Field Tests on Dominican Power-Generation Barge Confirm Benefits of New Mobilgard M Series Oils

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New Mobilgard M Series Oils Pass Tests

Extensive field-testing aboard a Seaboard Corporation power-generation barge in the Dominican Republic confirms that a newly formulated series of oils from ExxonMobil Lubricants & Specialties has solved several common problems associated with medium-speed marine diesel engines.

The new product line, called Mobilgard M Series, was introduced to the marketplace in February 2003. It was formulated with a new additive system for medium-speed marine diesels, which are used extensively in land-based power-generation stations.

ExxonMobil developed the new formulation specifically to combat maintenance problems that have occurred in recent years as demands on medium-speed marine diesel engines have changed. Lower lube-oil consumption rates, greater availability of lower-quality residual fuels and contamination of engine lubricants with unburned fuel have made maintenance of medium-speed diesels more difficult.

Solving problems

"These challenges have resulted in engine sludge and excessive deposits in critical engine parts, and that, in turn, has led to increased downtime and costs," says John Donofrio, a senior engineer with ExxonMobil Research and Engineering Company. "The Mobilgard M Series was formulated to counter these new conditions. Specifically, we set out to provide a complete solution that offers unmatched lube-fuel compatibility, piston undercrown deposit control and overall engine cleanliness. The results of the field tests in the Dominican Republic show how much we've succeeded."

Tests of new Mobilgard M Series began in late 1999 aboard the Estrella del Norte *power barge, which uses seven Wärtsilä Vasa 32 engines to generate electricity in the Dominican Republic. It is one of two power barges in Santo Domingo, with a combined rated capacity of 112MW, owned by Seaboard Corporation of Shawnee Mission, Kansas.*

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Real-world tests with the new formulation began in late 1999 aboard the *Estrella del Norte* power barge, which uses seven Wärtsilä Vasa 32 engines to generate electricity in the Dominican Republic. It is one of two power barges in Santo Domingo owned by Seaboard Corporation of Shawnee Mission, Kansas, U.S.A. Seaboard is a diversified international agribusiness and transportation company with overseas operations that include electric-power generation. The two barges have a combined rated capacity of 112 MW.

Like most power-generation stations in the Caribbean/Central America region, notes ExxonMobil, which markets lubricants and specialty products in nearly 200 countries and territories, *Estrella del Norte* operates with a continuous high load and uses heavy fuel oil. This fuel includes naturally occurring sulfur, asphatenes and Conradson carbon, which result in increased deposits, fuel pump plunger sticking and residual fuel leakage into the lubricating oil.

Complementing ongoing field tests in engine no. 7, ExxonMobil engineers initiated a test of Mobilgard M Series in engine no. 6 following an overhaul in June 2001. They returned five months later (3988 oil hours) to conduct interim engine cleanliness test inspections and a month after that (4332 oil hours) for a piston inspection.

Excellent overall engine cleanliness

The inspections showed excellent overall engine cleanliness. "The Mobilgard M Series oils tested provided the best cleanliness performance," says Dimiter Kourdov, manager of *Estrella del Norte*. "Now our engines are totally clean."

“Use of a dependable product such as Mobilgard M Series makes a huge difference to us.”

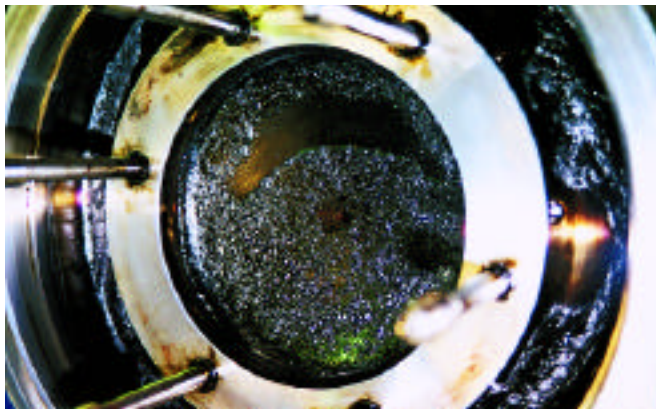
— *Dimiter Kourdov, Manager*
Estrella del Norte

In addition to visual observations, engineers from ExxonMobil and Seaboard based their assessments of the oils’ performance on measurements processed through the oil supplier’s Signum Oil Analysis program. Signum, which is available to all ExxonMobil power-generation customers, is designed to enable plant operators to monitor the condition of their lubricants, diesel marine engines and auxiliary equipment easily and efficiently. An ExxonMobil-patented Residual Fuel Detection (RFD) test is part of the oil analysis program. It detects and quantifies sources of fuel contamination and identifies unburned residual fuel in marine diesel engines.

Field test results confirmed that Mobilgard M Series met or exceeded the engineers’ high expectations:

- **Engine cleanliness:** Overall engine cleanliness was excellent in spite of significant levels of residual fuel contamination. The engine crankcase and top deck areas showed no significant accumulations of residual-fuel related sludge.
- **Camshaft:** The camshaft showed no significant deposits. Most camshaft-space areas were covered by a dark brown oil film, which readily drained from the engine’s vertical surfaces.
- **Pistons:** No significant carbon deposits were present on the ring lands, in the piston grooves or on the piston rings after 3988 oil hours.
- **Undercrown deposits:** Piston undercrown deposits were judged good based on the tendency of these engines to accumulate a significant level of piston undercrown deposits.
- **Piston rings:** Ring and groove wear (after 4332 hours) was low. Liner condition was excellent, with no signs of significant wear.
- **Oil Consumption:** Oil consumption levels were considered low and fully acceptable. Oil consumption averaged 0.70 g/kW based on a 90% average engine load.
- **Used-Oil Condition:** Despite significant contamination of the lube by fuel, the used-oil condition remained good. Wear metals were low.

New Mobilgard M Series (engine no. 7, 3988 engine hours)



Oil Y (engine no. 7, 2153 engine hours)

Visual inspection of engine no. 7 after 3988 hours of severe service showed that Mobilgard M Series limited undercrown deposit build-up to as little as 20 microns. Significant, reports ExxonMobil, because as deposit thickness increases, piston crown temperature can rise to where it burns the equipment, necessitating replacement. Other products can generate deposits (pictured after 2153 engine hours) with thicknesses up to 200 or 300 microns, or more.

Lower maintenance costs

“These results are significant because they translate directly to lower maintenance costs,” says ExxonMobil’s Donofrio. “ExxonMobil has been providing innovative lubrication solutions for well over a century, but the value of that experience has to be judged by what it does for a customer today. We identified changing maintenance challenges. We came up with solutions. And now companies such as Seaboard can benefit.”

“Use of a dependable product such as Mobilgard M Series makes a huge difference to us,” says Seaboard’s Kourdov. “Our plants have to operate smoothly, safely and continuously. The choice of lubricants is especially important because downtime can have severe repercussions when customers count on us for their power needs.”

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