



Whitepaper

# Lubrication solutions for casters

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## Executive Summary

Casters in the steel industries are subjected to high temperatures and high loads. The major challenge is the continuous availability of the lubricant, in such conditions. Non-availability of the lubricant can result in components failure, resulting in loss of production.

Klüberplex HB 98-601 is a semi synthetic oil based high temperature grease with a high load carrying capability. The excellent high temperature pumpability ensures no hardening of

the grease in continuous lubrication applications even under extreme temperatures.

It also helps in reducing the lubricant consumption, which results in less wastage. During the trial period itself, one of the customer experienced, reduction in grease consumption by 46 tonnes. It is a true testimonial of Klüber Lubrication approach towards a sustainable future.

For decades, continuous caster (billet, bloom, and slab) bearing lubrication has been a formidable challenge for maintenance teams in steel plants. There were many research and studies done to find an effective and permanent solution to line clogging issues and resulting bearing failures. These issues have eaten up productivity and profits due to heavy mechanical downtime, huge production shortfall and considerable man-hour loss. To tackle these hurdles, modern continuous casting process (CCP) segments were equipped with multiple split rollers, with an increased number of lubrication points. However, with greater slab widths, the performance of lubricants could never be optimal.

## Lubrication method, grease and caster bearing performance: A study

Modern slab casting machines have multiple separate centralised grease lubrication systems to lubricate different machine elements - mostly bearings. The type of lubrication system is dual line centralised lubrication system. Distributor metering valve for line change over (cracking pressure) varies from 80 bar to 350 bar.

Doze feeder delivery volume varies from 1.5 cc to 6 cc with line diameter as small as 8 mm - from distributor to bearing.

## Problems faced by the caster maintenance team

Generally in a steel plant the bearings and lubrication lines (distributor to bearing head) are exposed to higher radiation heat because of higher slab width and greater slab thickness. This leads to line clogging - solidification of grease inside the pipe and does not allow grease to reach the lubrication points. When the bearing is starved of lubrication for a prolonged period, the result is premature bearing failure or shortened bearing life. With a normal high temperature grease being pumped with shorter lubrication cycles the problem can be arrested, but the lubricant consumption will increase drastically. Nonetheless, frequent roll jamming and segment replacements are common with normal non-effective high temperature lubricants.

## Operational criticality and grease selection

Parameter	Application criticality	Grease property needed
Speed	Ultra low speed	High viscosity base oil with higher shear stability
Ambience	High water/ steam along with micro scale ingress	Good sealing with high base oil with good water resistivity and water washout
Load	Moderate to high at bow area due to high Ferro static pressure.	High load carrying with anti-wear (AW)
Temperature	High, specially at end rollers and higher slab width with higher slab holding time	High temperature stability, non-hardening, good oil release at high temperature
CGLS (Lubrication method)	Distributor line clogging	Good pumpability, non clogging in distributor / feeder

## Our solution

One leading integrated steel plant in India found the solution with Klüber Lubrication newly developed product, Klüberplex HB 98-601.

In this steel plant the CCP slab caster bearing and lubrication line were exposed to temperatures higher than 230 °C when the slab thickness was around 2000 mm. The temperatures were recorded by fixing two resistance temperature detectors (RTD) at the bender and bow area of the caster.

### Cyclic temperature metal tube test at Klüber Lubrication R&D facility in Mysore

Klüber Lubrication tested multiple greases, for high temperature pumpability:

- equivalent market samples; and
- the newly developed Klüberplex HB 98-601 grease from Klüber Lubrication.

All other commonly used caster greases were getting solidified inside the pipe, after being exposed to temperatures more than 180 °C for one hour. Klüberplex HB 98-601 did not show any hardening tendency, even after being exposed to temperature higher than 230 °C for many hours.

## Sample before and after

Before

Market sample before running the test

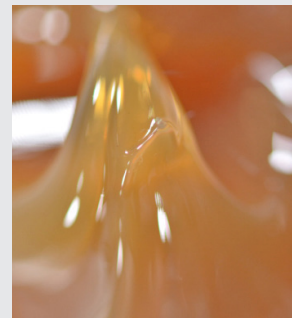


After

Market sample after testing at more than 180 °C for 1 hour



Klüberplex HB 98-601 sample before starting the test



Klüberplex HB 98-601 sample after testing at more than 200 °C for 3 hours



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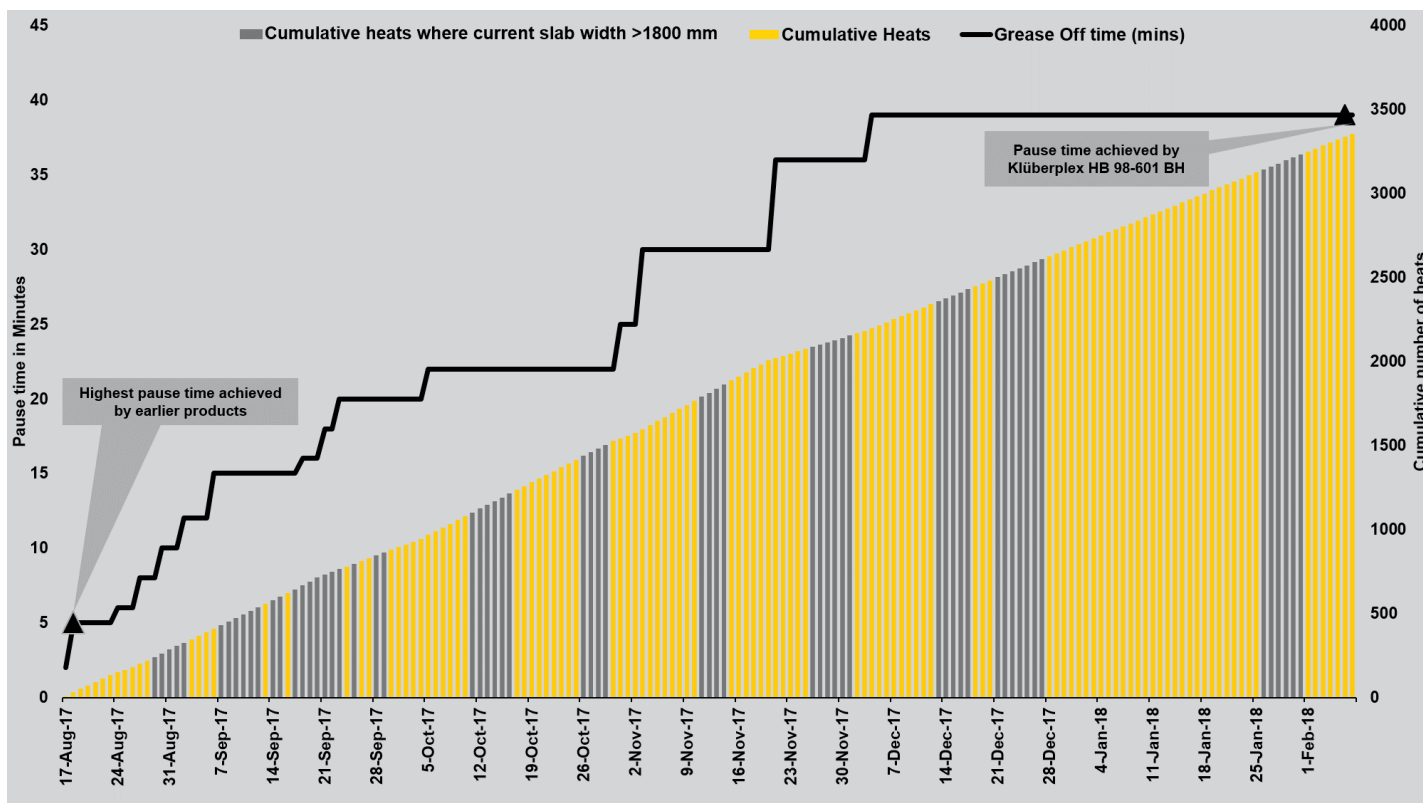
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## Field trial results show increase of lubrication cycle



For about 6 months Klüberplex HB 98-601 was under trials in a pilot designation. Lubrication cycle was increased to 42 minutes (39 min OFF, 3 min ON) from the earlier 8 minutes (5 min OFF, 3 min ON), without any line clogging or bearing starvation issues. More than 3500 heats have been casted with Klüberplex HB 98-601 with a highest slab width of 2100 mm and thickness of 300 mm. The cumulative number of heats with greasing cycles is plotted above (the gray lines plotted above show the cumulative heats where the slab width is higher than 1800 mm).

## Conclusion

Klüberplex HB 98-601 has been performing successfully at the CCP caster for more than a year. With this success, the steel plant has now introduced Klüberplex HB 98-601 in three slab casters and one 8-strand billet caster in the plant. No line clogging or abnormal bearing failure has been observed. Moreover, the lubricant consumption has been reduced substantially. Reduced consumption helps in reducing waste, which results in a safer environment and help the customers to reach their sustainability goals.

This newly developed grease not only aids in reducing consumption but also assist in creating a safer workplace for maintenance personnel by reducing the frequency of their visits to the hazardous areas.

The other tangible benefits are higher productivity, enhanced bearing life, reduced mechanical downtime, lesser energy consumption, less grease accumulation at scale pit and reduced spend on lubricants.

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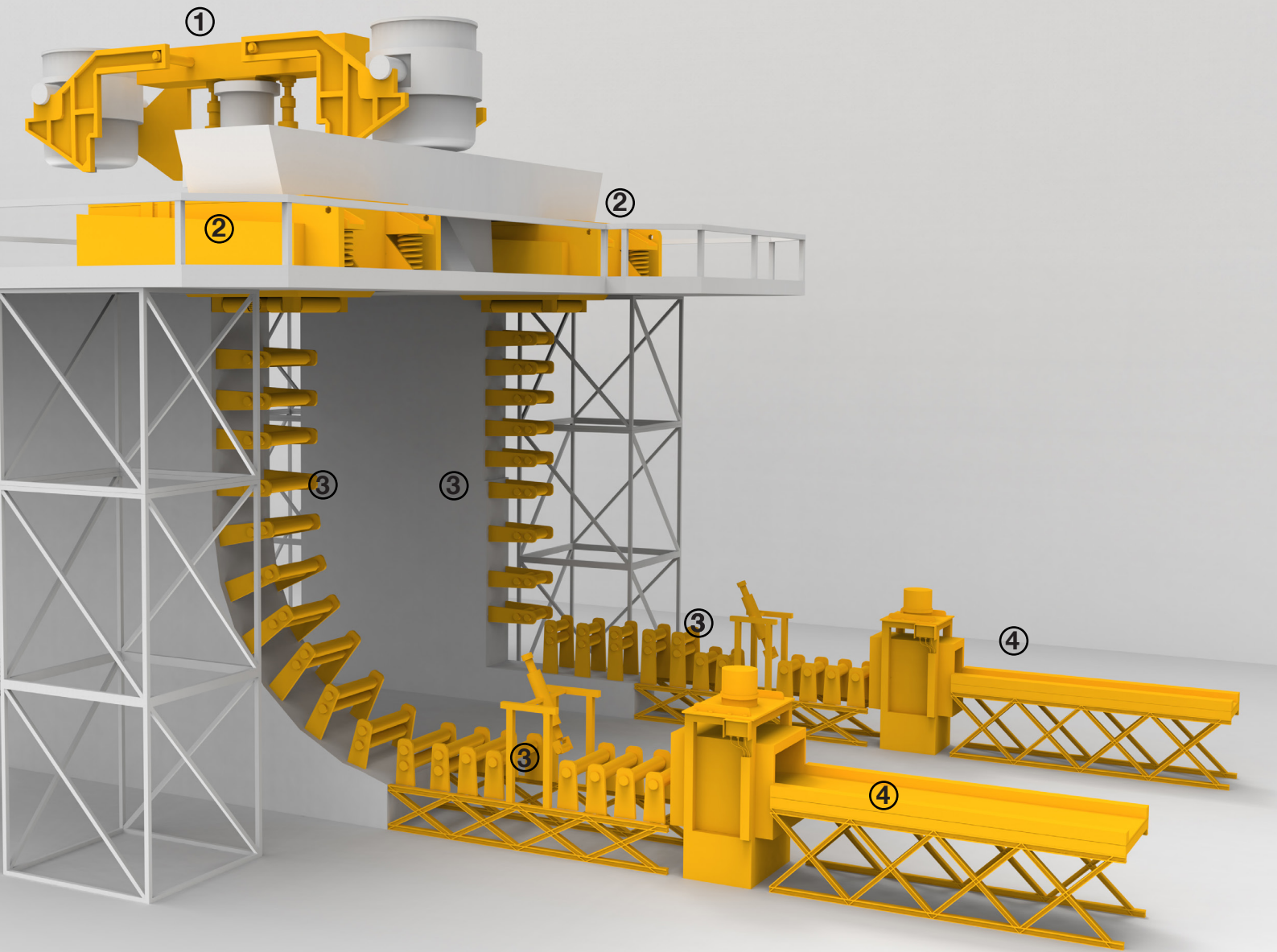
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Legend	Application	Recommendation
1	Turret	STABUTHERM GH 461
2	Oscillating mechanism	STABUTHERM GH 461
3	Roller bearings of segments/ Withdrawal segment (Caster)	Klüberplex HB 98-601 / STABUTHERM GH 461
4	Run-out table	Klüberplex HB 98-601 / STABUTHERM GH 461 / Klübersynth GH 6-320

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