



CURVING CONSUMPTION

Dom Peña, LE Lubricants Inc., discusses how open gear lubricants can help to reduce power consumption.

Plant overview

Solid Cement Corp., (SCC) is one of two cement plants owned and operated by CEMEX Philippines. It manufactures various brands of premium grade cement.

Application and challenges

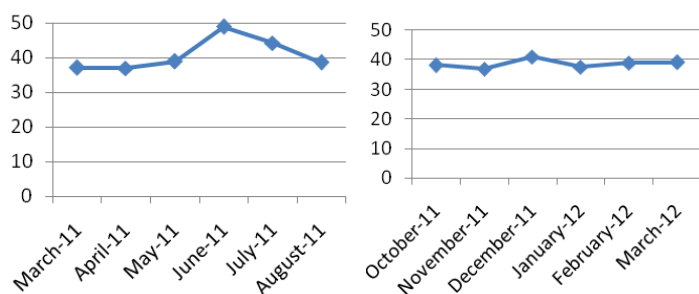
The plant's finish mill 3 and kiln open gear sets are lubricated via centralised lubrication systems. The finish mill 3 rotates at 16 – 17 rpm with a single pinion drive, and the lubricant is applied via eight lube system spray nozzles. Meanwhile, the kiln rotates on a dual pinion



Before conversion (left): excessive lubricant build-up required tedious daily housekeeping and contributed to elevated operating temperatures. After conversion to LE 9011 Pyroshield (right): gears are now visible for inspection without the need to shut down. Overall cleanliness has been achieved with no excessive lubrication build-up on the gear set and shroud.



Before conversion (left): unrecognisable spray pattern. Spray nozzles blocked by excessive lubrication build-up affecting the required intersecting lubrication spray pattern. Spray patterns are irregular. After conversion to LE 9011 Pyroshield (right): no lubrication build-up on spray plate, no blockage on spray nozzles, and equal distribution of lubricant.



Previous six months without Pyroshield (left); succeeding six months with Pyroshield (right). A 5% decrease in kWh/t was achieved.

Table 1. Power savings following conversion to Pyroshield on kiln.

Before conversion to LE 9011 PYROSHIELD	
Specific power consumption	39.97 (kWh/t)
After conversion to LE 9011 PYROSHIELD	
Specific power consumption	38.23 kWh/t
Difference	1.74 kWh/t
Total power save	1 629 825 43 kWh
Power price	6.715 PHP/kWh
Absolute power savings	PHP10 944 277.76 (US\$248 733.59)*
*Period: April – December 2013 (9 months)	

drive system at 4 rpm maximum speed with a total of twelve spray nozzles (six nozzles per pinion).

CEMEX decided to convert its finish mill 3 to another type and brand of open gear lubricant as pitting and wear was experienced on the pinion flanks after just one year of using a black graphite based lubricant. CEMEX's kiln was also using the same black graphite lubricant and experiencing the same gear wear issues.

Due to the performance of Lubrication Engineers' Pyroshield® Syn XHvy Open Gear Lubricant (9011) on FM-3, it was decided to apply it on the open gear drive of the kiln as well to achieve the same results.

Excessive lubricant build-up in the gears required daily tedious housekeeping by the maintenance team. The gears were also experiencing elevated operating temperatures.

Improved performance results were visible after the conversion to an enhanced synthetic high viscosity open gear lubricant.

Performance summary: finish mill

- Extended service life of FM-3 gear set without tooth breakage and no alarming micro-pitting within six months of continuous Pyroshield usage. 'Gear Healing Phenomenon' achieved.
- Pyroshield usage improved overall cleanliness of FM-3 gear set. There is no evidence of thick, black lubricant build-up in the shroud, gear roots, and shaft. There is no need for tedious excess lube cleaning every day. There is no more clogging of spray nozzles, allowing for correct and ample spray pattern onto the pinion gear. Visual inspection monitoring is now possible without the need to shut down to inspect gear surface condition. Temperature and vibration readings are both significantly lower.
- More than 50% reduction on lubricant volume consumption was achieved. The spray interval of 4 min. with the previous lubricant is now up to 18 min. with Pyroshield.
- A 5% reduction on kWh/t consumption was achieved.

The FM-3 gear set did not experience any tooth breakage or pitting progression until replacement with a new gear set in September 2012. PYROSHIELD was still used during commissioning of the new Falk gear

set, running-in lubricant was not recommended by Lubrication Engineers and was therefore not employed. As of the production of this report, the gear set had not experienced any tooth flank grinding, and no wear and pitting development was observed.

Performance summary: kiln

- The use of Pyroshield has improved the overall cleanliness of the kiln gear set. There is no evidence of thick, black lubricant build-up in the shroud, gear roots, and shaft. There is no longer any need for tedious excess lube cleaning every day. Spray nozzles are no longer clogged, allowing for correct and ample spray pattern onto the pinion gear. Visual inspection monitoring is now possible every time without the need to shut down to inspect gear condition.
- No evidence of pitting progression and tooth breakage has been seen within three months of Pyroshield Syn XHvy Open Gear Lubricant usage.
- More than 50% reduction on lubricant consumption was achieved. The spray interval is now 14 min. versus the previous spray interval of 2 min. with the competitive lubricant.

- A 5% reduction on kWh/t consumption was achieved. Power consumption variance is shown in Table 1.

Conclusions

The conversion of the finish mill and kiln to Lubrication Engineers' Pyroshield Syn XHvy Open Gear Lubricant enabled the Antipolo plant to achieve approximate power savings of Php 10M. The savings achieved by CEMEX, due to the conversion of its open gears to Pyroshield 9011, covered the initial higher cost of the lubricant as well as a new pinion gear for the kiln.

Electricity continues to be expensive and is a concern for the cement industry for economic and environmental reasons. Power consumption accounts for the biggest operating expense in a plant, so reducing power consumption is a critical component to the success of a company. Lubrication Engineers' long-life, high-performance industrial lubricants are designed to reduce friction and wear, and thereby help companies to reduce their power consumption. 🌐

About the author

Dom Peña is a Senior Lubrication Specialist at LE Lubricants Inc. (Philippines). As well as being a Certified Machinery and Lubrication Technician (ICML), he also holds a degree from the University of the Philippines-Diliman.