

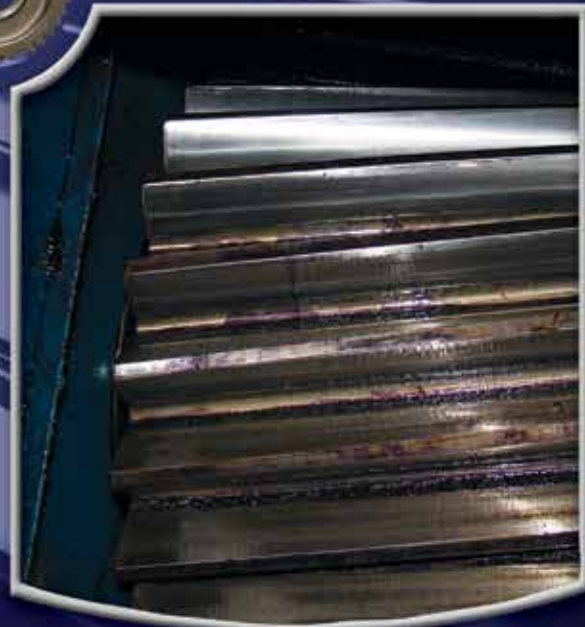
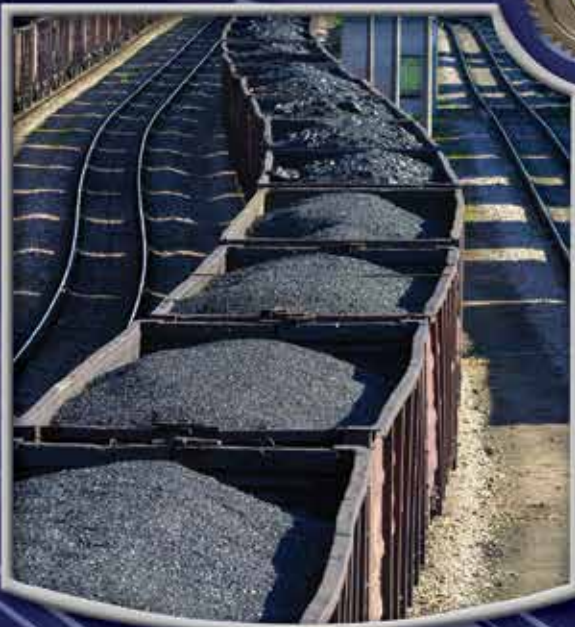
**The Lubrication Reliability Source™**



***LUBRICATION  
ENGINEERS, Inc.***

**POWER GENERATION  
at Coal-Fired Plants**

**800-537-7683**



# Suffering points got you down?

**Keep equipment up & running with LE's comprehensive approach.**

Operators at coal-fired power plants must keep all of their equipment operating as efficiently as possible under harsh conditions such as high operating temperatures, heavy loads, 24/7 operation and dusty, hot environments. Any downtime is costly and can lead to an interruption in power supply, so the proper care of critical equipment is of utmost importance. We've identified three of the most common suffering points, along with specific problems associated with each and our recommended solutions. Implementing a comprehensive approach with these solutions will enhance the performance and extend the life of your lubricant and equipment.

## Steam Turbines & Boiler Feed Pumps

### Problems

**Water contamination, oxidation, thermal degradation**

- Foam, rust, varnish & sludge
- Additive depletion
- Reduced lubricant performance
- Corrosion
- Decreased equipment efficiency
- Shortened life of lubricant & equipment

### LE Solutions

**Monolec® Turbine Oil**

- Separates readily from water
- Provides excellent resistance to foaming
- Imparts superior rust protection
- Resists formation of varnish & sludge
- Provides long-term oxidation resistance & thermal stability
- Enhances wear-reducing properties without affecting R & O inhibitors
- Can be filtered for long-term use

**Xtract™ Sight Glass**

- Enables visual inspection of oil

**Xamine™ Oil Analysis**

- Determines need for additional filtration, water removal or equipment maintenance
- LE's routine oil analysis program recommended monthly
  - Monitors for contaminants
- Full turbine oil analysis (TOA) recommended periodically, depending on condition of oil
  - Monitors for all factors that can affect performance & lifespan of oil & equipment
  - Includes rust, oxidation, varnish, foaming, viscosity, air release, water separation & more



**Before:** A major oil manufacturer's turbine oil in the reservoir of a power plant's steam turbine shows significant foaming. Unable to remove all the water caused by a damaged steam seal, the operator had to hire a vendor with a costly vacuum dehydration system to try to do the job. Continued problems led to two oil changeouts.



**After:** The same reservoir shows very little foam after the plant switched to LE's specially formulated Monolec Turbine Oil, despite the unit running with approximately 30 gallons of water intrusion per day. Using an in-house centrifugal purifier, the operator is able to remove the incoming water. Testing indicates the oil is still in good condition after four years with this difficult operating condition.

**Note about oil color:** Since the time of this conversion, LE has removed the red dye from its formulation. Monolec Turbine Oil is now light amber in color, which allows greater visibility and improves condition monitoring during turbine oil analysis.

## Ball & Rod Mills

Used for crushing and grinding coal or limestone, these are typically horizontal mills with large open gears.

### Problems

**Damage to equipment**

- Gears running hot
- Premature gear degradation & failure

**Ineffective lubricant**

- Lack of translucency prevents visual inspection of gears
- Excess lubricant usage
- Difficult to apply with automatic systems
- Frequent relubrication and cleanup required
- Environmental concerns, including costly disposal



**Before:** This pinion gear from a scrubbing unit limestone processing ball mill is coated with a thick accumulation of traditional asphaltic open gear lubricant. This type of lubricant is a housekeeping nightmare and makes it very difficult to inspect the gear for wear.



**After:** After a seamless conversion to LE's Pyroshield Syn Open Gear Lubricant, the same pinion is clean and easy to inspect for condition and wear. Pyroshield is much easier to apply, contain and dispose of than traditional open gear lubricants.

### LE Solutions

**Pyroshield® Syn Open Gear Lubricant**

- Reduces gear temperatures
- Withstands high-load, heavy-shock applications with exceptionally high film strength
- Appears translucent in use, enabling visual inspection
- Clings to metal without accumulating
  - Lowers lubricant consumption
  - Requires less maintenance & housekeeping
- Can be applied manually or through automatic spray systems
- Contains no lead or heavy metals
  - Can be disposed of like any other nonhazardous petroleum oil

**Seamless onsite conversion process**

- LE provides expert assistance
- No expensive shutdown required

## Bowl Mills

Used for pulverizing coal, these are typically vertical mills with enclosed gears.

### Problems

**Strenuous operating demands & dusty, harsh environment**

- Excessive load
- High temperatures
- Particle contamination

### LE Solutions

Implementing a comprehensive approach with the following solutions will extend the life of your lubricant and equipment by two to three times.

**Duolec® Industrial Gear Oil**

- Lowers operating temperatures
- Reduces wear on gears
- Improves efficiency

**Xtract™ Standard Filter Cart**

- Removes contaminants
- Filters out big particles with a course filter, then smaller particles with a fine microglass filter
- Keeps oil & oil reservoir clean

**Xamine™ Oil Analysis**

- Routine oil analysis recommended monthly
- Monitors for contaminants
- Determines need for additional filtration or equipment maintenance



Vertical bowl mills used for pulverizing coal require a lubricant solution that will help them run efficiently and reliably in a dusty, harsh environment with strenuous operating conditions.



For bowl mills, LE recommends a filterable oil and a high-flow, high-capacity filtration device such as this Xtract™ Standard Filter Cart.

## Equipment Reliability Assessment

*Maximizes equipment life, reduces downtime, consolidates lubricant inventory*

- Professional onsite assessment of all equipment requiring lubrication
- Detailed recommendations for lubricants, application methods, usage amounts and drain or lube intervals
- Also recommended: solutions for transfer, contamination exclusion, contamination removal, education and training

## Enhanced Lubricants

*Reduce friction and wear, enabling equipment to operate longer and more efficiently*

- Technologically advanced oils and greases
- Proprietary, high-performance additives
- Selected to meet needs of specific applications

## Oil Analysis

*Establishes optimum drain intervals and detects wear or contamination before it damages equipment*

- Xamine Oil Analysis for routine monitoring of oil and equipment
- Xamine TOA for periodic comprehensive monitoring of all factors that can affect performance and lifespan of turbine oil and turbine equipment
- Fast, accurate reporting and expert explanation
- Equipment for ensuring consistent oil samples

## Storage

*Ensures clean and organized lube rooms, worker safety and consistent lubricant quality*

- Storage systems to ensure oil cleanliness, inventory control and application efficiency
- Color-coding and ID tags to prevent misapplication and cross-contamination



## Handling & Transfer

*Keeps lubricants contamination-free and keeps equipment properly lubricated for optimum performance*

- Transporting, pumping and dispensing equipment
- Customizable automatic lubrication systems
- Single- or multi-point grease lubricators
- Clear Grease Guns with color-coding options
- Color-coded grease fitting protectors
- Color-coding and ID tags to prevent misapplication and cross-contamination

## Contamination Exclusion & Removal

*Protects and enhances performance of valuable lubricants and machinery*

- Desiccant breathers for absorbing moisture and preventing particulate ingestion
- Adapters and quick connect couplers for preventing contamination at drum and equipment level
- Mobile and stationary filtration carts for achieving oil's ISO cleanliness target
- Sight glasses for monitoring oil levels, inspecting oil and removing water
- Color-coding and ID tags to prevent misapplication and cross-contamination

## Education & Training

*Ensures knowledgeable employees and sustainable improvements*

- Onsite, public and online course options
- Consulting services
- Retainer-based services

## Design, Implementation & Support

*Initiates and maintains a Lubrication Reliability Program*

- Best practices approach
- Local MLT and/or CLS trained lubrication consultant
- Corporate technical support

# LE Provides Solutions for Coal-Fired Power Plants

## Ensuring Reliability Since 1951

Coal-fired power plants can benefit from the standout mix of products, services, knowledge and experience offered by Lubrication Engineers, Inc. With years of experience in the field, we understand the unique challenges you are facing and can help you take care of your valuable assets while lowering your costs.

LE's enhanced lubricants, made of highly refined base oils and proprietary additives, far exceed the performance of conventional lubricants in a variety of applications. They extend lubrication intervals and equipment life and significantly reduce wear, energy use, downtime and maintenance, thereby recovering the initial cost of the lubricant many times over.

We also offer a full line of lubrication reliability products and services, including solutions for oil analysis, storage, handling and transfer, contamination exclusion and removal, and education and training. Whether you need a solution to a single challenge or help setting up a complete lubrication reliability program, you can turn to LE for help.

### The LE Difference

#### Comprehensive Product Line & Full-Service Support

- Complete reliability program, including lubricants, reliability products and services
- Trained, local lubrication consultant to visit on a regular basis
- Corporate technical support to offer expert advice and troubleshooting

#### Research & Development

- Technology Center that continually develops and improves LE lubricants and additives
- Advanced technology to ensure that LE products remain the finest available

#### Proprietary Additives

LE has developed four high-performance additives for exclusive use in its lubricants.

- Almasol® solid wear-reducing additive
- Monolec® liquid wear-reducing additive
- Duolec® dual-acting (wear-reducing and extreme pressure) additive
- Quinplex® impact- and water-resistant additive



LE's state-of-the-art manufacturing facility and technology center is located in Wichita, KS, USA. Sales, customer service and technical support functions are based in Fort Worth, TX. Our global network of trained lubrication consultants ensures timely onsite assistance after the sale.



Nearly 60 percent of LE's lubricant orders are on the road the same day we receive them, while 95 percent go out in one day or less. Distribution comes out of Wichita as well as warehouses in Knoxville, TN, and Las Vegas, NV.



## Enhanced Lubricants

LE's premium industrial lubricants are available in a wide range of penetration and viscosity grades. From this broad offering, we are able to make recommendations based on your specific application and equipment needs.

Following is a list of LE lubricants that have provided years of reliable service at coal-fired power plants, along with the most common uses for them. For detailed descriptions and technical specifications, please visit the product pages at [www.LElubricants.com](http://www.LElubricants.com), refer to individual product flyers available online or in print, or contact your local LE consultant for assistance.

### Greases

#### Grease fittings, chain drives & sprockets

- Almasol® High Temperature Lubricant (1250-1251)
- Almagard® Vari-Purpose Lubricant (3750-3752)
- Monolec® Multiplex Lubricant (4622)
- Monolec® Industrial Lubricant (4700-4702)

### Open Gear Lubricants

#### Open gears

- Pyroshield® Syn Open Gear Grease (5100, 5180 & 5182)
- Pyroshield® Syn XHvy Open Gear Lubricant (9011)

### Gear Oils

#### Enclosed gears

- Almasol® Worm Gear Lubricant (460 & 680)
- Duolec® Industrial Gear Oil (1601-1610, 1302, 1304)
- Monolec® Syn Industrial Oil (9220, 9320, 9460)
- Duolec® Syn Gear Lubricant (9822 & 9832)

### Turbine Oils

#### Turbines

- Monolec® Turbine Oil (6461-6463)

### Other Hydraulic & Industrial Oils

#### Pump & motor bearings, gear reducers, air compressors, hydraulics, turbines

- Monolec® Hydraulic Oil (6105-6120 & 6520)
- Monolec® Centrifugal Compressor Oil (6260)
- Monolec® R&O Compressor/Turbine Oil (6401-6407)
- Multilec® Industrial Oil (6801-6807)
- Monolec® Syn Industrial Oil (9032-9150)



### Engine Oils, Transmission Fluids & Fuel Supplements

#### Diesel & gasoline engines, peaking diesels, transmissions, converters

- Synolec® Transmission Fluid (640)
- Monolec® Gear Lubricant (703-704)
- Monolec® Syn Multi-Vehicle Automatic Transmission Fluid (1150)
- L-X® Heavy-Duty Chemical Supplement (2300)
- Full Torque™ W (2411) & S (2421) Diesel Fuel Improvers
- Monolec® Power Fluid (7500)
- Monolec® Drive Train Fluid (7511, 7531 & 7551)
- Monolec Ultra® Engine Oil (8130-8131 & 8800-8801)
- Monolec® GFS Engine Oil (8420-8450)
- Ultra RDE Oil (8900)

### Aerosols & Wire Rope Lubricants

#### Wire ropes, chains, cables, frozen parts

- Wirelife® Almasol® Coating Grease (451-453)
- Wirelife® Monolec® Penetrating Lubricant (2001)
- Wirelife® Almasol® Coating Lubricant (2002)
- Monolex® Penetrating Oil and Lubricant (2059)



## Does your lubricant supplier do all of this?

If your lubricant supplier does not provide the products, services and results listed below as part of its lubricant reliability program, perhaps it is time to change suppliers.

### LE Lubrication Reliability Program

- ✓ Professional, onsite equipment reliability assessment
- ✓ Comprehensive lubricant line (industrial oils, engine oils and greases)
- ✓ Web-based oil analysis, with results reviewed by experts
- ✓ Storage systems, including stackable bulk units
- ✓ Visual identification, including tags, labels, color coding and wall charts
- ✓ Handling and transfer equipment, including portable transfer containers, clear grease guns, grease pumps and lube reels
- ✓ Single- and multi-point automatic grease lubricators and lubricating systems
- ✓ Contamination exclusion and removal tools, including oil reservoir sight glasses, desiccant breathers and filtration equipment
- ✓ Local, factory-trained specialist available 24/7

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