



## Pyroshield® Syn XHvy Open Gear Lubricant

### Coal-Fired Power Plant – Pennsylvania

#### Foster Wheeler Ball Mills

- Reduced lubricant consumption by 65 percent
- Cooled pinion gear temperatures by 20 to 30°F
- Saved \$504,000 in pinion gear costs in 15 years

#### Customer Profile

This base load power station located in Pennsylvania is a two-unit, coal-fired steam plant with a generating capacity of 356 megawatts. It uses northern Appalachian coal and provides power to western Pennsylvania and to the PJM Power Pool. PJM supplies power to 13 states and the District of Columbia.

#### Application

This coal-fired power plant has benefited from using LE Lubricants for more than 15 years. One area of significant improvement in lubricant performance and equipment reliability is the open gear lubrication of its four Foster Wheeler D8 Ball Tube Pulverizers. These ball mills, which pulverize coal used to fire the plant's two steam boilers, run continuously, each processing up to 83,000 lbs of coal per hour.

#### Challenge

##### Product Consumption & Gear Surface Temperatures

Using a black asphaltic open gear lubricant, the plant was experiencing exorbitant product consumption and elevated gear surface temperatures. The automatic lube spray systems were set on full volume to be sprayed every 15 minutes. Even with this frequent lubricant application, the pinion gear surface temperatures regularly exceeded 180°F.

##### Housekeeping

The asphaltic product hardened to a very solid tar consistency after application. Lube delivery lines, metering blocks, valves and spray nozzles were prone to plugging, which resulted in poor spray patterns of lubricant that required regular servicing of the spray system. Gears showed a build-up of hardened lubricant in the tooth root area.



Gear shrouds maintained a very thick coating of hardened product, which complicated scheduled mill maintenance. Waste lubricant containment was difficult, with product being directed to 3- x 4-ft pans that had to be emptied with great difficulty and mess.

##### Gear Life

Pinion gears showed evidence of aggressive wear, pitting and galling with significant loss of gear tooth mass. The plant had to replace pinions as frequently as every two years at significant expense. The cost of a replacement pinion assembly, including labor, is approximately \$28,000. Installation requires the labor of four millwrights working 10-hour shifts. In addition, the plant loses generating capacity during pinion replacement, and revenue losses can be significant.

##### LE Solution

Lubrication consultant John Hayes recommended replacing the black asphaltic open gear lubricant with LE's Pyroshield Syn Hvy Open Gear Lubricant (9001\*), a heavy-duty synthetic fluid developed specifically for ball mill applications that call for an extreme pressure lubricant to be applied using automatic spray systems. Pyroshield 9001 contains Almasol®, LE's exclusive wear-reducing additive, and a non-chlorinated diluent to ensure good low temperature mobility. Pyroshield is translucent purple and non-staining.



*Shown in a running mill, this pinion is more than 10 years old. Notice the excellent condition of the gear and lack of accumulated hardened product.*



*Used Pyroshield collects in a cake pan.*

As a service to the power plant, LE lubrication consultant John Hayes monitors, records and logs gear surface temperatures monthly. The plant's maintenance department keeps an updated log copy for reference.

**Results**

Following an LE-assisted conversion to Pyroshield, which included spray system cleaning and tuning, along with gear surface temperature monitoring, the power plant experienced the following positive results.

**Product Consumption & Gear Surface Temperatures**

The volume setting of the automatic spray system was lowered from 100 to 60%, with delivery frequency increased from 15 to 20 minutes. With those changes, the plant was able to achieve a consumption reduction of 65 percent, or 2.22 times less lubricant, at the same time that it recorded a 20-30°F drop in gear surface temperatures.

**Housekeeping**

Pyroshield Syn Hvy Open Gear Lubricant is a very heavy liquid, and its waste product always remains mobile, slowly moving downward where it can easily be contained and directed to collection containers. It will not plug spray lines or nozzles and will not accumulate in the gear tooth root zone or on shrouds. Cleanup is minimal and complete using steam. The power plant replaced the large waste collection pan it had been using with an 8- x 11-inch cake pan, which can be emptied easily into a nearby waste oil barrel.

**Gear Life**

The coal-fired power plant experienced immediate reduction in visible wear rates on all pinion gears. Damaged

irregular tooth surfaces began to even out, indicating greatly reduced wear. In 15 years using the Pyroshield lubricant, the plant has replaced only two pinion assemblies, and neither of the replacements was due to lubricant failure. Conservatively, 20 pinions would have been replaced during this time if the plant had continued using the previous product.

**Cost Savings of \$504,000!**

Replacement gear cost using Pyroshield lubricant  
2 pinions @ \$28,000 = \$56,000

Replacement gear cost using asphaltic lubricant  
20 pinions @ \$28,000 = \$560,000

**Other Products Used**

- Almaplex® Industrial Lubricant (1275)
- Quinplex® Food Machinery Lubricant (4025)
- Monolex® Multiplex Lubricant (4622)
- Monolec® Industrial Lubricant (4701)
- Duolec® Vari-Purpose Gear Lubricant (1608)
- Monolec® Turbine Oil (6451)

\*Pyroshield 9011 is the updated replacement for 9001, beginning in 2010.

*Thank you to the production manager and the maintenance supervisor at the coal fired power plant, and to John Hayes, LE lubrication consultant (pictured), for providing the information used in this report.*



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