



UNDERSTANDING DIESEL FUEL ADDITIVES

Performance Engineering for Diesel Fuel

An innovative way to reduce fleet costs, increase profits and turn Diesel Power Green

Skeptical – and Rightfully So!

Talk to most people about the use of diesel fuel additives, and they are immediately skeptical -- and rightfully so! With literally thousands of additives on the market, all claiming to guarantee better mileage and provide easier starting and more power, most people end up dismissing product claims. And, few additive manufacturers actually back up their claims with proven tests. Why not? The reason is simple: Most of these products, used at recommended treatment rates, will not meet the performance standards to which they lay claim.

Two main reasons exist for many additives' lack of performance:

- (1) Some are just poor products that simply do not contain or do not contain enough of the technically advanced chemicals capable of providing performance enhancement.
- (2) Others are too diluted. Yes, the base product would be capable of meeting the industry standards and the performance and mileage claims, but only if you used three or four times the recommended rate.

Performance Engineered Diesel Fuel: A new concept – or maybe not so new?

Smart fleet operators now look at various ways to reduce fuel and maintenance costs, including a new concept – Liquid Engineering of Diesel Fuel. Turns out, the concept is not that new. Refineries have always done some chemical work to get diesel fuel to meet regulatory standards.

So why has this concept been recently amplified? The answer is really quite simple if not obvious. Crude oil quality has been steadily degraded as we have passed the era of peak oil. We are now drawing more and more on lower quality crude oil stocks, which affect the base quality of diesel fuel. In addition, legal requirements for the use of Ultra Low Sulfur Diesel also affect the quality of the base diesel fuel available.

Using high-tech chemical engineering, some companies are now able to offer products that enhance the performance of diesel fuel to a point where it is cost effective – and, given the costs of fuel these days, it is not that hard to do. To get a solid understanding of how this technology works, and what it can do, you first need a good grounding in the performance aspects of diesel fuel, knowledge of standard industry testing and a decent understanding of diesel engine operation.

The additive market can be separated into two categories: marketing and professional.

Consumer-based products are usually displayed in attractive bottles with very vague information. They tend to hide the true cost such as how much is needed to treat a gallon of fuel. Consumers tend to look at the price of the bottle and disregard the treatment rate.

These products are typically watered down and the cost of the packaging is more than the value of the additive it contains. The huge profits generated from the watered-down product go to marketing, advertising and promotional incentives or gimmicks. These products are typically sold in retail environments where no time is taken to explain the product and its capabilities and where they are often purchased as impulse items.

Professional-based products are typically sold through specialty outlets such as performance shops, bulk fuel and oil dealers, professional repair shops, or directly to fleets. The sales teams promoting these products will typically spend time with the customer detailing the performance aspects and benefits of the product.

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Get the Facts about Diesel Fuel Additives

How do you separate the snake-oil products from the professional products?

Ask your Sales Representative these tough questions:

1. Do you have a good understanding of the operating principles of a diesel engine?
2. What type of water dispersal technology does your product use, if any?
3. Does your product contain a fuel stabilizer? If so, is it a thermal stabilizer or storage stabilizer or both?
4. What level of lubricity enhancer is included and what tests will it pass?
5. Does your product meet any industry standards with respect to degradation of seals, rubbers and neoprene?
6. If it is a winter additive, what technology does it use to control wax, pour point and cold filter plug point?
7. What tests does it meet with respect to corrosion and detergency?
8. Do you know the top tier treatment rate for the product in parts per million?
9. Does your product meet any "Clean Up" and "Keep Clean" industry standards, and do you know what these are?
10. Does your product contain any cetane enhancers, and if so, what type and what increase will it give?
11. Does your product significantly change the flash point of diesel fuel? (There are huge safety issues here.)
12. Does the product contain any corrosion and rust inhibitors?
13. Will the product affect the operation of Diesel Particulate Filters on new engines?
14. Is the product registered with the EPA for legal use with Low Sulfur Diesel fuel?

15. How many of the nine aspects of diesel fuel performance does the product address?

16. What is the recommended treat rate, and how much will it cost you to treat one gallon of fuel?

If your sales representative appears to be comfortable in answering these questions and clearly understands all of these concepts, then you are probably dealing with a professional who represents a professional product.

The bottom line is this: Too much is at stake to be dumping a product into your expensive diesel engine if you are not confident about what it contains. Products do exist that can be detrimental to your engine and fuel system.

Understanding Diesel Fuel Additives

Good diesel fuel additives can and will give you many cost saving benefits. The right additive can save you expensive repairs, provide better fuel economy and improve starting and overall performance.

But not all additives are made equal. The most basic additives are single purpose additives such as Lubricity Agents or Flow Improvers.

Lubricity Agents

A Lubricity Agent will provide additional lubrication to your diesel fuel, protecting pumps, injectors and upper cylinder parts such as valves and rings. This is all it will do! Yet there are lubricity agents with claims of improved mileage and starting. You could argue that if the fuel system was operating with less friction, it would improve mileage; however, the lubricity of standard diesel fuels has improved significantly since the early days of low sulphur diesel fuel, and while lubricity is an important factor, other factors are necessary for maximum performance.

Flow Improvers

Flow improvers will alter the pour point of diesel fuel at low temperatures. You also need to ensure that such a product contains a good wax controller, typically a product that prevents the formation of wax seed crystals. It is seldom water that causes plugged filters in cold weather, but more often than not it's the accumulation of wax on the filter surfaces.

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Such a product will control paraffin and wax, prevent filter plugging, and help prevent vehicles from stalling in cold weather, which as we all know can prove very costly indeed.

Several components are critical to the performance of an engine. Some of these components can be found in the fuel but in such small quantities that they provide basic maintenance but cannot provide the enhanced performance that will reduce costs in terms of repairs, downtime and fuel economy. The second tier of additives may contain these components, such as detergents, rust and corrosion inhibitors, water inhibitors, storage and thermal stabilizers, lubricity agents, cetane improvers and anti-gel agents.

Detergents

Detergents are used to clean gums, varnishes and carbons. Like everything else, there are good detergents and bad detergents. A good professional additive product will contain the most current detergent technology, meaning that the chances of harming parts such as seals are non-existent. Many of the old generation detergents contained strong alcohols and sometimes even turpentine. These products can easily do more harm than good.



New generation detergents are capable of cleaning at very low treatment rates and do not contain any harmful formulae and should meet Cummins L-10 superior clean up test criteria even when applied in very low dosages -- translating to cost savings for the fleet operator.

Detergents also play a very important part in extending engine life. Most of us tend to focus on the benefits of diesel fuel additives as they relate to fuel injection components. However, a huge benefit is related to piston ring and cylinder bore life. When compression is developed in the cylinder, the compression enters the area behind the piston rings, forcing the rings outward, thus getting a good compression seal. When that pressure is released, the rings will actually turn in their grooves.

Because low sulphur fuel develops a great deal of carbon, this carbon will collect behind the piston ring, destroying its sealing and rotating action. Remember that the top piston ring on the latest diesel engines is located very close to the top of the piston. Consequently, it is very easy for excessive carbon to collect in the ring and cause serious damage -- resulting in reduced engine life. By using a premium additive, you can prevent carbon deposits from building up, and if they have already accumulated, the detergent will remove accumulated deposits. If deposits have built up, we strongly recommend a full system flush which can be done with the use of a "clean-up" product.

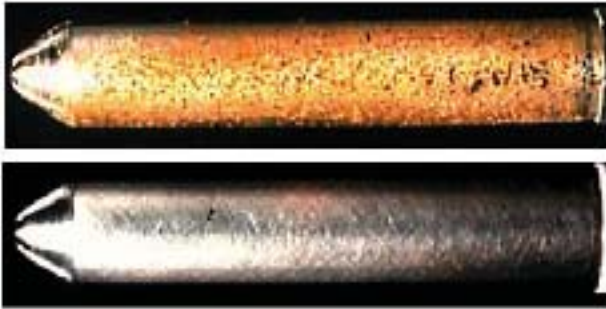
Thermal Stabilizers

Another area that is effectively treated by a good detergent along with a thermal stabilizer is the build up of varnish and gums. Low sulphur fuel tends to have poor thermal stability, meaning that a variety of unwanted chemical reactions take place at high temperatures. These reactions lead to the development of varnish and gums, which can be seen in the form of plugged filters, sticking valve stems and even stuck piston rings.

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The above pictures show an injector needle after 250 hours with untreated fuel, followed by fuel treated with DSG 4Plus Premium.

Corrosion Inhibitors

Corrosion is a natural by-product of the combustion process. Corrosion inhibitors prevent the formation of corrosive chemicals in the fuel system. They should also meet NACE specifications. A good inhibitor will save you a great deal of expense and down time by preventing small amounts of water and other corrosive agents from damaging internal parts.

You can see from these pictures that an anti-corrosion additive has been very effective at saving this injector from severe damage -- the type of damage that drives up your maintenance costs.

Water Tolerance

Water, which is present virtually all the time in diesel fuel due to condensation, can be very dangerous to a fuel injection system. A water control additive demulsifies water so that it is separated from fuel and the equipment's fuel filter / water separator will remove the water preventing it from going through the injection system. This does make quality filtration critical. Also, if you control water in fuel, there is a smaller chance that the growth of algae / micro-organisms will be inhibited. This technology is what is required by OEMs today and replaces old technology that 'magically' made water disappear.



Fuel Savings: Good Additives Can Do It!

Claims are often made by various additive manufacturers that are very general -- and seldom backed by solid facts. Take , for example, the claim, "improves fuel economy by 6%." Is this for every vehicle? The truth is that fuel economy savings will vary significantly depending on various factors such as: the type of fuel used, the condition of the engine, the cetane level of the fuel, climatic conditions and more.

Cetane Improvers

Modern diesel engines are designed to run with a Cetane number of around 50, but most fuels on the market weigh in significantly lower. By adding a cetane improver to diesel fuel, one is able to better control combustion, leading to improved engine efficiency and resulting reduction in fuel consumption.

Thermal Stabilizers and Detergency Agents are also agents of improved fuel economy. When the fuel system and upper cylinders are kept free of wax and gum, the system is able to operate more efficiently. When this happens, the engine produces better power and torque. Better power and torque mean that the operator does not have to keep his foot on the accelerator pedal as much, and this leads to better fuel economy.

At the end of the day, good fuel additives don't use smoke and mirrors to deliver performance -- just excellent formulations that do the job.

DSG Power Systems Fuel Additives Deliver Improved Fuel Performance and Protect the Environment

Since 1983, DSG Power Systems has been developing diesel fuel enhancers that significantly improve diesel engine performance and reduce fleet costs -- without wrecking havoc on your vehicles. We are one of the few diesel aftermarket suppliers to guarantee its products against engine and particulate filter damage.

Thousands of satisfied users of DSG Power Systems's 4PLUS Premium and other DSG products report fuel mileage improvements ranging from 3% to 20%.

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Using Fuel Economy Test J1321 over a period of 15,000 miles, highway trucks using fuel with DSG 4Plus added were compared against the same trucks with standard fuel. Significant improvements in fuel economy were observed, ranging from 1.8 percent to 2.97 percent. Taken over a year, these savings alone will more than cover the cost of using our Premium Diesel Fuel Additives.

Along with the savings in fleet costs, DSG additives help to protect the environment.

Testing was done on buses at the City of Fredericton. Base fuel was used and emissions recorded. 4Plus was then added to the diesel fuel and repeated tests were run. Progressive clean up was apparent and after several tests, the following emission reductions were recorded:

Hydro Carbons	-14.6%
NOx	-1.0%
Carbon Monoxide	-6.8%
Particulates	-5.1%

DSG Meets or Exceeds all Industry Tests

DSG additives have been subjected to all the relevant industry tests to ensure that the product we offer meets our performance claims. Our commitment to customer satisfaction demands that we subject our products to these tests. Below are some industry tests which DSG products consistently meet or exceed:

- Cummins L-10 Superior
- Cummins N14
- EMA Corrosion requirements
- NACE rust test
- Thermal Stability
- EMA/TMC and NCWM criteria for premium diesel lubricity
- Injector Deposit Detergency rating (L-10 IDT/CRC)
- ASTM lubricity quality testing

Understanding additives and how they benefit your diesel engine will save you money by offering improved performance and protection from costly repairs and downtime.

Start saving money today. The assurance that you have purchased the best fuel enhancement products on the market, is a ***valuable asset to your Peace of Mind.***

Invest in your Peace of Mind order 4Plus Premium Fuel Enhancers and help to protect the environment.

1-800-667-6879

Our Team of Diesel Specialists are waiting to help you get started saving money & protecting the environment

To learn more about how DSG Power Systems can help you improve fuel performance and reduce fleet costs, contact DSG today at 1-800-667-6879 or e-mail our sales department at sales@dieselservices.com.

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