



DSL-MAX

with Advanced Additive Technology

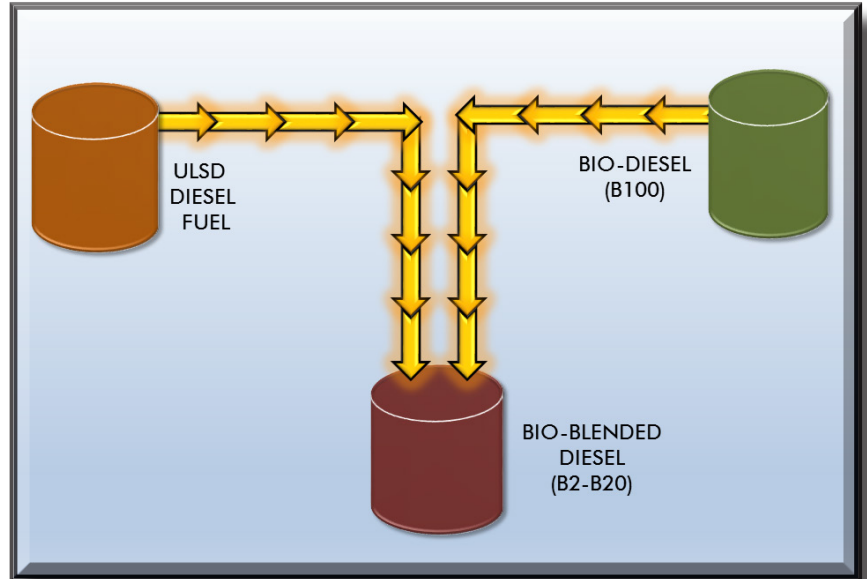


"Tomorrow's Additive Technology for Today's Diesel Fuels"

PROTECTION, POWER, and PERFORMANCE
A BIO-QUALIFIED MULTI-FUNCTIONAL FUEL CONDITIONER

Understanding the Characteristics Of Today's Diesel Fuels

When looking at the diesel fuel industry today, you only see a glimpse of what it was a decade ago. Changes in diesel engine designs, driven by increased EPA regulations, have caused critical issues for OEM's (Original Equipment Manufacturers) and the operators of diesel engines.



PROBLEMS CAUSED BY RECENT FUEL CHANGES:

Major Reductions in Lubricity
Increased Water Content
Decreased Power
Increased Deposits & Lacquers

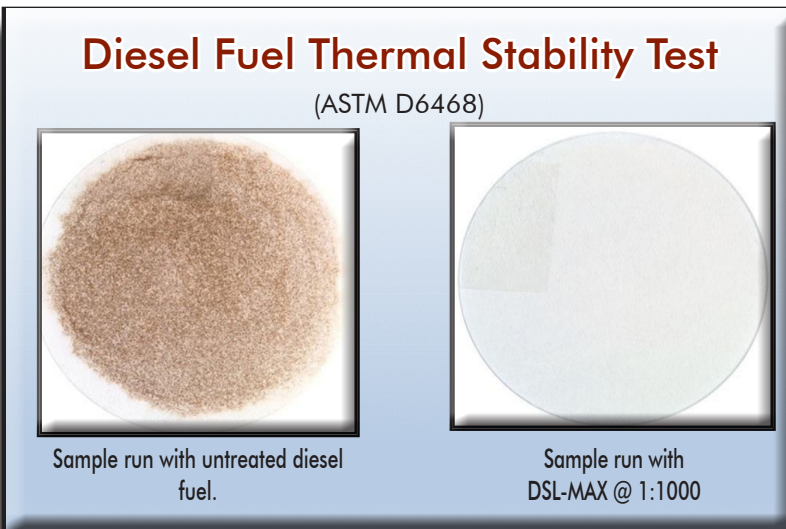
Decreased Thermal Stability
Increased Oxidation Rate
Poor Storage Capabilities
Poor Cold Weather Performance

Traditional diesel fuels are gone, and so are the "traditional" methods of treating and servicing diesel fuel. Today's diesel fuels and bio-diesel blends present equipment owner operators and OEM's with an entirely new set of concerns. While the quality of today's fuel struggles to keep pace with the advances in power and performance by equipment manufacturers, the industry must turn to advancements in fuel treatment. The Advanced Additive Technology found in DSL-MAX is the result of diligent monitoring of the current fuel industry, years of engineering experience, a dedication to quality and the ability to react to the needs and concerns of all diesel fuel users. Take a closer look at the issues today and why DSL-MAX is your advanced solution to fuel-related concerns.

*"DSL-MAX is designed to work with a wide range of
today's diesel fuels and bio-blends"*

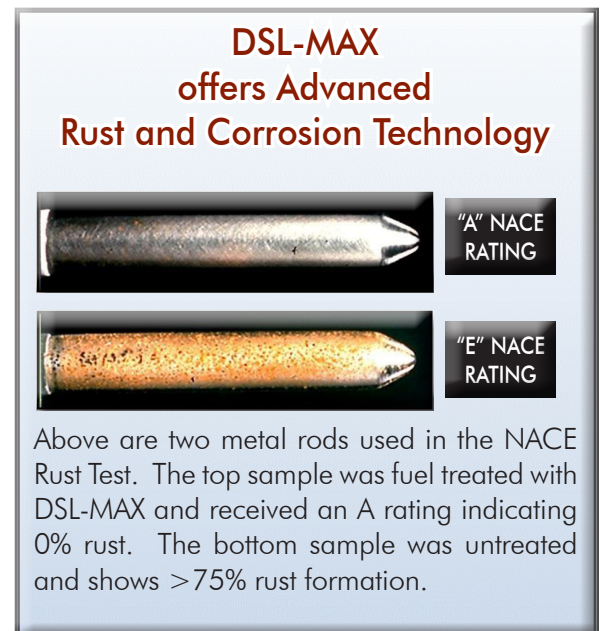
Fuel Stability and Oxidation

Today's refining process for ULSD and Bio-Fuel is producing diesel fuels weakened in a number of areas, including thermal stability and the level of anti-oxidants. These issues combined with advanced injection systems, higher operating temperatures and varying blends of fuel, can only be addressed with the latest in additive technology. DSL-MAX offers unparalleled engineering and addresses these issues at a time when it is needed most.



The Anti-Rust and Anti-Corrosion Technology found in DSL-MAX is incredibly effective. Preventing the formation of harmful rust and corrosion build up on surfaces within the fuel system allows for better performance and more efficient operation, in addition to increased equipment life. DSL-MAX also effectively manages rust in steel fuel tanks, another critical area. Elimination of steel corrosion in treated fuel, as demonstrated in ASTM D-665A, is the highest standard for prevention in this trouble area. DSL-MAX not only meets, but exceeds these recommendations for rust and corrosion protection.

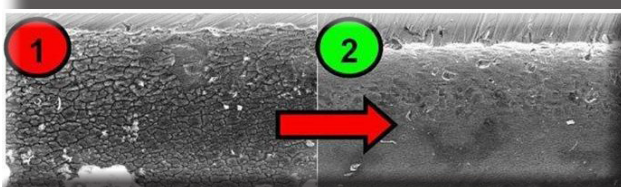
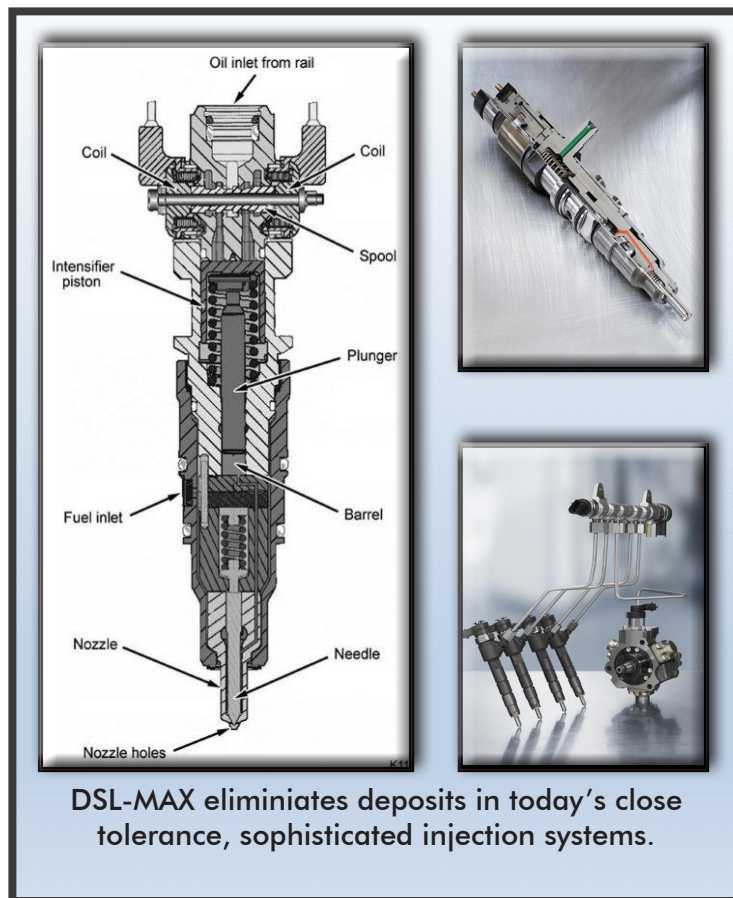
The ASTM D6468 Test is a standard procedure for determining a fuel's thermal stability, or resistance to breaking down under temperature and pressure. The results to the left show a filter after untreated fuel had been run in the fuel system. The picture on the right shows the same fuel run using DSL-MAX. By improving the fuel's thermal stability, DSL-MAX helps eliminate the harmful by-products of fuel oxidation and offers dramatic increases in performance and storage stability.



"DSL-MAX utilizes extremely effective anti-oxidant and anti-corrosion technology"

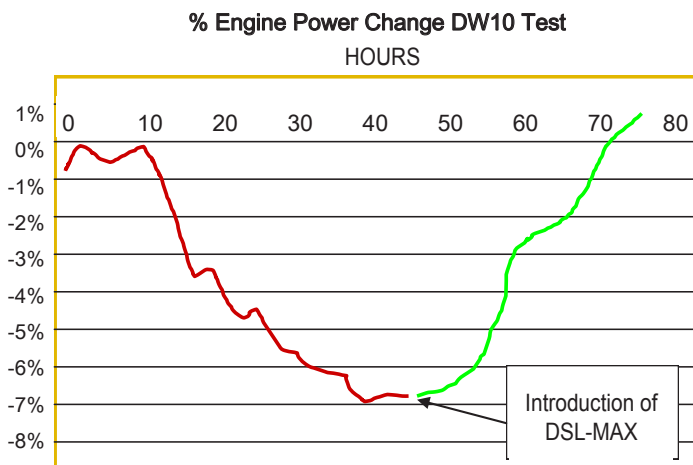
Injector Deposits and IDID's (Internal Diesel Injector Deposits)

Injector deposits have been an issue with diesel engines since their inception. However, with deposits on injector tips being the primary area of concern for decades, the arrival of IDID (Internal Diesel Injector Deposits) has turned the industry upside down. New High Pressure Common Rail Injection Systems represent the latest in diesel injector technology, and OEMs have invested billions in this state of the art technology. The problem today comes from the fuels and not the injection systems themselves. OEMs, including CAT, John Deere, Cummins, Volvo, Navistar, and Peugeot have all seen the formation of Internal Diesel Injector Deposits and the problems they represent. Unlike injector tip deposits, the clean up process is far more challenging with IDID and the impact of these deposits requires advanced additive technology like that found in DSL-MAX.



Injector after being run with untreated fuel. Injector after being run with fuel treated with DSL-MAX.

The correlation between harmful deposits and performance is a proven concern. As shown above, the formation of deposits cover internal surfaces inside the injector. These deposits can dramatically reduce power and fuel efficiency. The chart to the right shows the reduction of power from these deposits and the improvement in power once DSL-MAX is added to the fuel.

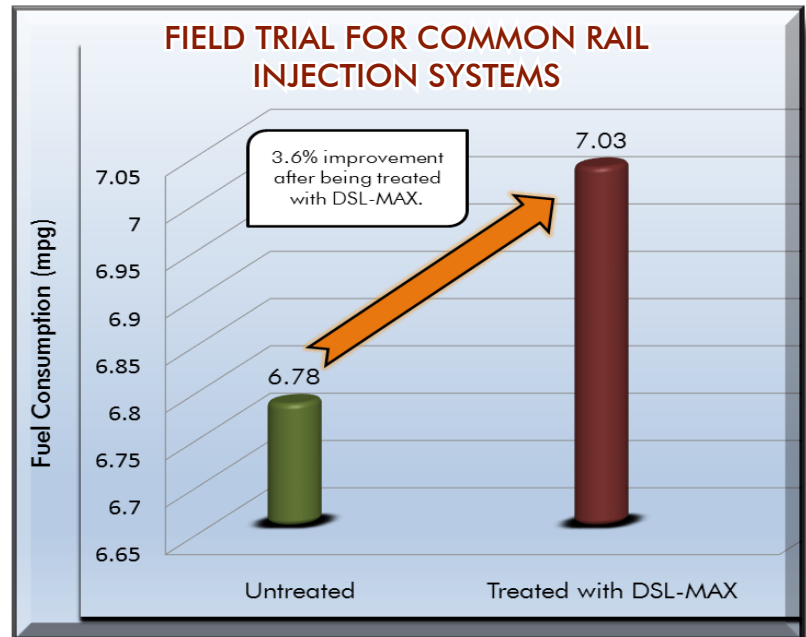


"DSL-MAX is the answer for today's sophisticated fuel injection systems"

Many of these Ultra Low Sulfur Diesels do not seem to be able to stand up to the injection pressures and the conditions inside the high pressure common rail systems and they are breaking down. We're seeing injector deposits form internally, they are not easy to remove, and a lot of the conventional detergent/dispersant type additives that might have worked great on L10 are not necessarily working in this application for "keep clean". This is a real concern and it's impacting all OEM's with high pressure common rail systems with the higher injection pressures.

John Deere Power Systems

While the industry's attention is focused on the crippling effects of IDID, in today's fuel systems the more traditional injector tip deposits remain a major concern. Any build up or formation of varnish and carbon will have significant impact on performance of equipment and lead to costly repairs & downtime. With very tight tolerances in these components, the slightest build up or formation of varnishes or carbon, can have significant impact on fuel consumption.



The formation of injector deposits can dramatically alter spray patterns and have an impact on an operation's bottom line in a number of ways. From maintenance costs and downtime to high fuel consumption.

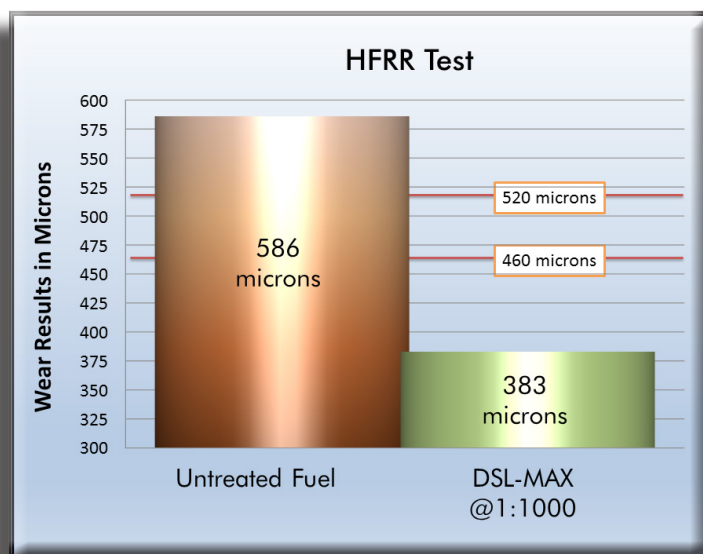


Royal Oil Co.'s DSL-MAX offers the detergent and cleaning power needed to "clean up" both IDID and Injector Tip deposits. In addition, DSL-MAX offers a "keep clean" technology that will protect equipment against the harmful effects of running today's fuels, tank after tank.

"DSL-MAX offers unparalleled fuel performance and fuel system efficiency"

Lubricity in ULSD ad Bio-Diesel

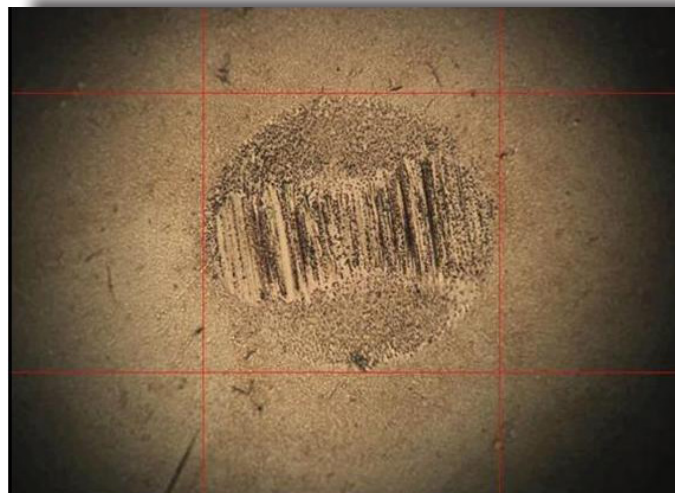
With a steady decline in the lubricity of Low Sulfur Diesel and Ultra Low Sulfur Diesel, OEM's and equipment operators have felt the harmful effects of wear to fuel system components. Implementing lubricity standards helped draw attention to the issue, though still leaving many questions unanswered. DSL-MAX provides levels of lubricity far exceeding the requirements of OEMs and that of other fuel conditioners. While maintaining the required regulations for low sulfur levels, Royal Oil Co. offers a solution to the industry's lubricity concerns with DSL-MAX.



DSL-MAX reduces wear up to 35%

Made from a variety of organic materials, Bio-Diesel has higher levels of lubricity than that of ULSD. The common practice of blending these fuels, to address the lubricity issues in Ultra Low Sulfur Diesel, has led to the highly unstable Bio-Blends the industry is experiencing today. DSL-MAX adds lubricity while addressing all the critical needs of today's fuels systems.

The HFRR (High Frequency Reciprocating Rig) Test is designed to measure the lubricity offered by a test sample of diesel fuel. Measured in microns, a wear scar can indicate the level of wear allowed by a fuel, both treated and untreated. The results compare untreated fuel to that of fuel treated with DSL-MAX. OEM's recommend a maximum wear scar of 520 and European standards recommend a wear scar below 460.

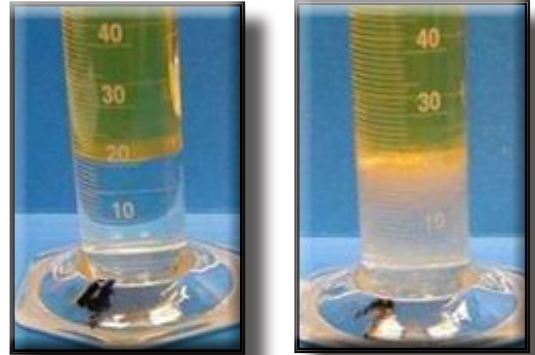


This wear scar is a perfect example of how low lubricity in fuel can damage fuel system components.

"DSL-MAX's ability to provide lubricity and reduce wear is exceptional"

High Water Content

DSL-MAX 's Advanced Additive Technology acts in a significant manner to control the effects of water in fuel. The demulsifier promotes the separation of water and fuel when water is excessive. In vehicle tanks where fuel is re-circulated, water separators are vital to the reduction of water build-up in fuel. DSL-MAX helps such systems by offering more efficient fuel/water separation. While using DSL-MAX, peak performance and drivability are maximized.



With fuel/water separation being a critical concern for OEM's, DSL-MAX offers what few products can - excellent demulsibility as seen in the sample on the left.

Cold Temperature Fuel Gelling

Fuel systems which once specified 25 micron filters now specify 10 micron filters or less. Filters can become clogged when temperatures drop and cloud points are reached.

The Cloud Point is the temperature at which solid wax materializes. With tighter filter restrictions, this is more critical than Pour Point, as it is reached at a higher temperature. In many units, when the Cloud Point is reached, plugging of fuel filters occurs and equipment fails. DSL-MAX dramatically lowers the Cloud Point and Pour Point of Diesel Fuel and Fuel Oils to allow fuel to flow at cold temperatures.



DSL-MAX controls wax crystals through its unique Advanced Additive Technology. By modifying the size and shape of wax crystals, DSL-MAX keeps wax crystals from combining with one another to form a gel. This helps fuel flow and equipment operate in severe weather conditions.

For best results, DSL-MAX should be added to the storage tank before adding the fuel. As the fuel is added, it will readily mix the DSL-MAX with the fuel. The same method can be used when adding DSL-MAX to fuel tanks.

DSL-MAX must be added to diesel fuel before the fuel has reached its cloud point.

"DSL-MAX offers solutions to an expensive concern"

DSL-MAX

*Keep product from freezing.

DSL-MAX has been registered with EPA per 40 CFR 79.23 Reg. #0285-0009.

This diesel fuel additive complies with the federal low sulfur content requirements for use in diesel motor vehicles and non-road engines.

DSL-MAX PERFORMANCE PACKAGES

TREAT RATE	Platinum Performance Package 1:1000 Drops Pour Point and CFPP an Average of 20°C	Gold Performance Package 1:2000 Drops Pour Point and CFPP an Average of 15°C	Silver Performance Package 1:3000 Drops Pour Point and CFPP an Average of 10°C
Recommended treat rate for Biodiesel B2 thru B20	✓ ✓ ✓		
Helps Reduce IDID (Internal Diesel Injector Deposits)	✓ ✓ ✓	✓ ✓	
Superior Detergency	✓ ✓ ✓	✓ ✓	
Reduces Emissions	✓ ✓ ✓	✓ ✓	
Reduces Smoke	✓ ✓ ✓	✓ ✓	
Adds to Fuel's Stability	✓ ✓ ✓	✓ ✓	✓
Helps Neutralize Acids			
Improves Fuel Economy	✓ ✓ ✓	✓ ✓	
Protects fuel from Oxidation at High Heat	✓ ✓ ✓	✓ ✓	✓
Restores Lost Horsepower	✓ ✓ ✓	✓ ✓	
Controls Gum Formation	✓ ✓ ✓	✓ ✓	✓
Added Lubricity, Exceeding OEM Requirements	✓ ✓ ✓	✓ ✓	✓
Reduces Filter Plugging	✓ ✓ ✓	✓ ✓	✓
Meets Federal Low Sulfur Requirements	✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓
Rust Inhibitors	✓ ✓ ✓	✓ ✓	✓
Corrosion Inhibitors	✓ ✓ ✓	✓ ✓	✓
Removes/Prevents Injector Tip Deposits	✓ ✓ ✓	✓ ✓	
Reduces Wear In Fuel Pumps	✓ ✓ ✓	✓ ✓	
Water Demulsibility	✓ ✓ ✓	✓ ✓	✓
	✓ Meets the Minimum Required	✓ ✓ Higher Level	✓ ✓ ✓ Highest Level

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This diesel fuel additive complies with the federal low sulfur content requirements for use in diesel motor vehicles and non-road engines.

Handling Information: For safe handling of the product, read the Safety Data Sheet (SDS).



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