Bengaluru



Bechem India @ Bengaluru



Bechem India @ Bengaluru



Bechem India @ Bengaluru



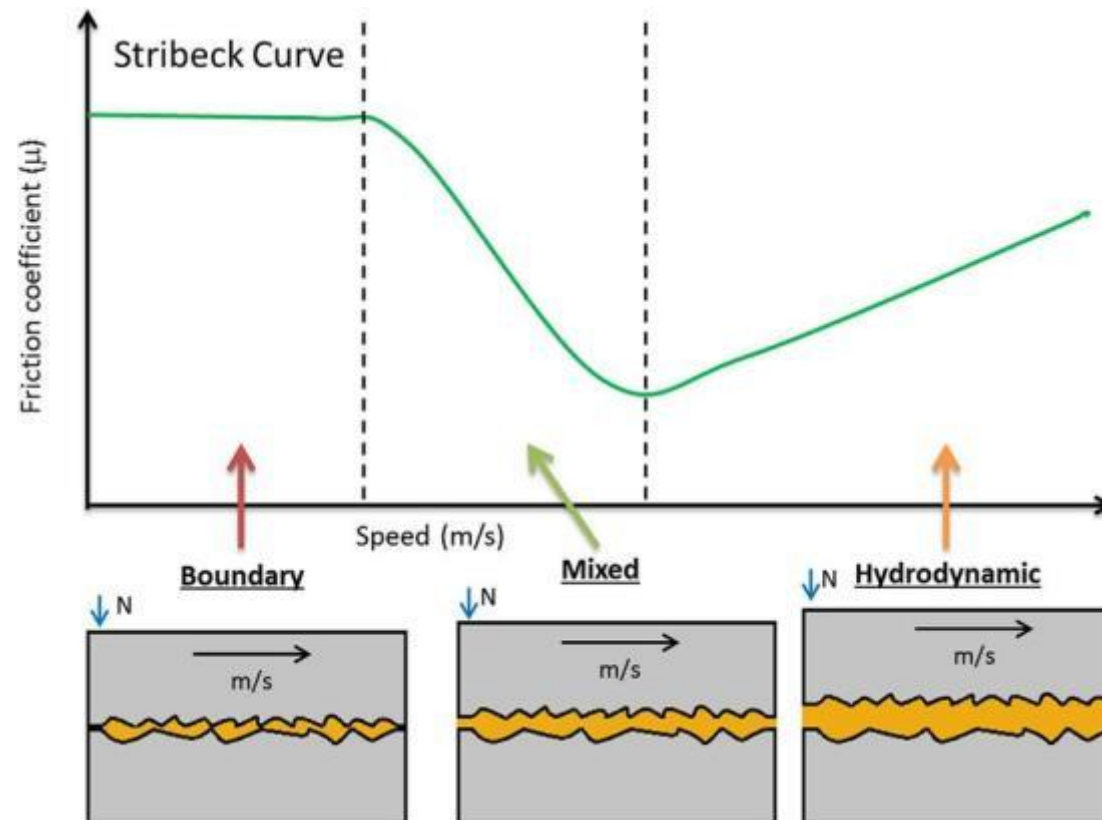
Content

- Fundamentals of lubrication
- Key test methods of greases
- Best lubrication practices
- Synthetic vs Mineral oil – advantages and limitations
- Case studies – Paper processing plants
- Important application area's in paper processing plants

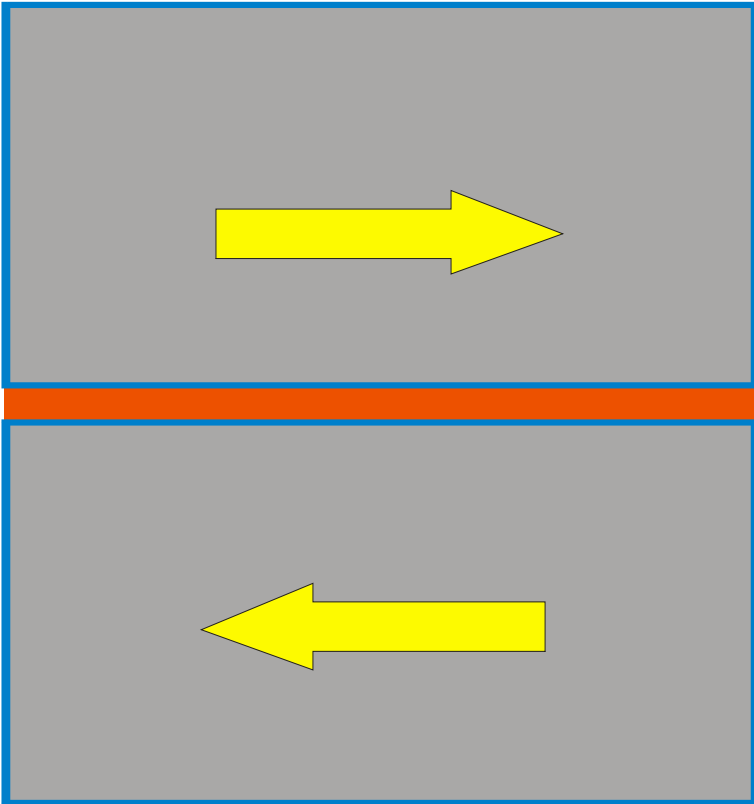


Effects of Friction

- Because we are in maintenance industry, our job is to keep **friction** as low as possible.
- Main reasons for reducing friction:
 - Material Loss – Wear.
 - Energy loss – Higher forces.



Primary task of Lubricant



- Separation of friction partners to ensure load transmission through:
 - a) Hydro dynamic lubricating film
 - b) Elasto hydro dynamic lubrication film
 - c) Additive reaction in mixed friction zone

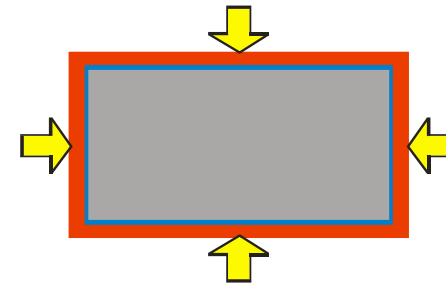
Tribology -- Secondary task of Lubricant



to seal



to cool



Corrosion protection

Fundamentals – Lubrication Options Available

Grease



Oils



Anti friction
Coatings



Lubricating paste



Fundamentals -- Grease Constituents

Thickener



Thickener ... 10 %

Base Oils



Base oil ... 85 %

Additives



Additives ... 5 %

Fundamentals -- Paste Constituents

Thickener



Thickener ... 10 %

Base Oils



Base oil ... 50 %

Solid
Lubricating
Additives



Up to 40 %

Oils – Hydraulic, gear, transmission, engine etc...



Base oil – Up to 90%



Additives



Up to 10 %

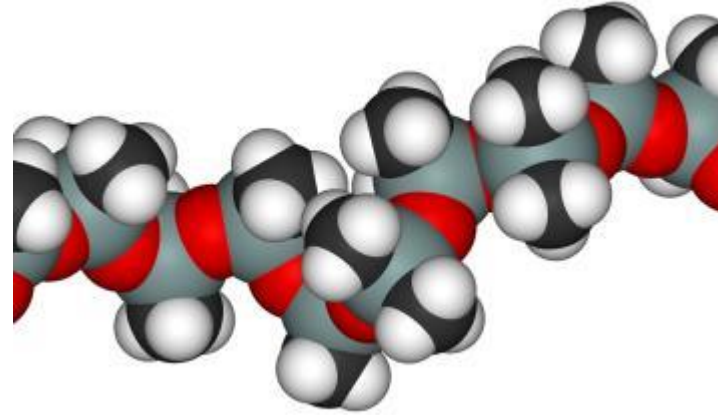
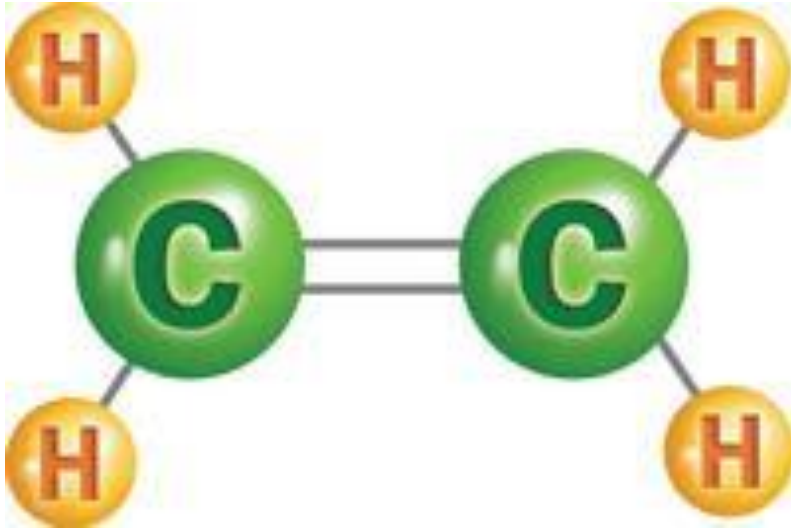
Base Oil types

Mineral Oil – From the earth



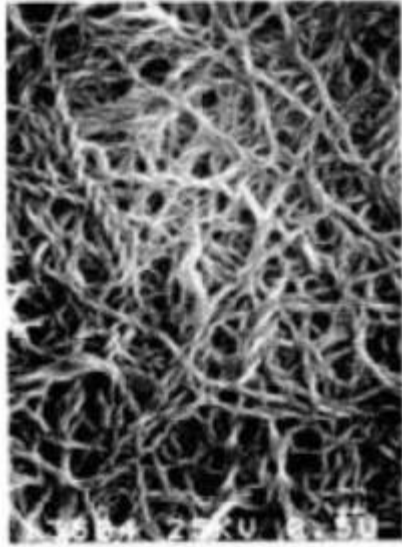
Base Oil types

Synthetic oil



Other types - Ester, Polyglycol, PFPE

Thickener types



Lithium Soap

Aluminium, Sodium, Calcium,
Barium & Complex soap
Thickeners.

Complex and non soap thickeners better for temperature and
vibration resistance.

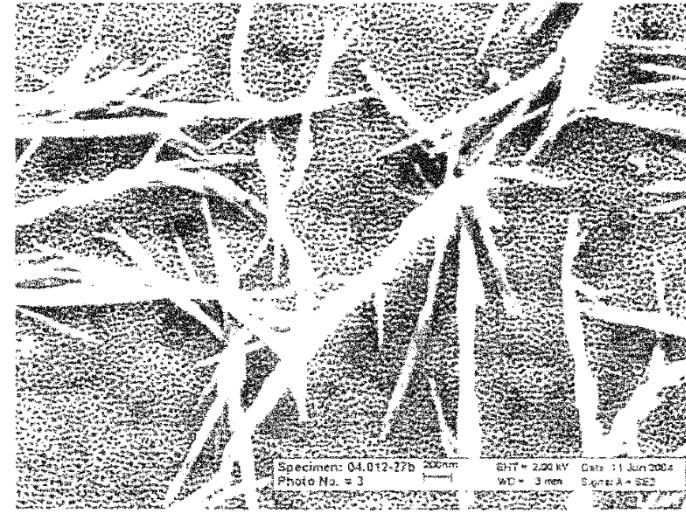


Fig. 4

Polyurea, Bentonite, Gel, PTFE.

Additives – Solid lubricants

PTFE solids



Graphite / MOS 2

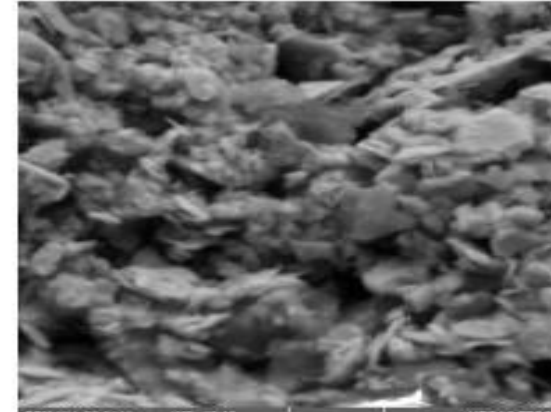


Fig 5. Molybdenum Disulphide particles on scanning electron microscope.

Grease test Methods



Grease test methods – Water Resistance

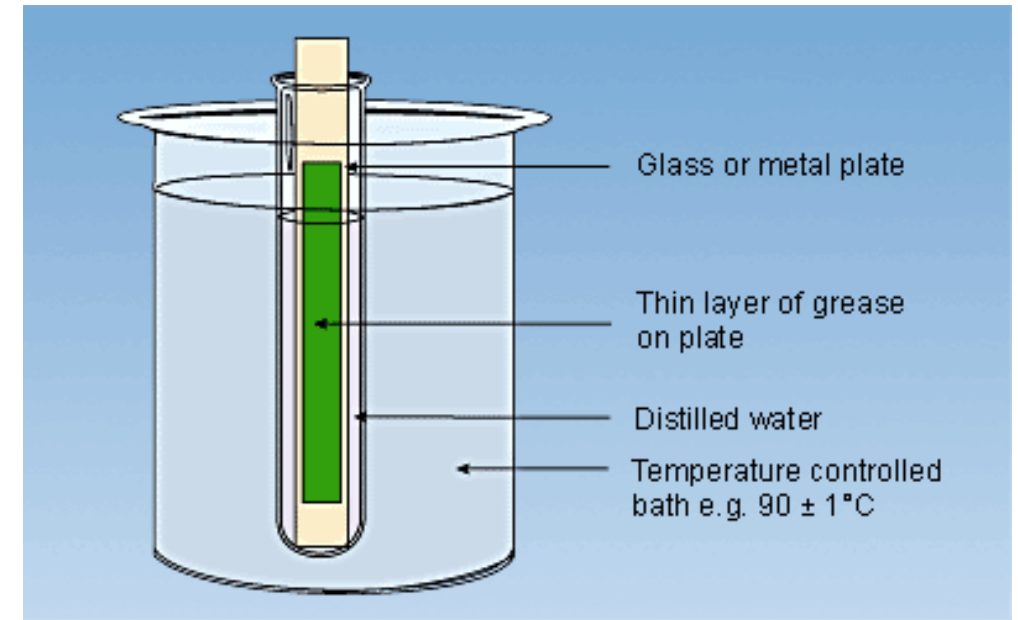
Water resistance :

To check water resistance property of the grease under static condition.

Measuring instrument : Glass strips, metal template & test tube

DIN Standard : 51807

Unit of measurement : Rating - 0, 1, 2, 3



EMCOR Corrosion test.



5 swivel bearings

Speed of shaft: 80 rpm

Grease volume / bearing: 10 g

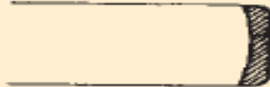
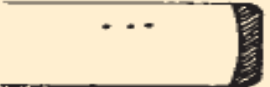
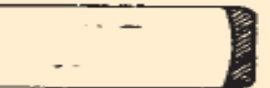
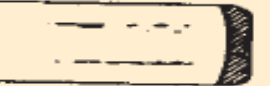
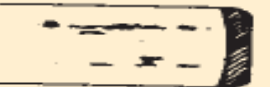
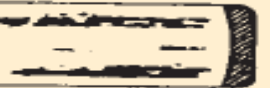
Water: 20 ml inside every bearing shell – distilled or salt water

Test cycle: 8 hrs run / 16 hrs standstill / 8hrs run / 16 hrs standstill / 8 hrs run / 108 hrs standstill

Results: visual rating from 0 (best = no corrosion) to 5 (worst = very strong corrosion)



EMCOR Corrosion test.

Corro- sion degree	Meaning		Description
0	no corrosion		unchanged
1	traces of corrosion		max. 3 corrosion spots with a diameter of max. 1 mm
2	slight corrosion		max. 1% of the surface is corroded, but more and larger corroded spots as with corrosion degree 1
3	moderate corrosion		> 1% but not more than 5% of the surface is corroded
4	strong corrosion		> 5% but not more than 10% of the surface is corroded
5	very strong corrosion		> 10% of the surface is corroded

Lubrication Excellence

Five rights in Lubrication

- **Quality of Lubricant.**
- **Time.**
- **Place.**
- **Quantity.**
- **Procedure.**



Lubrication excellence

Information to be recorded

Equipment Name
Bearing type
Bearing RPM
Bearing running temperature
Running hours per day
Vibration levels (Low / Medium / High)
Influence of external contamination. If yes, what is The type of contamination
Chances of exposure to humidity or water? If yes, please provide details
Bearing operating in chemical environment? If yes, what is the type of chemical (Acidic/ Alkaline/solvents)
Presently used grease
Quantity for initial fill
Lubrication frequency

Lubrication excellence

Information to be recorded

Quantity for top up
Greasing method
Leakage / bleeding of grease
Bearing life
Cost per bearing
Once bearing fails, time taken to replace in hours
Man power needed to replace bearing
Improvement , if any

Example – Lubrication chart

Sl.no	Bearing Locations	Bearing Nos	RPM	Qty of Grease/Bearing (Fresh Fill)(in gms)	Qty of Grease/Bearing (Re-greasing)(in Gms)
1	BOTTOM WIRE PART	23052K	175	997	208
2	BOTTOM WIRE PART	22240K	195	869	176
3	BOTTOM WIRE PART	22232 K	242	457	116
4	TOP & BOTTOM WIRE PART	22316C	412	149	49
5	TOP WIRE PART	22230 K	260	366	99
6	TOP WIRE PART	22228K	280	312	85
7	TOP WIRE PART	22228 K	280	312	85
8	1 ST PRESS	23256K	140	3225	440
9	2ND & 3RD PRESS	23272K	108	7356	754
10	1 ST & 2 ND & 3RD PRESS ROLL	22316C	412	149	49
11	PRE DRYER SECTION	23044K	206	608	153
12	PRE & POST DRYER SECTION	22318C	369	184	61
13	PRE & POST DRYER SECTION	22316C	412	149	49
14	SIZE PRESS SECTION	23248K	159	2281	352
15	POPE REEL SECTION	22230 K	260	366	99

Lubrication excellence

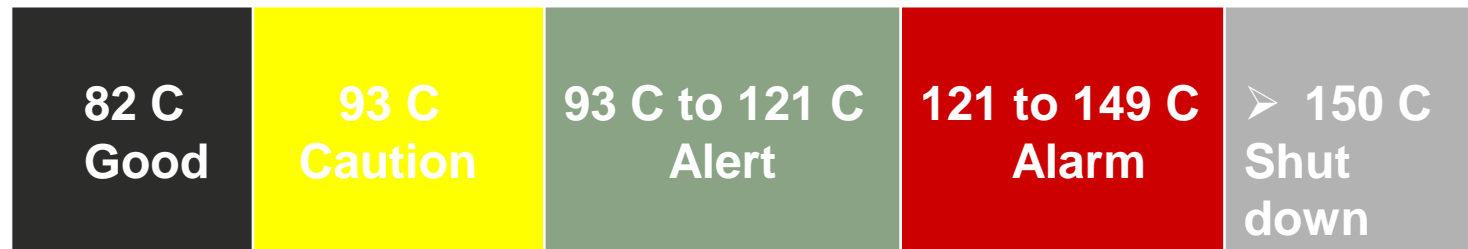
Condition monitoring -- Bearing running temperature

Measurement techniques:

- Temperature checks must be performed in the same location and preferably by the same person. Changing location of measurement itself can change temperature readings.
- Ambient temperature, Closer to where the person is standing to measure temperature, should be recorded.
- Last lubrication date should be known, which will help trend changes in temperature after re lubrication.
- Any changes in the operating conditions of the bearing like speed change, load change, equipment operating after a long shut down etc.... Should be recorded.

Lubrication Excellence

Bearing running temperatures



Lubrication Excellence

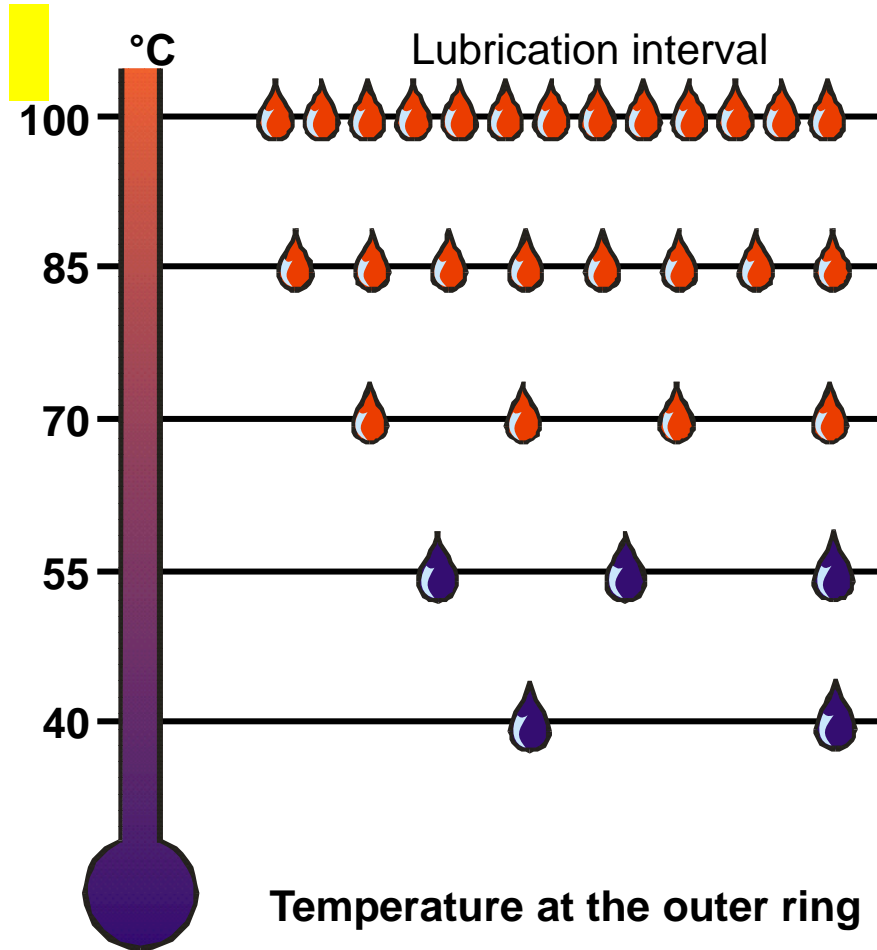
Bearing running temperature

Other information:

- Temperature of 120 C and more, calls for a C 4 clearance bearing.
- If bearing temperature crosses 150 C, it is travelling towards failure in some stage in future.
- Limit the number of startups/ shut downs of these bearings. Also frequent fluctuations in load and speed to be avoided.
- Be extremely careful with re lubrication for (Especially grease). Slightly more quantity than necessary, will further increase temperature.

Life time of greases -- 15 K Rule

Dependence of re-lubrication intervals on temperature



- above 70°C the factor 0,5 applies for each temperature rise of 15°C.

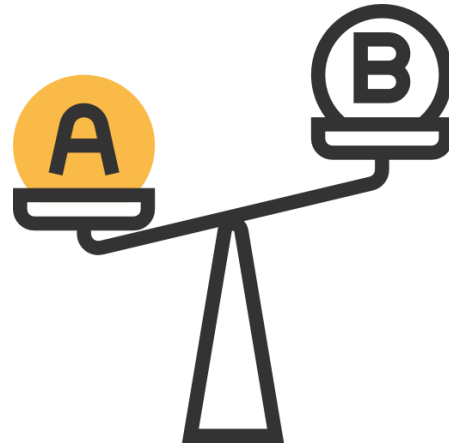
i.e. with a temperature rise from e.g. 70°C up to 85°C the service life of the grease is cut by half.

Synthetic Vs. Mineral

Why use a synthetic lubricant?

- **Advantages:**

- Cost efficiency
- Reduced maintenance and down time
- Reduced lubricant consumption
- Reduced emissions and disposal
- Drive for cost and energy savings



- **Disadvantages:**

- Higher Cost (3 to 5 times of Mineral)
- Seal Compatibility
- Solubility
 - PAO's
- High Disposal Cost

“Synthetics are problem solvers to be used where their unique properties are cost justified”

Synthetics vs Mineral

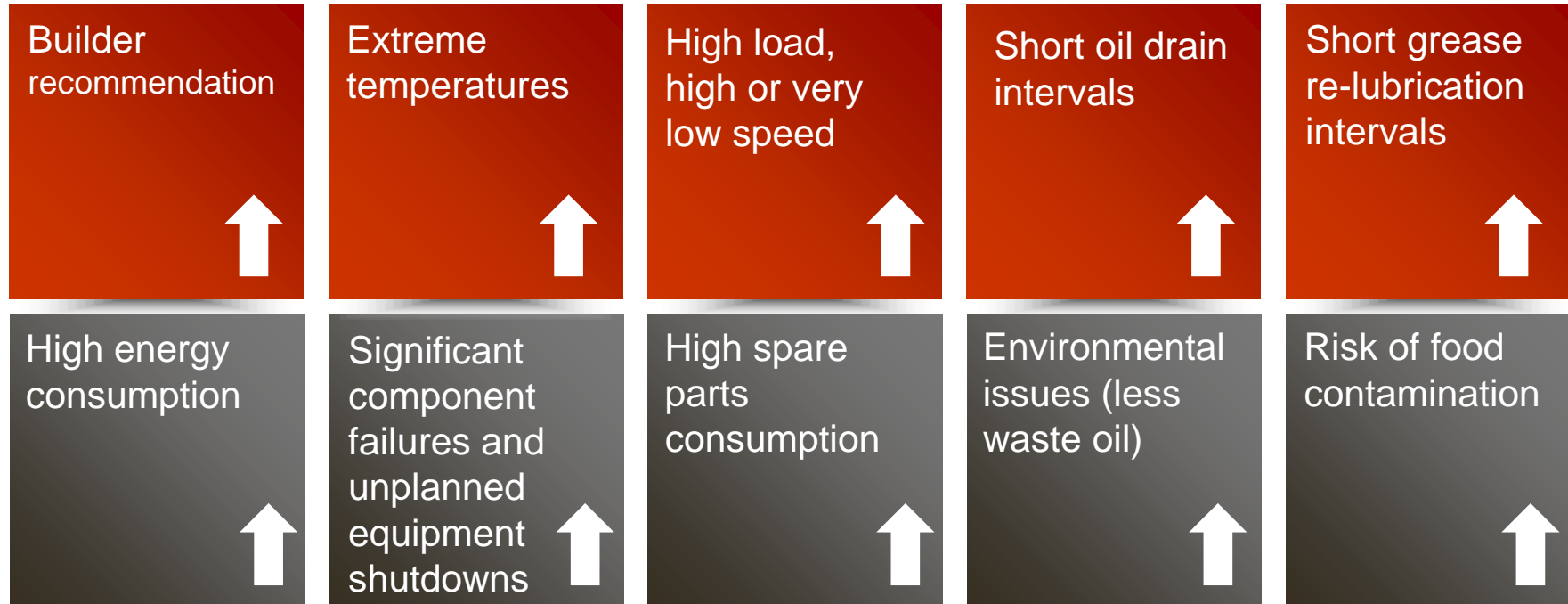
Lubricant Type	Expected Hours of Operation (OEM)
Group II	1500-2000 hours
Partial Synthetic (blended with ester)	4000 hours
PAO	8000 hours
PAG/Ester	8000 hours

“When considering which oil to use from a system/usage-based viewpoint, you’ll quickly find that *it’s not a question of synthetic vs. mineral, but of practical application and having a holistic outlook on lubrication processes that allows you, your equipment, and your oils and greases to excel*”

Air Compressor Lubricants Based on Fluid Life

Summary: Synthetic vs Mineral Lubricants

Opportunities for usage of synthetic lubricants



Case Studies – Paper plant

1. Wet End Area – Paper Machine
2. Drier gear box – Paper Machine
3. Hot air fan bearing

High lub FA 67-400

Wet End Area – Paper Machine

Application images



Press felt assembly



Application requirement

- **Machine Make : Servall**
- **Application Area : Press felt roll bearings**
- **Bearing Type : Double Row Tapper roller bearing**
- **Bearing Make/Number : TIMKEN NA 759/752 D**
- **Bearing RPM : 600 rpm**
- **Bearing Vibration : Normal**
- **Bearing Load : High**
- **Bearing Temperature : 79 Deg C**
- **No of bearings present in roll : 2 Nos (Drive and Non Drive end)**
- **Life of Bearing : Approx. 45 to 60 days**

Application requirement

- **Lubricant used : Competitor Grease**
- **Greasing Practice : Once in 15 days**
- **Machine is subjected to chemical water ingress consistently**
- **Bearing Parameters**
 - OD :161.9 mm
 - ID :88.9 mm
 - Width: 104.77mm
 - Weight : 4.1Kg
 - Number of rollers per row : 19

Problems faced by customer using a conventional grease

- Repeated Premature Bearing failures
- Unplanned maintenance activity and downtime
- Production losses
- Frequent grease lubrication with excessive consumption
- Poor water repellant properties and corrosion prevention properties

BECHEM High-Lub FA 67-400 – Grease salient features

- **Excellent water resistance property as it is Lithium - Calcium thickened grease**
- **Very good corrosion protection properties, prevents bearing from rust formation when they are exposed to water or moisture**
- **EMCOR corrosion test 0-0 for BECHEM High-Lub FA 67 400**
- **400 cSt base oil viscosity for a slower speed bearing ensures better lubricating film to be restored in the friction zone while operation**
- **Anti-wear additives ensures no wear and tear during sudden impact load/Shock loads or fluctuating loads in bearings**
- **Extreme pressure additives are present to take heavy loaded condition**
- **Ultra Purified Base oil to ensure longer life to increase the lubrication interval in bearings**

Trial Methodology

- A Separate felt roller was identified and scientifically calculated 370 grams of fresh grease was applied on bearings and that specific roller was marked for condition monitoring
- As mentioned , water ingress was consistent onto bearings which was rotating under critical conditions like high load and high rpm with nominal temperature & vibration level
- We also ensured that no grease dumping is done in housing for smoother bearing rotation during operation.
- Vibration and Temperature readings were monitored on daily basis through PLC control system of that roller
- Grease consumption was not quantified ,Hence excess lubricating practice was followed during fresh fill and also during re-greasing which will result in temperature rise
- Re-greasing quantity of 100 grams suggested technically against earlier unconventional practices of over lubrication
- A separate Gun was requested for High-Lub FA 67-400 to ensure no mixing of two greases in the trial roller

Press felt assembly



Trial results

- Repeated Premature Bearing failure's arrested . Nil Bearing failures achieved during trial period.
- Temperature reduction observed with extended re-lubrication interval of 30 days.
- Vibration pattern showed normalcy even though doubling the grease life.
- Cost savings achieved with respect to increased spare parts life and reduced downtime with its associated maintenance activity.
- Reduced inventory level as grease consumption reduced to half with calculated grease fill and also increase in grease life with extended maintenance schedule.
- Notes: All the preparatory process of paper machine involves the same criticality ,hence all the bearings subjected to chemical water ingress with load shall be used same BECHEM High-Lub FA 67 400 grease for above mentioned benefit's.
- Application examples – Wire part rollers , Mold area bearings ,Pressure screen bearings, mixers & refiner bearings etc.

Cost savings

S.No	Details	Competitor Product	Bechem Product
1	Qty of Grease for initial fill/frame	Approx. 500 grams	370 grams
2	Re-Lubrication Quantity	Approx. 150 grams	100 grams
3	Re-Lubrication Frequency	15 days once	30 days once
4	Grease cost	Rs 250 /Kg	Rs 550/Kg

- **Effective usage of man power by avoiding repeated maintenance activity schedule.**
- **Please note that spare part cost(bearing) and production loss incurred by the firm due to downtime and maintenance activity is not included in the cost saving calculation.**

Cost savings

- Fresh fill grease quantity reduced by 35% .
- Re-greasing consumption quantity reduced by 200% (i.e. 300 grams per month vs 100 grams per month)

As machine size and no of rollers varies from mill to mill .Considering the below as avg rollers for 1 machine

Machine Breast & couch rollers - 2

Wire Part rollers - 7 rollers

Pick up felt press rollers – 10 rollers

Total - 48 Bearings

So overall saving of Rs. 11,520 per annum using FA 67-400

Paper Machine – Drier gearbox

Application overview

- Application name: Drier end gearboxes
- Operation Temperature: 70-90 degrees
- Existing gear oil: Synthetic Oil – Competitor
- Oil Changing frequency: 1-2 years (Based on oil condition)



Product recommendation

Product Name: Bechem Berusynth GP 320

Base oil: PAO

Viscosity Index: 145

Service Temperatures: -35 °C to +150 °C

Flash point: ≥ 280 °C

FAG Load Stage: ≥12

Technical Product Information

Berusynth GP 68...1000

Fully synthetic extreme pressure lubricating and gear oil

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Examples of Application

- For heavy duty spur, bevel and worm gears in rolling mills, crushers, mills, calendars, cranes, conveyors and open cast mining equipment
- Oil lubricated roller bearings of vertical roller mills and roller presses
- Gears exposed to continuous operating temperatures above 100 °C
- Machinery and equipment in deep breeding plants
- Gears and circulation systems in the paper and textile industry

Properties

- Extended oil changing intervals
- Excellent wear protection
- Very high ageing resistance
- High load carrying capacity
- High viscosity index
- Excellent oxidation stability and shear resistance
- Compatible with mineral oil resistant seals and machine paints
- Miscible with mineral oil

Characteristic data

- Service temperature range:
 - Berusynth GP 68 -50 °C to +140 °C
 - Berusynth GP 150 to GP 460 -35 °C to +150 °C
 - Berusynth GP 1000 -25 °C to +180 °C
- Appearance: clear, colourless to yellowish

Berusynth		DN 515173 Density 15 °C [g/cm³] DN 515157	Kin. viscosity 40 °C DN 51562 [mm²/s]	Kin. viscosity 100 °C DN 51562 [mm²/s]	Viscosity index, DN ISO 2268	Flash point, °C DN ISO 2592	Pourpoint, °C DN ISO 3016	FZG A/8-9/80-M DN ISO 14056-1 load stage	wear [mg/kWh]
GP 68	CLP HC	0.84	67	11	155	≥ 275	-60	≥ 12	
GP 150	CLP HC	0.84	143	19	155	≥ 265	-45	≥ 12	≤ 0.2
GP 220	CLP HC	0.85	236	26	145	≥ 250	-42	≥ 12	≤ 0.2
GP 320	CLP HC	0.85	316	33	145	≥ 280	-40	≥ 12	≤ 0.2
GP 460	CLP HC	0.86	440	44	155	≥ 245	-39	≥ 12	≤ 0.2
GP 1000	CLP HC	0.86	1067	85	165	≥ 250	-27	≥ 12	≤ 0.2

Lubrication Solutions for Industry
BECHEM develops, produces and sells high performance lubricants and process media all over the world. The product range covers the fields of special lubricants, lubricants for industry and lubricants for metal working and forming technology. All product formulations are based on latest tribological knowledge.

Trial initiation



Trial was done in 4 drier end gearboxes at Paper machine on May 2018.

Trial monitoring

- Trial was monitored periodically and recorded such as temperature of the gearbox housing , Vibration analysis, oil viscosity testing etc.
- No change of oil color after 6 months of operation



Vibration readings

DP-24		DATE >	8/10/01.18	19/24/02.18	24/28/03.18	15/19/04.18	11/05.18	30.06.18	22.07.18	20.08.18	02.09.18	29.10.18	26.11.18	27.12.18	29.01.19	24.02.19	22.03.19	18.04.19	20.05.19
GB I/P DE	11.2	H	0.4	1.1	0.6	0.7	0.5	0.5	0.5	0.7	0.8	0.5	1.0	0.5	0.6	0.4	0.6	0.6	0.5
		V	0.5	0.6	0.7	0.4	0.5	0.7	0.4	0.5	0.6	0.4	0.5	0.6	0.4	0.5	0.5	0.5	0.4
		A	0.8	0.8	0.9	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP
		H	0.4	1.2	0.7	0.5	0.8	0.7	0.6	0.8	0.5	0.3	0.9	0.5	0.8	0.4	0.7	0.5	0.4
		V	0.3	0.8	0.5	0.6	0.6	0.6	0.5	0.6	0.4	0.5	0.7	0.5	0.6	0.3	0.6	0.6	0.8
		A	0.6	0.4	0.7	0.8	1.0	0.9	0.8	1.1	0.6	0.4	0.7	0.8	0.5	0.6	0.5	0.7	0.5
GB O/P DE		H	0.3	0.8	0.5	1.6	1.4	1.2	1.0	1.4	0.9	0.6	0.6	0.7	0.9	0.4	0.6	0.6	0.6
		V	0.3	1.1	1.0	0.8	0.9	1.1	0.6	1.2	0.5	0.4	0.9	0.6	0.7	0.3	0.5	0.7	0.7
		A	0.6	0.6	0.9	1.0	1.9	1.5	1.5	1.4	1.2	0.8	0.5	0.6	0.4	0.4	0.6	0.8	
		H	0.4	0.4	0.5	0.5	0.9	1.0	0.8	1.1	0.9	1.0	0.7	1.0	0.4	0.5	0.5	0.8	
		V	0.3	0.5	0.2	0.9	0.7	0.8	0.6	0.6	0.5	0.7	0.5	0.6	0.6	0.3	0.6	0.4	0.5
		A	0.5	0.4	0.3	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP
DP-25		DATE >	8/10/01.18	19/24/02.18	24/28/03.18	15/19/04.18	11/05.18	30.06.18	22.07.18	20.08.18	02.09.18	29.10.18	26.11.18	27.12.18	29.01.19	24.02.19	22.03.19	18.04.19	20.05.19
GB I/P DE	11.2	H	0.8	1.1	0.9	0.5	0.7	1.0	1.2	1.2	1.0	0.9	1.4	0.9	1.6	0.8	1.6	0.9	0.9
		V	0.6	0.8	0.7	0.8	0.9	0.6	0.6	0.5	0.8	0.6	1.0	0.7	1.0	0.3	1.2	1.0	0.9
		A	1.1	0.9	1.2	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP
		H	0.7	0.8	0.6	0.6	0.7	0.6	0.8	0.7	0.9	0.5	1.0	0.6	1.2	0.3	1.0	0.9	0.7
		V	0.8	1.1	1.0	0.5	0.6	0.8	0.6	0.6	0.7	0.4	0.8	0.5	1.4	0.4	0.9	0.8	0.7
		A	0.9	0.6	0.7	0.7	0.5	0.5	0.5	1.0	0.5	0.6	0.7	0.7	1.3	0.5	1.4	0.7	0.6
GB O/P DE		H	0.7	0.8	0.6	0.5	0.7	0.9	0.8	0.8	0.6	0.3	0.9	0.6	1.0	0.5	1.0	0.6	0.8
		V	0.6	0.9	0.5	0.4	0.4	0.7	0.5	0.5	0.4	0.4	0.7	0.4	0.9	0.8	0.8	0.8	0.7
		A	0.8	0.7	0.6	1.1	0.6	0.6	0.6	0.7	0.9	0.5	0.6	0.8	1.1	0.8	0.9	0.7	0.9
		H	0.5	0.8	0.7	0.6	0.7	0.5	0.7	0.6	0.8	0.5	0.8	0.6	1.0	0.7	0.6	0.8	0.5
		V	0.4	1.1	0.6	0.5	0.6	0.7	0.5	0.9	0.6	0.4	0.6	0.5	0.9	0.9	0.6	0.6	0.4
		A	0.8	0.6	0.7	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP
DP-26		DATE >	8/10/01.18	19/24/02.18	24/28/03.18	15/19/04.18	11/05.18	30.06.18	22.07.18	20.08.18	02.09.18	29.10.18	26.11.18	27.12.18	29.01.19	24.02.19	22.03.19	18.04.19	20.05.19
GB I/P DE	11.2	H	1.1	1.2	1.3	0.4	1.0	1.5	1.7	1.6	1.4	1.2	1.9	1.0	1.6	0.8	1.9	1.2	1.1
		V	0.6	1.3	1.1	1.6	1.7	1.2	1.4	1.4	1.3	1.1	1.5	0.9	1.5	0.5	1.4	0.8	0.9
		A	1.2	0.8	1.0	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP
		H	1.1	1.3	1.2	0.8	1.0	1.1	1.2	1.2	1.4	1.0	1.4	1.1	1.4	0.9	1.4	1.3	1.2
		V	0.6	0.8	0.9	0.9	0.7	1.0	0.9	1.1	1.0	1.3	1.0	0.7	1.0	0.5	1.0	1.0	0.9
		A	0.9	1.3	1.1	1.4	1.6	1.7	1.5	1.4	1.5	1.5	1.4	1.2	1.7	0.7	1.2	1.0	0.9
GB O/P DE		H	0.8	0.8	0.9	0.9	1.0	1.1	1.0	1.2	1.2	1.1	1.2	0.9	1.0	0.7	1.0	0.9	0.8
		V	0.3	0.6	0.7	1.9	0.6	0.9	0.7	1.1	0.9	0.7	1.0	1.2	1.9	0.6	0.9	0.8	0.7
		A	1.2	0.8	0.5	1.8	1.1	1.2	1.2	0.7	1.1	1.3	0.8	1.3	1.4	0.8	0.8	0.6	0.5
		H	0.6	0.6	0.4	1.0	1.0	1.0	0.9	1.2	1.2	1.0	1.0	0.9	1.0	0.7	0.9	0.8	0.7
		V	0.4	0.8	0.6	0.9	0.7	0.9	1.0	1.1	0.9	0.6	0.8	1.3	0.8	0.9	0.7	0.7	0.6
		A	1.1	0.6	0.4	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP
DP-27		DATE >	8/10/01.18	19/24/02.18	24/28/03.18	15/19/04.18	11/05.18	30.06.18	22.07.18	20.08.18	02.09.18	29.10.18	26.11.18	27.12.18	29.01.19	24.02.19	22.03.19	18.04.19	20.05.19
GB I/P DE	11.2	H	0.3	1.1	1.2	0.4	0.8	0.9	0.9	0.6	1.2	1.0	1.0	0.6	0.8	0.5	1.0	0.9	0.8
		V	0.4	0.9	1.0	0.2	0.6	0.8	0.8	0.5	0.8	0.5	0.8	0.6	0.7	0.3	0.6	0.6	0.5
		A	0.3	0.5	0.6	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP
		H	0.4	0.6	0.5	0.2	0.5	0.7	0.8	0.7	0.9	0.6	0.9	0.7	0.5	0.6	0.5	0.9	0.8
		V	0.5	0.7	0.8	0.3	0.6	0.9	0.7	0.9	0.6	0.8	0.7	0.5	0.6	0.5	0.6	0.9	0.8
		A	0.3	0.8	0.5	0.4	0.9	0.6	0.6	0.7	0.4	0.4	0.6	0.8	0.8	0.8	1.4	1.3	1.1
GB O/P DE		H	0.4	0.8	0.6	0.4	0.6	0.6	0.5	0.8	0.5	0.3	0.5	0.6	0.6	0.4	1.0	1.0	0.9
		V	0.3	0.6	0.4	0.4	0.5	0.5	0.7	0.5	0.4	0.5	0.6	0.4	0.5	0.3	0.7	0.9	0.8
		A	0.4	0.5	0.3	0.6	0.8	0.9	0.9	0.6	0.9	0.4	0.8	0.5	0.6	0.6	0.9	0.8	0.7
		H	0.5	0.4	0.2	0.4	0.7	0.8	0.6	0.6	1.0	0.8	0.5	0.6	0.6	0.5	1.0	0.7	0.6
		V	0.4	0.5	0.3	0.4	0.6	0.5	0.5	0.4	0.6	0.5	0.6	0.4	0.5	0.7	0.4	0.9	0.8
		A	0.3	0.6	0.5	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP

Earlier readings

After using Berusynth GP 320

Oil analysis

CARL BECHEM LUBRICANTS (INDIA) PRIVATE LIMITED, Bangalore.



Date: 09.07.2019

Analysis Report

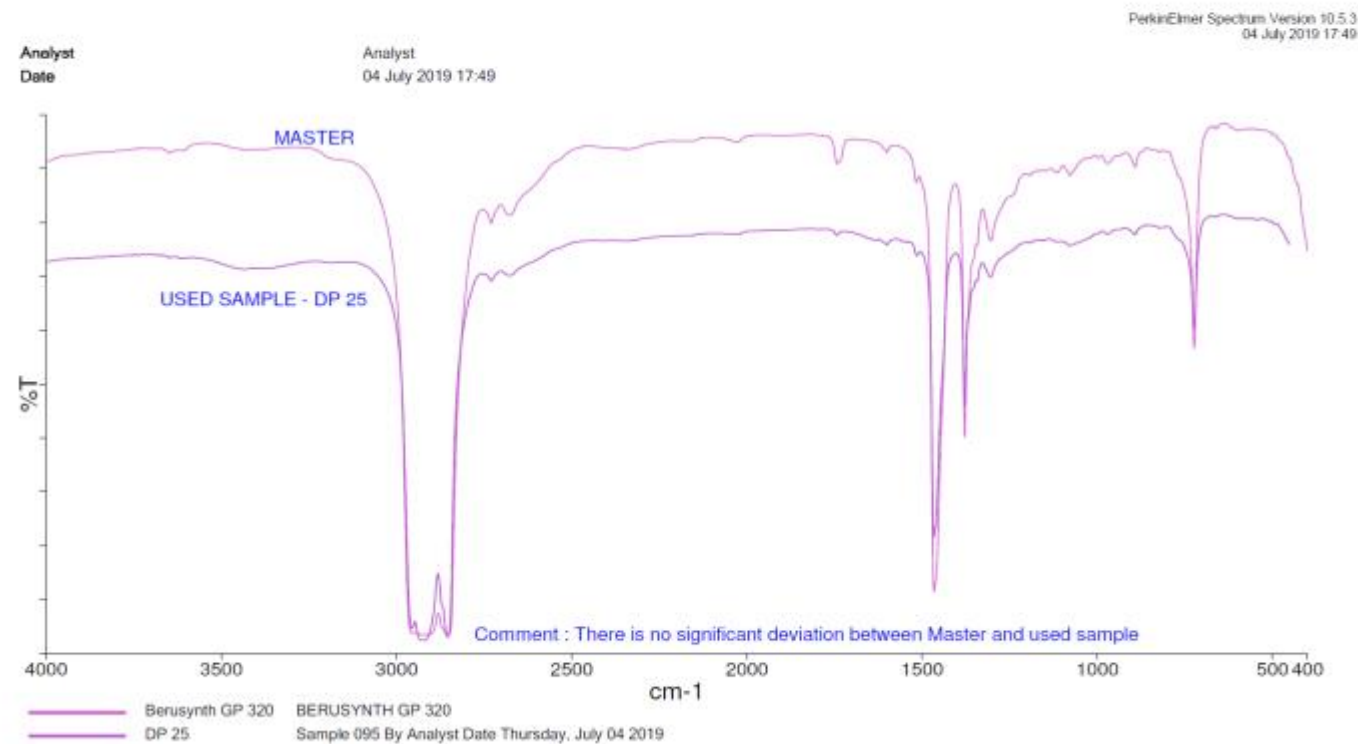
Customer Name :
Sample Name : Bechem Berusynth GP 320 (Used Oil) - DP 25
Sample Qty : Approx 250 ml
Ref No : MKT -2653 /2019

Sl No	Test parameters	Bechem Berusynth GP 320 (Used Oil) - DP 25
1	Appearance	Yellow colour clear viscous liquid
2	Viscosity @ 40 Deg C, cSt	351.1
3	IR	Ref PDF

Analysed by

A handwritten signature in black ink, appearing to read "S. S. Srinivasan".

Oil analysis



Conclusion

- No major variation found in the temperatures & vibration reading from earlier product.
- Very slight color change ever after 24 months of continuous operation showcasing exceptional oxidation stability of the oil.
- Clearly evident from the lab reports, Oil viscosity was still intact ever after 1 year of continuous operation.
- Bechem Berusynth GP 320 is used successfully for 2 years 6 months without oil changing.



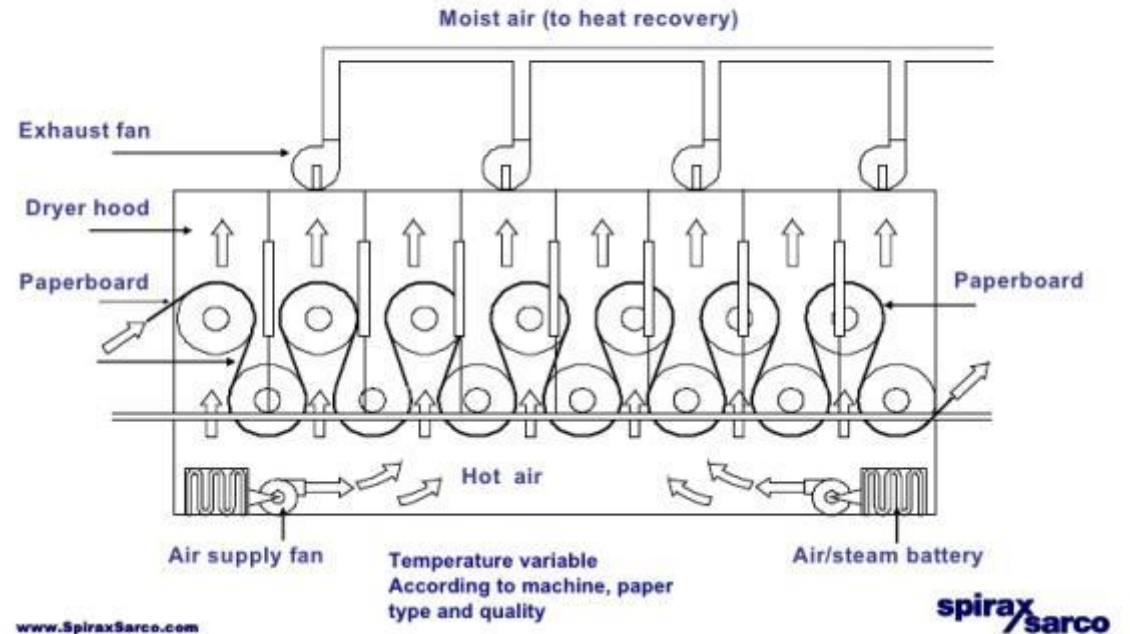
Hot air fan bearing – Berutox FB 22

Hot air fan at paper machine

There are total of 9 hot air fans at one of the paper machine

1. Pre MG Supply fan
2. Post MG Supply fan
3. Post Size Press Supply fan
4. Back coat supply fan
5. Pre coat supply fan
6. Pre coat exhaust fan
7. Back coat supply fan
8. Top coat supply fan
9. IR Dryer supply fan

Dryer section air systems



Application details:

- Application : Back coat supply fan
- Bearing Number: 22220 CK
- Bearing temperature:
 - DE: 64 Degrees
 - NDE: 90 Degrees
- RPM: 2870
- Earlier used grease: Competition PTFE Grease
- Quantity of grease used per Bearing: 200gms (Approx.)
- Lubrication Interval: every 7 days
- Problems: Grease was dripping from the bearing & frequent Bearing failures due to abnormal raise in bearing temperatures



Back coat supply fan

Application study

- Detailed application study was conducted for the application and it was identified that the abnormal raise in the plumber block bearings was majorly due to lubrication failure.
- Details technical proposal was submitted to customer with Bechem product recommendation and exact quantity of grease to be used for complete fill and for re-lubrication.
- Convinced customer for conducting trial in one of the critical fan bearings with Bechem Berutox FB 22.



Earlier temperature readings

S.NO	EQUIPMENT NAME	TAG NO	DATE: 04/05/2016		DATE: 07/06/2016		DATE: 02/07/2016		DATE: 03/08/2016		DATE: 03/09/2016		DATE: 05/10/2016	
			DS	NDS	DS	NDS	DS	NDS	DS	NDS	DS	NDS	DS	NDS
1	VACCUME FAN 1	103-F-001	120	75	62	60	52	94	49	52	54	55	62	63
2	VACCUME FAN 2	103-F-002	119	118	65	46	52	82	44	34	53	81	66	48
3	VACCUME FAN 3	103-F-003	55	119	98	97	91	89	82	78	90	87	61	93
4	PRE MG SUPPLY FAN-1	106-F-002	68	88	61	71	64	64	58	69	56	73	69	77
5	PRE MG SUPPLY FAN-2	106-F-004	87	78	58	54	54	50	65	68	68	69	76	86
6	POST MG SUPPLY FAN-1	106-F-006	54	62	52	62	44	53	45	50	61	61	73	71
7	POST SP SUPPLY FAN-2	106-F-008	54	60	52	61	48	57	48	55	65	75	70	75
8	PRE COAT EXHUAFT FAN	106-F-010	NR	NR	50	48	48	45	43	41	49	45	53	51
9	PRE COAT SUPPLY FAN	106-F-011	NR	NR	57	85	100	109	90	97	92	106	102	113
10	BACK COAT EXHUAFT FAN	106-F-013	NR	NR	51	46	47	43	39	37	39	39	49	48
11	BACK COAT SUPPLY FAN	106-F-012	NR	NR	68	99	97	102	56	94	98	102	66	402
12	TOP COAT SUPPLY FAN	106-F-014	NR	NR	83	62	94	88	85	85	88	85	98	98
13	TOP COAT EXHUAFT FAN	106-F-015	NR	NR	56	52	58	55	51	46	54	48	63	60
14	IR DRYER SUPPLU FAN		NR	NR	88	78	88	85	50	79	90	86	95	93
15	BACK COAT SUPPLY FAN(NEW)	106-F-012A	NR	NR	63	59	82	73	65	62	70	77	93	72
16	BACK COAT EXHUAFT FAN(NEW)	106-F-013A	NR	NR	52	64	70	71	50	58	60	68	65	72

Trial with Berutox FB 22



2 New bearings both for drive end and non-drive end of the shaft were used for trial and Exact quantity of 42gms of FB 22 grease was measured for fresh fill of the bearing.

Trial procedure

- Now the grease is applied manually on to the bearing to ensure all the rollers are lubricated properly.
- Both Drive end and Non-drive end Bearings are lubricated with FB 22 Grease properly ensuring grease is passed between the gaps of each roller from both ends of the bearing.



Trial monitoring

DATE	TIME	106-F-014 - TOP COAT SUPPLY FAN		106-F-012 - BACK COAT SUPPLY FAN		106-F-011 - PRE COAT SUPPLY FAN		106-F-012A - BACK COAT NEW SUPPLY FAN	
		NDS	DS	NDS	DS	NDS	DS	NDS	DS
26/1/17	4:30pm	80°C	80°C	58°C	58°C	69°C	63°C	—	—
27/1/17	9am	70°C	92°C	58°C	50°C	70°C	68°C	68°C	84°C
28/1/17	8:40am	94°C	97°C	54°C	48°C	77°C	92°C	—	—
29/1/17	10:45am	99	98	62	53	104	69	70	101
30/1/17	9am	90°C	90°C	50°C	45°C	76°C	81°C	60°C	75°C
31/1/17	9am	90°C	90°C	51°C	45°C	95°C	76°C	59°C	96°C
1/2/17	9am	84°C	87°C	53°C	45°C	96°C	73°C	60°C	91°C
2/2/17	9:30am	88°C	86°C	52°C	46°C	93°C	76°C	61°C	91°C
3/2/17	9am	83°C	84°C	51°C	46°C	90°C	57°C	61°C	91°C
6/2/17	10:00am	84°C	87°C	51°C	45°C	94°C	58°C	66°C	92°C
8/2/17	12:15pm	108°C	110°C	67°C	60°C	118°C	100°C	74°C	112°C
10/2/17	9:30am	96°C	89°C	51°C	45°C	103°C	80°C	64°C	90°C
11/2/17	9:30am	92°C	90°C	51°C	45°C	102°C	76°C	61°C	93°C
14/2/17	9:15am	53°C	52°C	57°C	50°C	108°C	102°C	66°C	60°C
Temp after changing bearing grease to Berutox FB 22									

Trial was closely monitored by the customer by collecting the temperatures every 3 hours for a period of 15 days

Conclusion

- After using Berutox FB 22 Customer found that there was a huge reduction in bearing temperatures and also the lubrication interval increases from 7 days to 45 days without any bearing failures.
- Berutox FB 22 has replaced their presently used competition PTFE grease by reducing the consumption from 200gms to 42gms per bearing
- By improving the re-lubrication interval and reducing cost incurred in downtime due to bearing failure which justified the cost of FB 22 approx. 4.5 times presently used grease.
- Now 9 out of 9 fans run on Berutox FB 22 grease.

Important Application Area's in Paper processing plant

Wood Preparation

Application examples: Conveyor rolls, Bark Crusher, Disc chipper

- Dusty
- Shock loads
- Open air
- Water ingress



Pulp Preparation

Application examples: Pulp press bearings; Suction Press roll bearing

- Very low speed
- Heavy loaded
- Chemical fumes
- Open air
- Exposed to water and hot steam



Recovery plant

Open gear drives, Pinion bearing and live ring/tyre of the kiln:

- High load
- Corrosive environment, Dust
- Slow speed



Paper Machine

Wire press bearings:

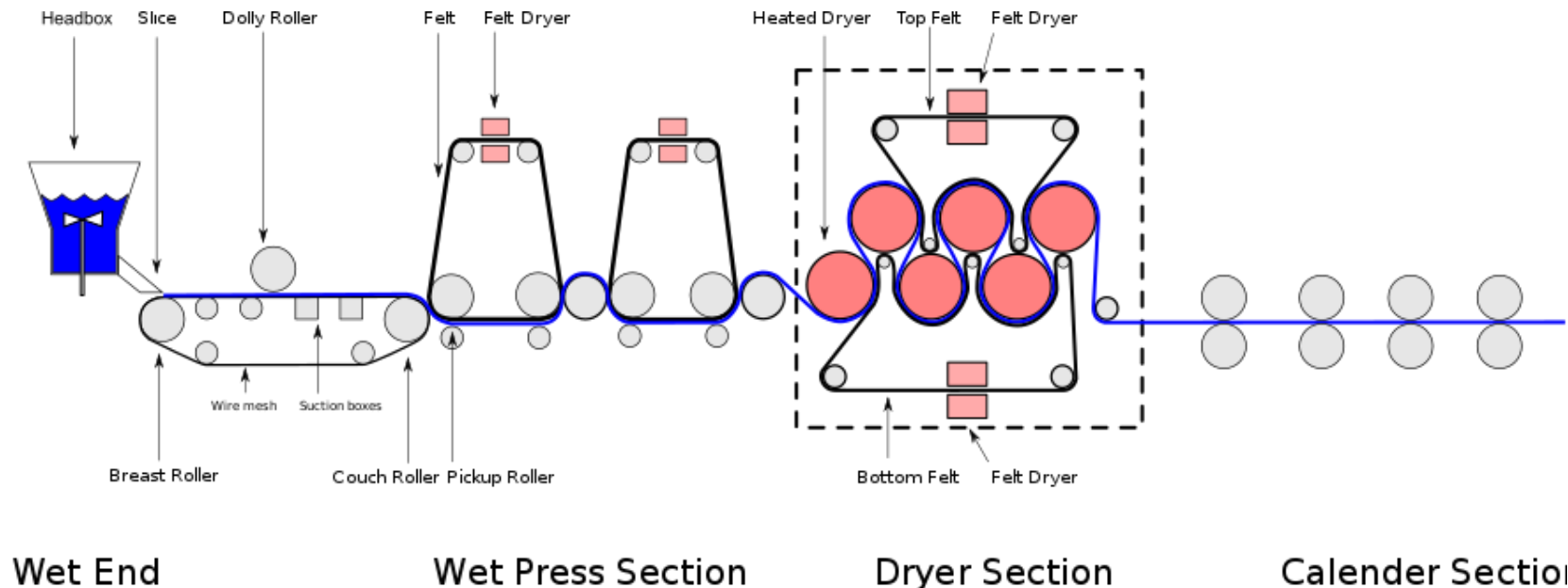
(High load, presence of water, low speed)

Drier bearings:

(High load, steam and high temp)

Hot Air Fan bearings:

(high speed, high temp)



Any questions?



Thank You!

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