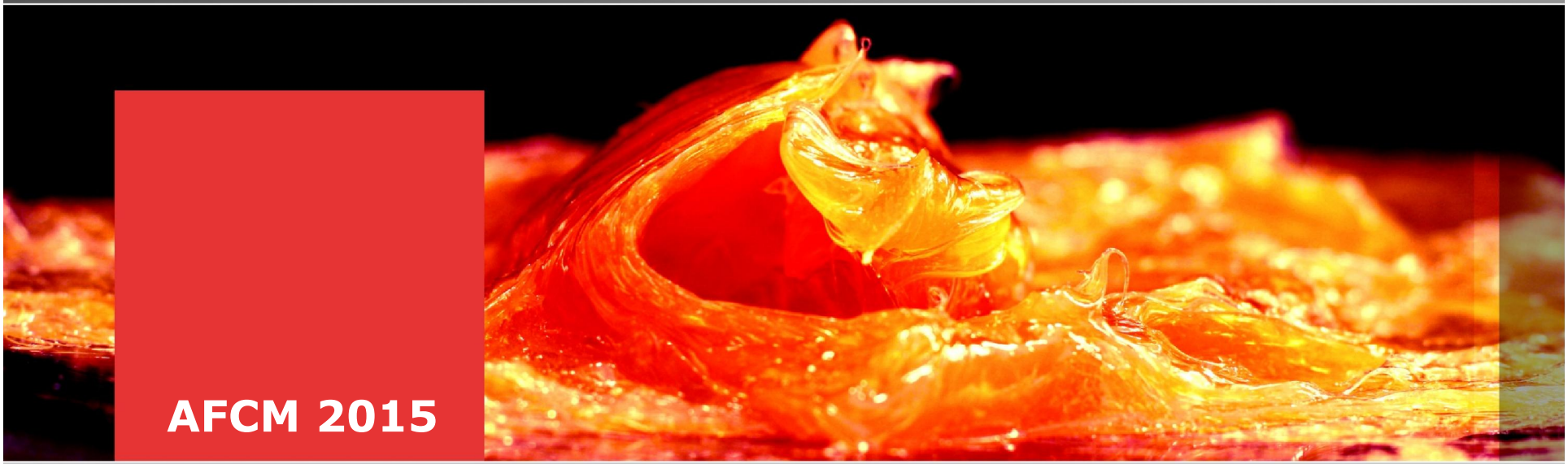

AFCM 2015

The New Evolution in Open Gear Lubrication

The new CEPLATTYN GT Range

A Member of the FUCHS PETROLUB Group

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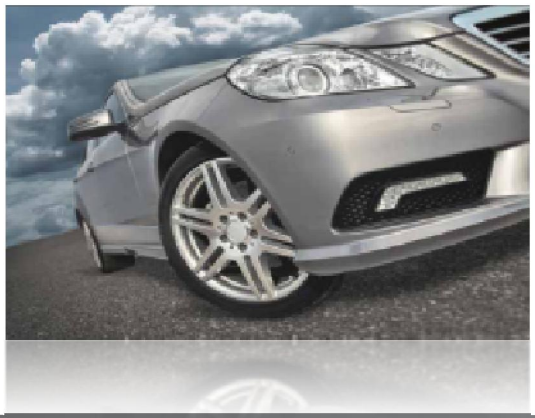
FUCHS LUBRITECH a member of the FUCHS PETROLUB SE

FUCHS PETROLUB SE – Holding

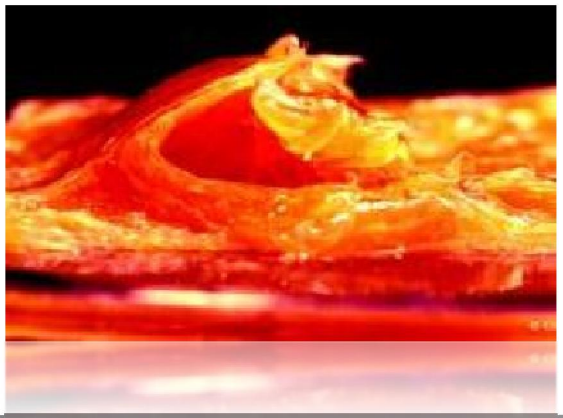
- Founded in 1931 by Rudolf Fuchs in Mannheim
- Global company with about 60 operating companies
- Revenue generated 1.832 Mio. € (2013)
- Employs more than 3,888 employees (2013)
- Largest independent manufacturer of lubricants and specialties in the world
- Leader in innovation, specialization and customer service

FUCHS Industrial

FUCHS Automotive



FUCHS LUBRITECH Specialty Lubricants



Company Profile of the FUCHS LUBRITECH Group

- Headquartered in Kaiserslautern, Germany.
- Further subsidiaries, locations and divisions in Germany, UK, France, Asia Pacific, Australia, Brazil, China, India, Japan and the United States.
- Represented in over 60 countries through sales partners.
- Employs more than 500 people.

FUCHS LUBRITECH globally present

Our research and development: leading the way!

- Every 10th employee is engaged in research and development
- Developments are individual and customer-related
- All products are developed and tested using the latest laboratory and testing equipment

Development of FUCHS LUBRITECH since 1951

1951

Formation of Hans Reiner KG

2013

Intro-duction of the new company logo

Focused on your industrial applications and industries

Construction Industry

Food & Beverage Industry

Railway

Cement Industry

Power Industry

Precious Metal Mining

Renewable Energy

Steel & Forging Industry

Auto supplier Industry

Traditional Open Gear Lubricants

Traditional Open Gear Lubricants all have certain advantages and / or restrictions for use on rotating equipment of Kilns and Mill Open-Gears and these can be categorised into 3 different groups:

- **Brown coloured asphaltic products –** relatively easy to apply as they contain solvents however after evaporation of the solvent, these products can solidify in the gear root.

- **Black greases –** Easy application and contain protective "lubricating solids" such as graphite however have the disadvantage of being non transparent and poor draining characteristics unless the lower gear guard design promotes flow.

- **High viscosity fluid type lubricants –** Have good draining characteristics and clear transparent colour but contain no protective boundary solids or high retention qualities on contact surfaces during equipment shut down periods.

Performance Features
Comparison of Today's Lubricants

Feature	Asphaltics	Fluids	Graphited Greases
Sprayability	+	+	++
Pumpability	+	+	++
Wear + Damage Protection	+	+	++
Drainability	+	++	-
Clean appeareance	-	++	-
Suitability for Kilns	-	-	++
Dry-running Properties	-	-	++
Pinion application	-	+	++
Rating	4	8	12

The Challenge

The challenge for FUCHS LUBRITECH was to combine all advantages and exclude the disadvantages of today‘s Open Gear lubricants.

The CEPLATTYN GT range combines all benefits of commonly used graphited products and high-viscosity fluids.

CEPLATTYN GT10 is free of asphaltics and dilutants, providing excellant drainability while containing protective boundary layer solids.

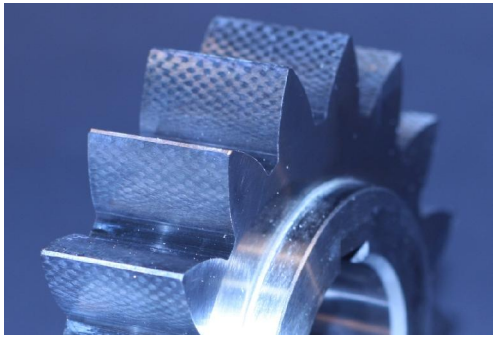
The first genuine open gear lubricant suitable for all open gear application methods.

Performance Features of CEPLATTYN GT for Spray, Bath and Circulation Systems

- Spray application ➔ good spray pattern across a wide temperature range
- Bath lubrication ➔ good back-flow to gear mesh
  ➔ low evaporation (kilns)
- Circulation application ➔ good pumpability/strainability

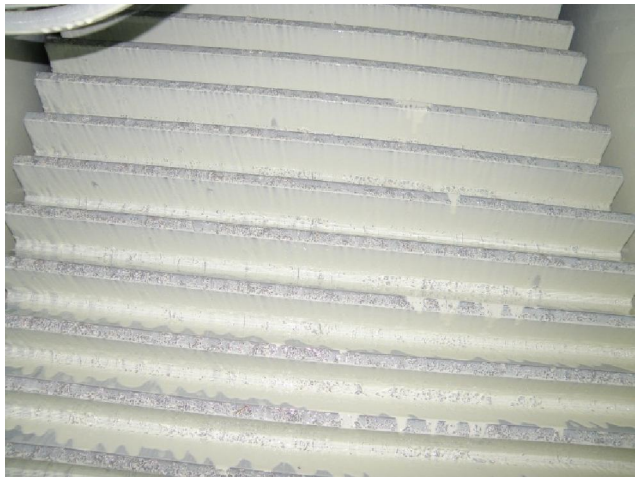
PERFORMANCE FEATURES - CEPLATTYN GT 10

High-viscosity oil	Hydrodynamic lubricant layer.
White solid lubricants	Optimum protection during boundary conditions.
Flame-retarding additives	Isolation from surrounding oxygen No self ignition on hot kilns etc.
Lower consumption	25% reduction possible on conventional fluids.
Improved gear parameters	Lower gear related vibration.



Test gear after DIN wear test / no wear / manufacturing marks still visible

Performance features - CEPLATTYN GT10

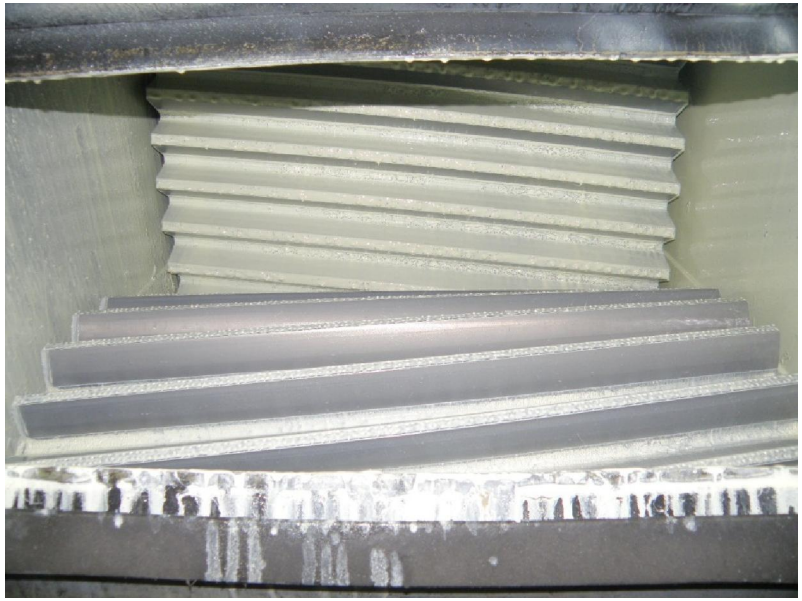


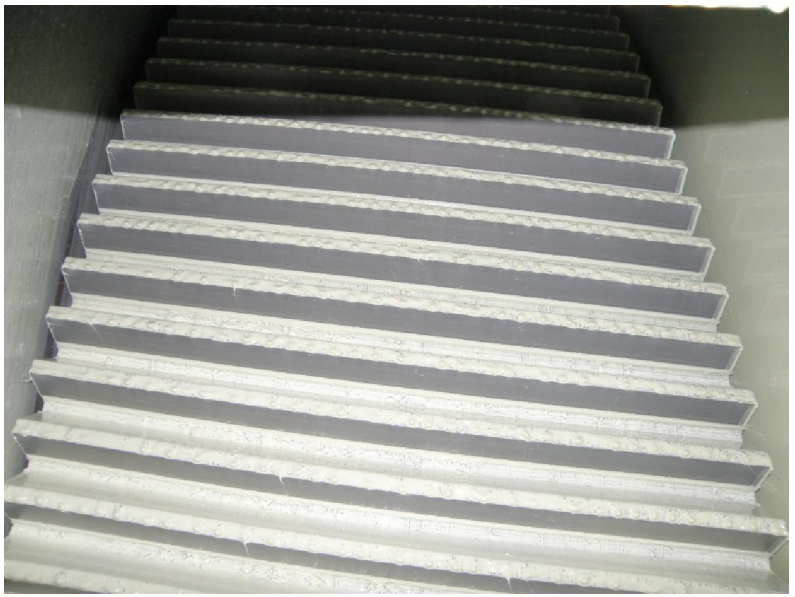
Lubricant static gear retention during machine shutdown.

Due to the Thixotropic nature of the CEPLATTYN GT10 we achieve

Extreme retention times	→	Lubricant film stays on tooth flank during long shutdown
Enhanced sealing	→	Reduced leakage from guard
Application and waste flow	→	Good pumpability / flow

Semi transparent solid film





Operational conditions of CEPLATTYN GT10 during Australian trials at Savage River

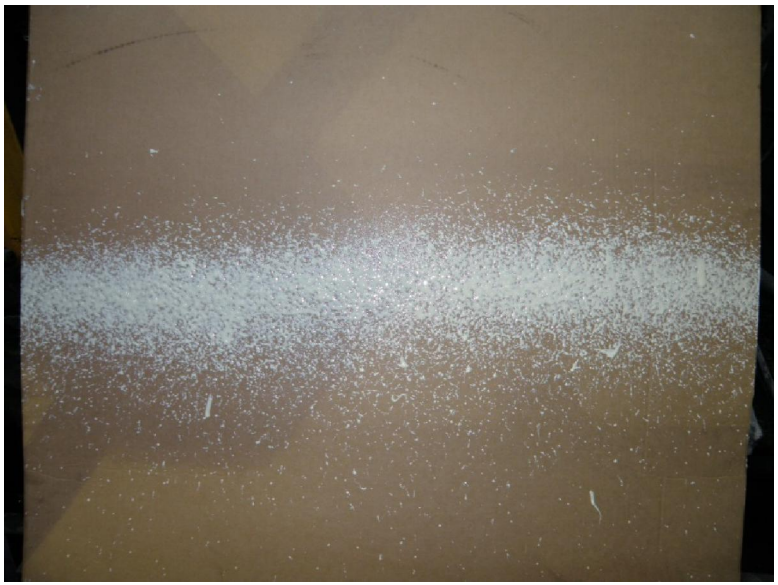
Following successful testing, Savage River mine now utilises CEPLATTYN GT10 on all 4 x Mill large gear drives.

In March 2014, KCGM Fimiston began on usage on their 12MW SAG Mill.

Glencore Mt Isa Mines also utilise this product as their operational lubricant.

Application without the need for cleaning

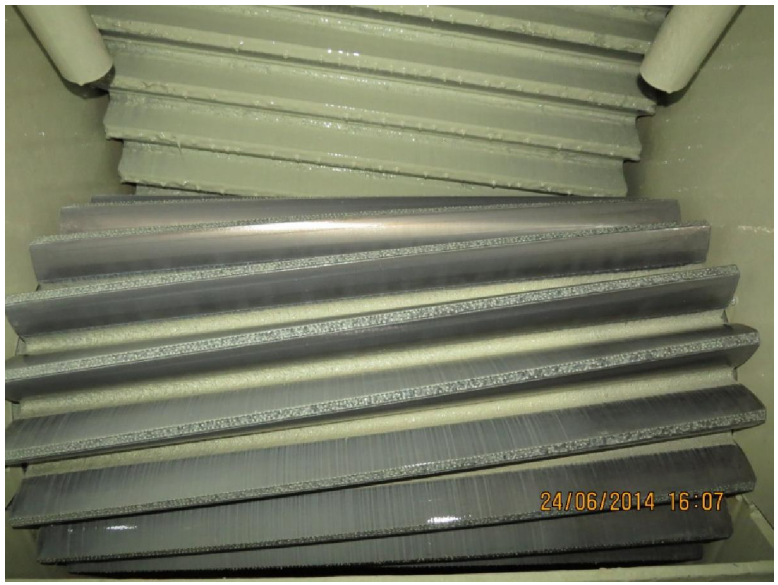
Application over high viscosity oil product during operation.



Spray application of CEPLATTYN GT 10

The CEPLATTYN GT 10 can be applied directly over existing Open Gear Lubricants including graphited or molybdenum greases and also high viscosity clear lubricants with no cleaning of the gear teeth required.

Lower consumption, less waste



Operational Pinion after 3 months of trial. Note root build up of emergency lubricating solids.

OPEN GEAR LUBRICATION SYSTEM (COMPETITOR LUBRICANT 17/03/14)					
ATOMISATION AIR (KPA)	500		PUMP AIR PRESS (KPA)	500	
LUBRICANT PRESS (KPA)	13,000		# SPRAY NOZZLES	6	
SPRAY APPLICATION (SEC)	26		SPRAY INTERVAL TIME (SEC)	240	
DISPLACEMENT GRAMS	5		# OF CYCLES	1	
CURRENT CONSUMPTION (GRAMS / HOUR)	450		RECOMMENDED CONSUMPTION (GRAMS / HOUR)	215 = (2.5GM/CM/HOUR)	
APPLICATION OF LUBE	PINION	GIRTH	INJECTOR / DIST SENSOR	YES	NO
LUBE DISCHARGE CHECKED USING SCALES ID #			VR 4062 - 1	CALIBRATED	Nov 13

OPEN GEAR LUBRICATION SYSTEM (OPERATING CEPLATTYN GT 10 - 19/03/14)					
ATOMISATION AIR (KPA)	500		PUMP AIR PRESS (KPA)	500	
LUBRICANT PRESS (KPA)	13,000		# SPRAY NOZZLES	6	
SPRAY APPLICATION (SEC)	20		SPRAY INTERVAL TIME (SEC)	310	
DISPLACEMENT GRAMS	3		# OF CYCLES	1	
CURRENT CONSUMPTION (GRAMS / HOUR)	209		RECOMMENDED CONSUMPTION (GRAMS / HOUR)	215 = (2.5GM/CM/HR)	
APPLICATION OF LUBE	PINION	GIRTH	INJECTOR / DIST SENSOR	YES	NO
LUBE DISCHARGE CHECKED USING SCALES ID #			VR 4062 - 1	CALIBRATED	Nov 13

Lubrication system setup prior and during trail of CEPLATTYN GT10 :Note gear width @ 860mm

The CEPLATTYN GT10 is applied normally at 2.5g/cm face width/hour (209 grams / hour) prior to this the previous lubricant was applied at 5.2g/cm/hour (450grams per hour) this represents a reduction of over 50% and reduced consumption of 5.8 kg of lubricant per day.

Gear temperature load stability

Clear Fluid

KCGM

Values

Equipment:	Fim Sag Mill East Pinion
POWER KW	11223
TONNES P/HR	1150

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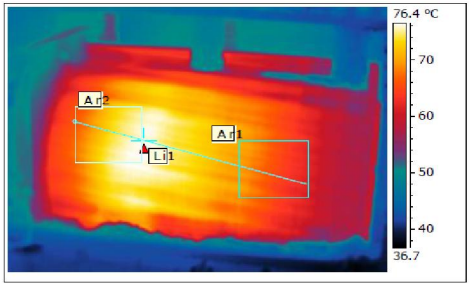
Image Time:	8:44:31 AM
Filename:	IR_6408.jpg

IR Image:

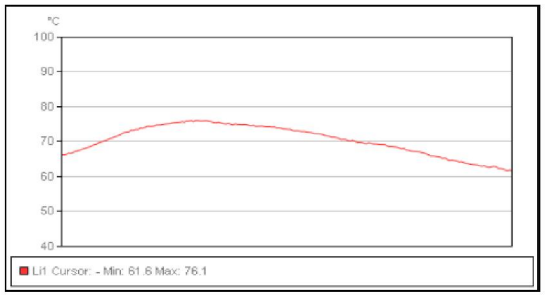


Analysis:

Priority Rating:	3
Temp. Differential	7 °C
(Ar1) AVG Temp:	65.5 °C
(Ar2) AVG Temp:	72.4 °C
Ambient Temp	25 C

Comments and Recommendations:

Gear set is operating as well as can be expected. Continue to monitor at agreed intervals.



GT10

KCGM

6core Values

Equipment:	Fim Sag Mill East Pinion
POWER KW	10641
TONNES P/HR	1192

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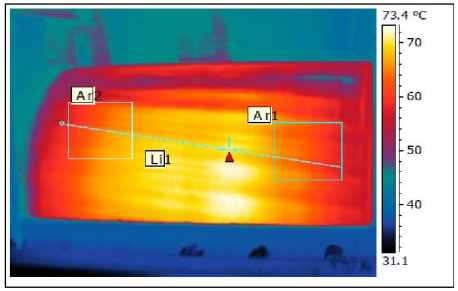
IR Image:

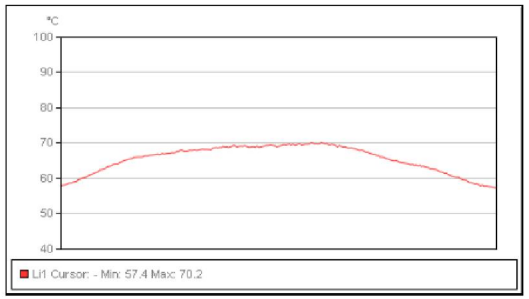


Analysis:

Priority Rating:	3
Temp. Differential	2 °C
(Ar1) AVG Temp:	62.0 °C
(Ar2) AVG Temp:	63.5 °C
Ambient Temp	25 C

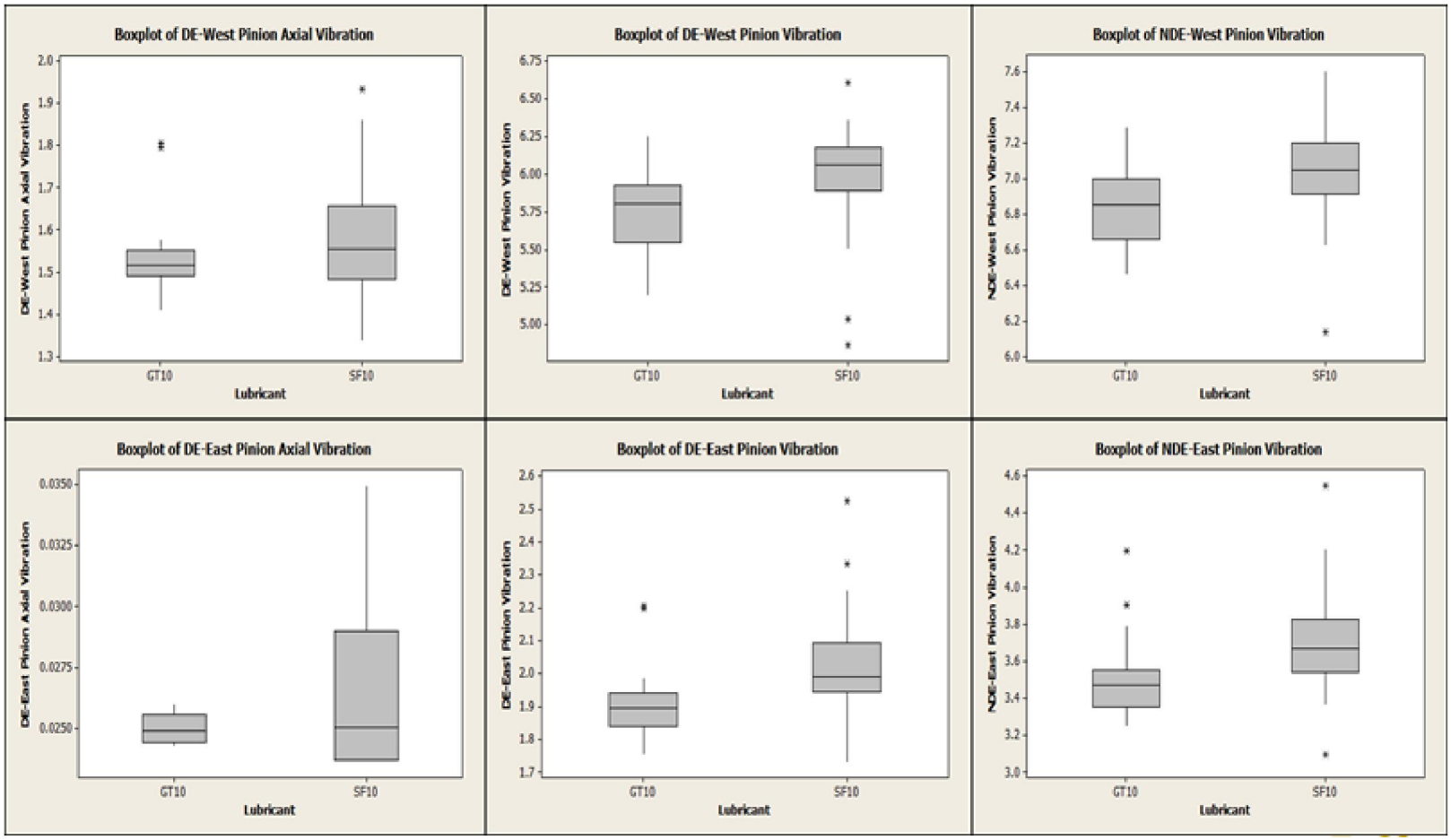
Comments and Recommendations:

Gear set is operating as well as can be expected. Continue to monitor at agreed intervals.



Improved temperature distribution across the contact surfaces and reduced overall operating temperatures due to inclusion of lubricating solids.

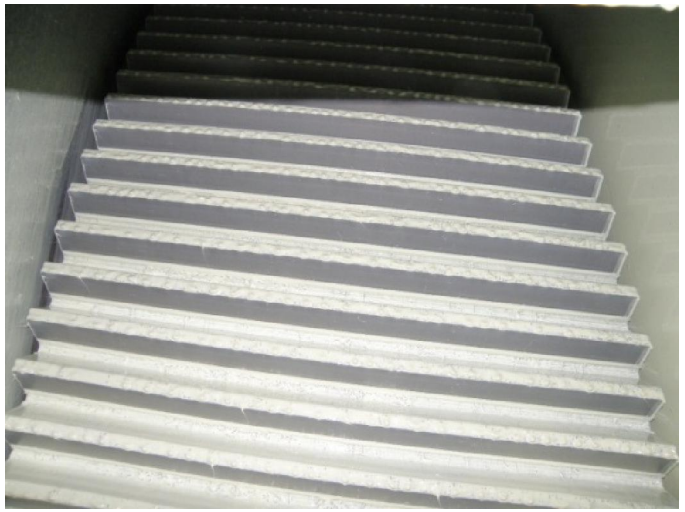
Lower vibrations



Reduced Pinion bearing vibration – Documented from Mill permanent installed vibration monitoring system.

CEPLATTYN GT 10
Performance feature summary

- Excellent wear protection
- Reduced consumption/less waste
- Reduced vibration
- Improved temperature distribution
- Lower gear operating temperatures
- Light yellowish / milky appearance
- Very good “emergency lubrication”
- No self-ignition on hot metal
- Free of solvents and asphaltics
- Minimal run-off from tooth flank after shutdown
- Suitable for spray, circulation and dip lubrication
- Unlimited suitability for mills and kilns
- Designed for AGMA and DIN/ISO gears



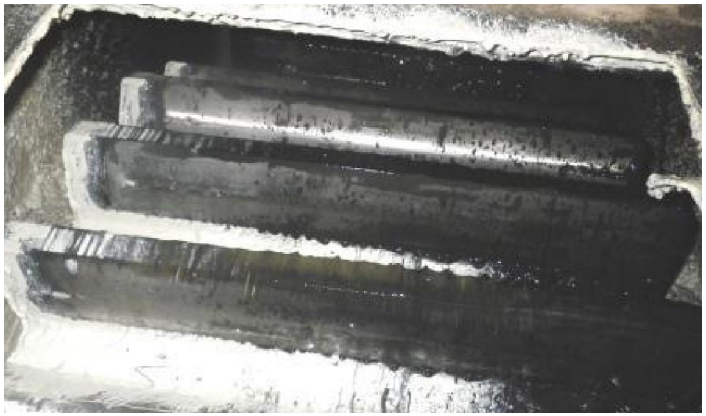
Performance Features
Comparison of Today's Lubricants

Feature	Asphaltics	Fluids	Graphited Greases	CEPLATTYN GT
Sprayability	+	+	++	++
Pumpability	+	+	++	+
Wear + Damage Protection	+	+	++	++
Drainability	+	++	-	++
Clean appeareance	-	++	-	++
Suitability for Kilns	-	-	++	++
Dry-running Properties	-	-	++	++
Pinion application	-	+	++	++
Rating	4	8	12	15

Field Results – Kiln Gear

Dual pinion drive at a German cement plant

- Previously running on graphite product
- Changeover without cleaning procedure
- Shortly after the changeover, lubricant consumption was reduced by 1/3



Results after 18 months of operation

- Reduction of lubricant-related costs
- Excellent drainability of used product from gear sump
- No leakages on gear guard
- No negative impact on gear parameters

Field Results – Cement Mill (1)

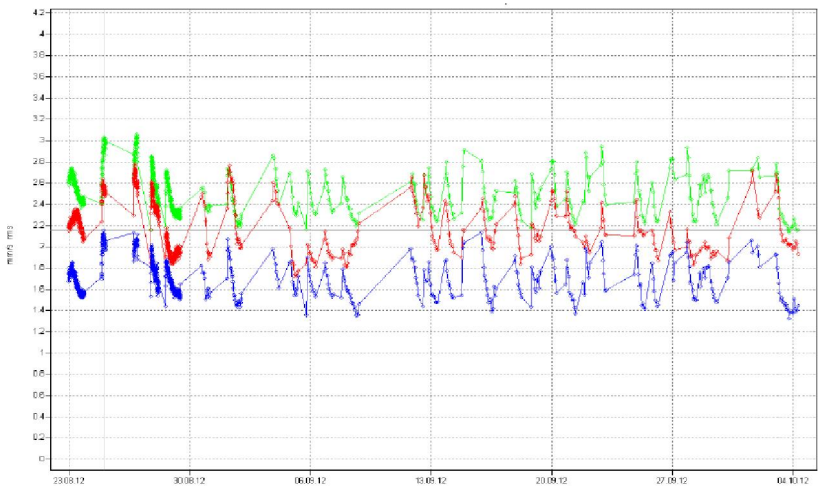
Single pinion / spur gear at a German cement plant

- Previously running on a fluid lubricant
- Changeover without cleaning or flushing of lube system
- Shortly after the changeover lubricant consumption was reduced by 1/3.
- Visible spray pattern

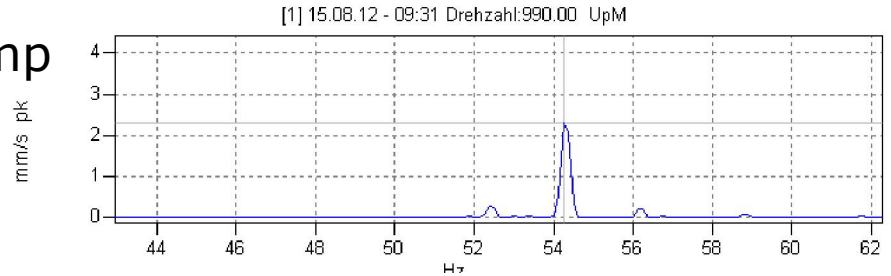
Field Results – Cement Mill (2)

Results after 18 months of operation

- General vibration level could be reduced at lower consumptions
- Vibration level during start-up was reduced tremendously
- Improved visual inspection as gear appeared transparent
- Improved drainability from gear sump
- Cost savings for customer



Highest vibration: 3.2 mm/s



Vibration peak at start-up: 2.2 mm/s

Field results
Cement kiln / circulation lubrication

Single pinion / spur gear at a US Cement Plant

- New gear set in circulation lubrication
- First fill and start-up done with CEPLATYN GT 3
- No lubrication problems after 12 months of operation

Our service – personal and exclusive

- FUCHS LUBRITECH highly-trained service engineers provide on-site technical service and global support.
- World-wide inspection, maintenance and repair of large open gear units by experienced service engineers.
- FUCHS LUBRITECH offers a widespread choice of technical training courses for customers, sales partners and employees.

Technical Support Services

- Open Gear technical support:-
  - Quality Inspection by certified engineers.
  - Static and dynamic inspections of gear interfaces.
  - Dynamic drive line temperature and vibration assessment and trending.
  - Lubricant application assessment.
  - Gear repairs.
  - Full testing and service of the lubrication system.
  - Comprehensive reporting of machine condition.

Additional Services

At times gear conditions can be compromised by outside influences and as a result damage is sustained. FUCHS LUBRITECH Service Engineers can provide repair recommendations and provide the most efficient solution with minimal downtime.

FUCHS LUBRITECH Service Engineers can repair gears as required by grinding and also where needed our online Reconditioning and Running in procedures can be used which eliminates the need to take the machine offline.

Gear grind repairs

Online reconditioning

- This technology and service is already available in Vietnam and across South East Asia. Please contact:
- http://www.fuchs-lubritech.com

- Local details of authorized contacts:

- Vietnam – STD&S http://www.stdsvn.com
- Malaysia – RED ENERGY http://www.redenergy.com.my
- Philippines –PLATINUM INTERNATIONAL http://www.platinuminternationalsupplyandservices.com.ph

Thank you!