

Building confidence in marine lubricants

Marine diesel lubricant supplier Lubrizol is applying advanced testing techniques to simulate real-world challenges and accelerate the pace of product development.

FOR AS LONG as diesel engines have propelled the global shipping industry, the development process for marine diesel lubricants has remained unchanged. Given the dynamic nature of the industry, as well as evolving regulatory demands, it's a perplexing shortcoming.

But Lubrizol, a global developer and manufacturer of marine lubricant additives, claims to be changing the paradigm. In contrast with what it argues are the current industry's inefficient development process, Lubrizol says it has substantially improved testing protocols in order to bring new products to market more quickly and with performance confidence. The company believes that its advanced fired engine testing protocols bring that confidence to vessel owners, operators, and lubricant manufacturers.

For its testing, Lubrizol uses a modern, two-stroke engine that is representative of the engines powering today's vessels. "From approaching and leaving port to the high seas and then to berthing, our fired engine testing simulates real world engine load conditions," says Ian Bown, technical manager – marine diesel engine oils.

"This advanced level of real-life testing gives ship operators a much greater level of confidence in the lubricants that contain our additives. They know the product is proven before it even hits the field and this gives chief engineers less to worry about."

Lubricating oils perform a number of important functions in a marine diesel engine. They reduce wear on bearings, piston rings, cylinder liners and related parts; reduce friction of boundary and hydrodynamically lubricated components; help cool and clean pistons while preventing deposit build-up; prevent corrosion caused by acids and moisture; and serve as a hydraulic media in components such as fuel injection system.

Marine engine lubricants consist of a base oil and an additive package. A base oil alone cannot provide all the required functions in today's modern diesel engines. Additive packages have evolved to play an increasingly important role to protect those engines.

New International Maritime Organisation regulations, as well as uncertain economic conditions, are affecting engines and their operational profiles. Among the issues causing change are:

- Regulations regarding sulphur and nitrogen oxide emissions;
- New engine designs for improved efficiency;
- Lower-load operations (e.g., slow steaming);
- Use of alternative marine fuels instead of heavy fuel oil;
- Use of fuels with a wide variation of sulphur content;
- Emission abatement technology (e.g., exhaust gas recirculation and selective catalytic reduction).



Fired engine testing gives Lubrizol the confidence to move new products swiftly to field trials

Some of the recent regulations require a reduction in the concentration of sulphur in marine fuels. Fuel changes require lubricant changes for maximum engine protection. During combustion, the sulphur in the fuel is subject to oxidation generating predominantly sulphur dioxide but also sulphur trioxide. Sulphur trioxide readily combines with moisture in the air to produce sulphuric acid that can corrode critical engine parts. The lubricant, blended with an appropriate additive package, acts as a neutralizing agent to minimize the corrosion.

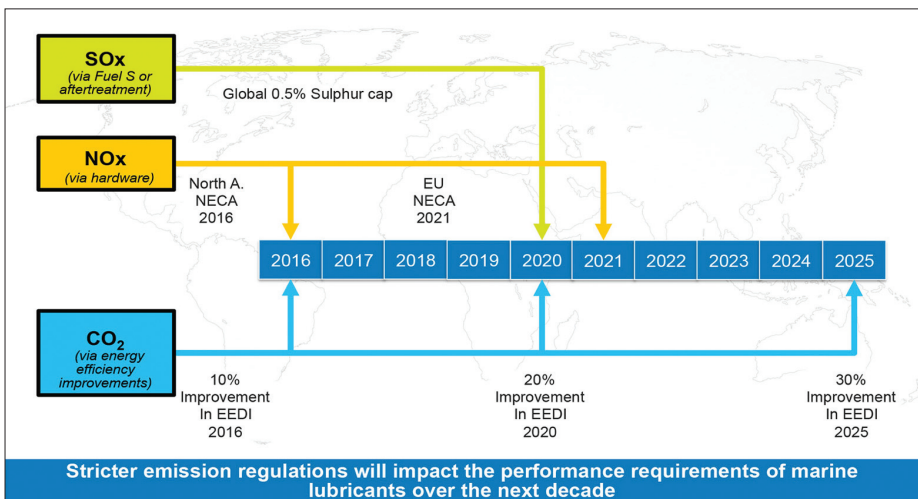
All of these factors create a variety of engine operational issues – all requiring specially formulated lubricant and additives. New developments are constantly occurring in the changing seascape for ship operators, requiring new products and solutions geared to solving existing, and preventing new engine problems.

Failure to match a thoroughly tested lubricant to the engine, fuel, and operating conditions can have severe cost implications including significant machinery damage and even catastrophic engine failure.

PRODUCT DEVELOPMENT

Creating solutions for the complex changes in the industry requires not only engine hardware modifications and operating protocols, but also new lubricants. Harriet Brice, marine diesel engine oils technology manager, explains: "New lubricant formulations are needed to deal with these emerging issues.

The lead-time for a new lubricant introduction can be lengthy in this industry, but our engine facility enables us to shorten the time from the creation of a new formulation to the actual sea trials, which is advantageous in these times of change. Demonstration of lubricant performance in a modern fired engine presents a higher degree of performance assurance to the ship manager before it is trialled in the engine."





A Lubrizol engineer inspecting a test engine during a trial

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Lubrizol’s new product development cycle involves four steps: formulation, bench testing, fired engine testing, and field trial assessments. Product managers define the performance targets while considering feedback from customers, engine manufacturers and users in the field. Highly skilled marine lubricant formulators then draw on extensive knowledge of additive performance characteristics to design a lubricant that meets those requirements. In addition to existing additive technologies, new and innovative additives are developed in conjunction with Lubrizol’s world class research scientists.

Bench testing is designed to examine a number of key performance characteristics. In the laboratory, these short-duration tests offer essential screening to confirm the formulators’ data, but do not reflect real-world engine conditions.

Fired engine testing follows and is what differentiates Lubrizol’s testing protocols from all of its competitors. “If the bench trials suggest that a new formulation has merit, it then goes through our world-class fired engine testing protocol,” remarks Bown.


Brice adds: “While bench tests are directional performance indicators, the capability of the lubricant to address today’s shifting targets can only be

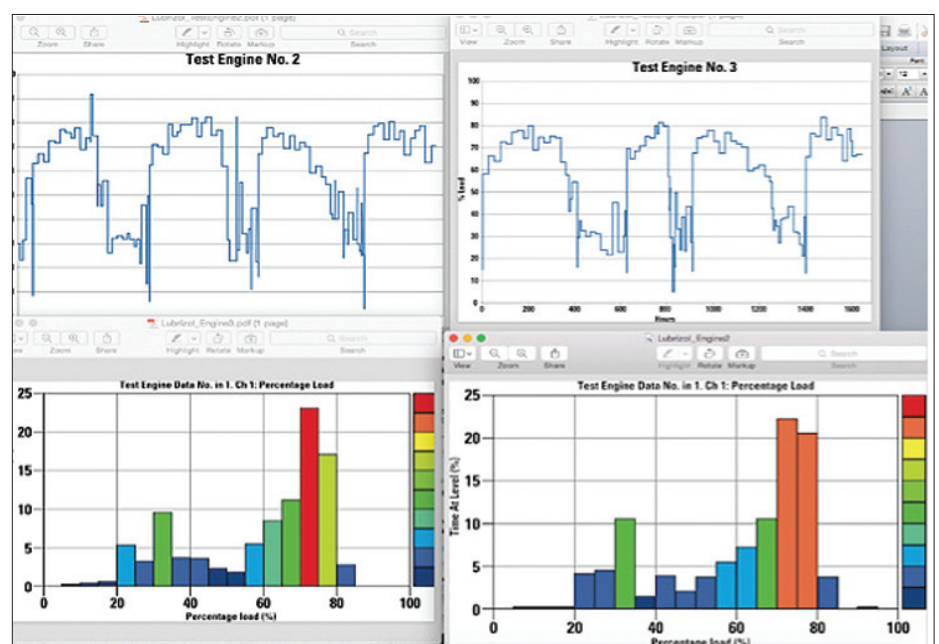
truly evaluated in a fired engine utilizing changing operating conditions and fuels. It is this capability that gives us the confidence to move swiftly to field trials knowing we have the right lubricant for the right application.”

Field trial assessments are the actual sea trials and represent the ultimate test of a new lubricant. Chief engineers and superintendents then provide feedback to Bown about the efficacy of the tested products for further evaluation.

As legislation in the shipping industry quickly continues to evolve, coupled with increased efforts for more engine efficiency, the role of lubricants and their requirements to perform under a wide range of conditions is increasing.

Technical manager Ian Bown thinks the Lubrizol methodology is well suited for these changing times. “Because of our effective development and testing cycle, we can respond to a problem and bring the solution to market quicker than our competitors. The bottom line means Lubrizol can get the right product to the marketplace faster with a higher level of confidence for the ship manager. In the case of one product, we were able to develop, test, assess and bring to market a new additive package in under a year.”

The good news for container ships, cargo ships, oil tankers and the other diesel-powered behemoths of the sea: there’s now one less operational matter to worry about. 



Using operational data from real world voyages, Lubrizol has developed a range of profiles simulating such activities as ocean going, port approach and berthing