

The Lubrizol Corporation

Meeting Micropitting and Materials Compatibility Challenges

Industrial Gear Oils as an Integral Component of Gearbox Design

By **Tim Cooper**, Industrial Product Manager, The Lubrizol Corporation

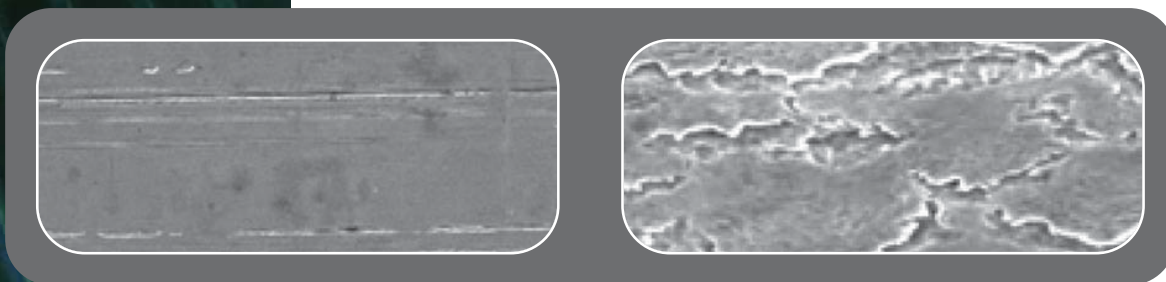


Figure 1. Non-micropitted surfaces (left) help reduce equipment downtime. Micropitted gear tooth surface (right) can lead to equipment failure.

From extreme-duty mining to power generation and beyond, gearbox applications throughout the industrialized world are confronting design and construction trends that have led to an increase in micropitting – a phenomenon of fatigue stress on gear teeth often attributed to changes in steel quality and surface finishing methods. Additionally, the drive towards higher power densities, reduced oil volumes and consequently raised temperatures places further stress on the gear teeth, bearings, elastomer seals and other components of modern high-performance industrial gearboxes.

The combination of these factors has created a demand for lubricants that provide improved thermal stability, increased bearing protection, better seal and internal paint compatibility along with exceptional micropitting resistance. Nowhere is this demand more evident than in the stringent Siemens MD specification for helical, bevel and planetary gear units.

The Siemens MD specification

The Siemens MD (formally known as the Flender) specification was designed to ensure trouble-free performance of Flender gearboxes in heavy-duty industrial applications. With its emphasis on materials compatibility, as well as micropitting and scuffing resistance, today's specification requires gear oil

formulators to look at high-performance industrial gear oils as an integral element of gearbox design. In addition to requiring oils to meet DIN 51517-3, Siemens MD requires an FVA 54 micropitting resistance test, dynamic foam testing and several stringent protocols for ensuring internal paint, elastomeric seal and liquid sealant compatibility.

The challenge for oil formulators has been that additive chemistries designed to deliver performance in one aspect of the specification can have a detrimental effect on other performance areas. For example, many oils with acceptable seal compatibility have been shown to blister the paints used inside Flender gearboxes, while some oils benign to the paint are incompatible with the elastomer seals. Performance requirements for both paint and elastomer seals have evolved through various revisions to the Siemens MD specification. As a result, formulators are eagerly searching for an additive solution able to ensure the long-term integrity of gearbox materials as well as providing guaranteed resistance to micropitting fatigue.

The ramifications of micropitting

Micropitting is a fatigue mode that begins as tiny pits barely visible to the eye (see **Figure 1**), it appears as a grey matt area often described as grey staining or flecking. Over time, this micro-

pitting may attenuate or even polish away and cause no further distress. Alternatively, the micropitting may increase, growing deeper and leading to noise and vibration. It may also prevent smooth gear engagement or even continue on to macropitting – a much more destructive form of gear distress that can result in operational disruptions and costly repairs.

A chemistry breakthrough

With the introduction of a new industrial gear oil technology, Lubrizol has resolved the “seals versus paint dilemma,” while at the same time delivering excellent micropitting resistance and outstanding bearing protection. Extensive laboratory testing has demonstrated that this new and proprietary chemistry provides improved performance across a range of Group I through IV base stocks in all the following areas:

- Micropitting resistance
- Elastomeric seal compatibility
- Dynamic foam control
- Bearing protection
- Paint durability
- Thermal and oxidative stability

Siemens MD approvals are base stock specific; accordingly, Lubrizol provides this exciting breakthrough technology not only as the additive package, but also as a finished lubricant. In addition, Lubrizol provides re-brand approval assistance for oil marketers not having access to the required base oils. These finished lubricants are Lubrizol® FM2205A through Lubrizol® FM2209A, representing ISO viscosity grades 150 through 1000.

Having successfully vaulted over the Siemens MD performance bar, the new family of industrial gear oil technology from Lubrizol eliminates concerns over

micropitting and material incompatibilities, thereby helping reduce maintenance costs and improving uptime for industrial gearbox operators.

This new Industrial Gear Oil technology from Lubrizol ensures:

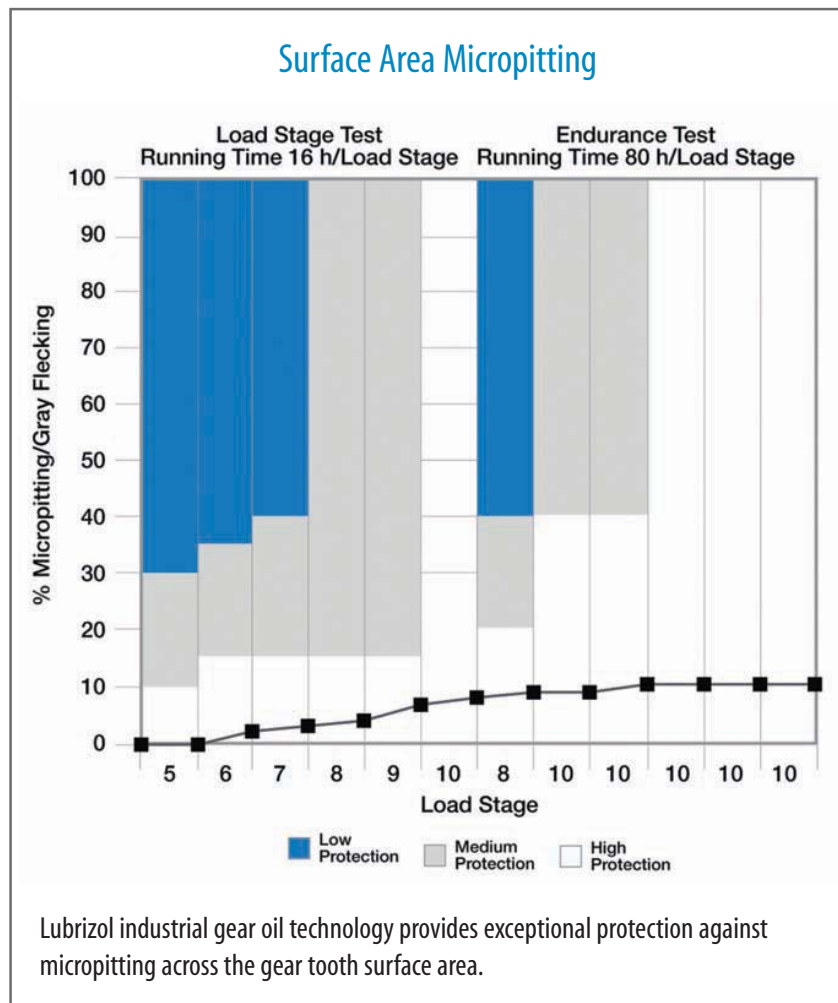
- Extended gear and bearing life in enclosed gear drives operating under extreme load, speed, and temperature conditions
- Excellent resistance to oil degradation at high temperatures, resulting in extended oil life and longer drain intervals
- Smooth operation in both high and low temperature environments for reliable performance year-round
- Excellent resistance to corrosion and very good demulsibility for trouble-free operation in applications where water contamination is unavoidable
- Reduced filter plugging for fewer filter changes
- Proven compatibility with the ferrous and non-ferrous metallurgy, internal paints and both liquid and elastomeric seals used in today’s high-performance gearboxes

Advantages of Lubrizol technology

There are many factors to be considered in obtaining a Siemens MD approval. The tests are costly, time-consuming and some can only be conducted at a small number of approved external laboratories. When faced with these challenges, oil blenders may prefer to purchase a finished lubricant that has already been tested, proven and certified by the OEM.

With Lubrizol FM2205A series of fully formulated finished lubricants, the technical work has been completed, the approvals are in place and Lubrizol is positioned to facilitate re-branding into an oil marketer’s product line.

The Lubrizol family of industrial gear oil technology offers the performance demanded by today’s gearbox manufacturers and their industrial users and is available for distribution worldwide.





Stroke of Genius

For formulators of oils that keep industrial gearboxes running, passing the Siemens MD specification is a master stroke of achievement. Introducing: a new Lubrizol high-performance technology to help you master that challenge. Micropitting resistance: resolved. Seal compatibility: done. Paint compatibility: mission accomplished. Now available worldwide as a finished fluid or full-performance additive package.

With you every step of the way.

Lubrizol

www.lubrizol.com

© 2012 The Lubrizol Corporation. All rights reserved.
120991