FUEL ADDITIVES: PART IV

In the last installment we discussed lubricity—how it's measured and why lubricity improvers may be worthy of consideration. In Part IV of the series, we'll look at selection of lubricity additives and ensure that you get what you pay for.

Selecting Lubricity Improvers

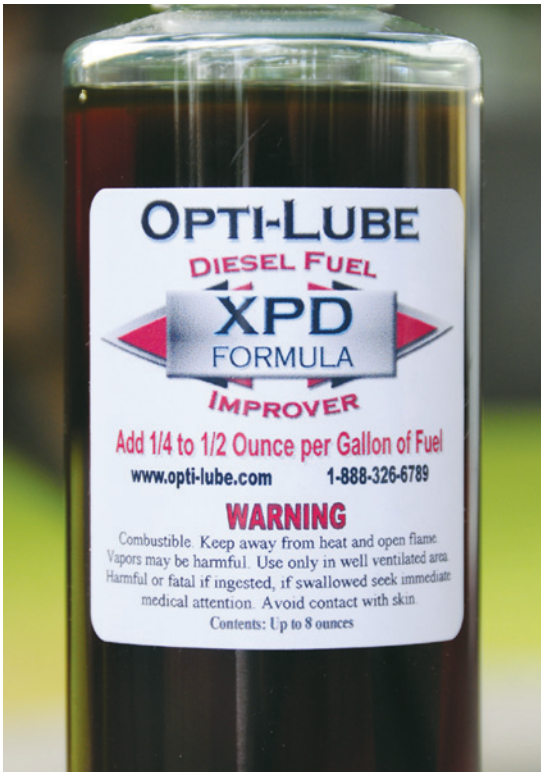
How do you choose a lubricity improver? Start by asking the manufacturer if they have tested fuel dosed at the recommended concentration with their additive using the High-Frequency Reciprocating Rig (HFRR) mentioned in the previous column. If so, what was the wear scar size or improvement when compared to untreated fuel? If they reply, "What's a high-frequency whatchamacallit?" then confidence in the representative and the product's ability to enhance lubricity would necessarily be called into question.

Manufacturers and vendors of these products should be well versed in their content and performance should be measurable, even if it's not from an independent third-source lab, although that's certainly preferable. It's too easy for manufacturers or distributors of additives to rely on anecdotal evidence. The familiar testimonials that heap praise on a product based on users' experience, while valuable to a point, should only serve as an adjunct to solid, scientific lab results.

Lubricity improvers should never be used unless you have first determined their makeup. Don't worry, this doesn't mean that you have to head to the community college for a night chemistry class. Instead, determine if the additive contains an acid-based dimer or monoacid-based lubricity enhancer. This type of lubricity agent, while very effective at reducing wear, is also highly reactive when it comes into contact and combines with metal cations such as calcium and sodium, elements that are frequently found in fuel tank bottoms. Even if your fuel tanks are spotlessly clean, these contaminants can exist as residuals from the refining process, that is, they enter the tank with the fuel. Ultimately, this reaction forms what the industry refers to as "soaps." As the name implies, it's a waxy, viscous deposit that is capable of clogging filters and causing injection system deposits.

Additionally, if the additive performs other functions, such as mitigation of water, ensure that it is alcohol free. Most diesel engine and fuel injection system manufacturers prohibit the use of additives containing alcohol.

Ideally, the lubricity improver that you choose will be recommended or at least approved by your engine (and generator) manufacturer.



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The problem with lubricity is there's no easy way to determine if the fuel meets the spec or not, and even if it does, many engine manufacturers believe it's not conservative enough. Erring on the side of caution means using a lubricity additive.

Engine manufacturers who recommend lubricity improvers do so knowing that users will likely include them with brand-new engines—engines that are under warranty. They have a strong incentive to provide or approve a product that will extend the life of the injection system components and avoid filter clogging or deposition of substances within the fuel system, all of which generate undesirable warranty claims.

You also have the option of obtaining your fuel from a source that guarantees its lubricity to be better than commercial-grade diesel fuel, such as ValvTect. I've interviewed the folks at ValvTect on several occasions on a variety of fuel-related subjects, including lubricity. I'm happy to report that they do carry out HFRR tests on the additives used to formulate their ValvTect Marine Diesel Fuel and guarantee that their marine-grade diesel and additive exceeds, at the very least, the ASTM 520-micron wear scar requirement used by refiners for commercial-grade ultra low-sulfur diesel (ULSD) fuel.

The bottom line on lubricity improvers is that they make good sense and are cheap insurance considering how costly damage from fuel that lacks proper lubricity can be.

Cetane Improvers

Cetane is roughly analogous to gasoline's octane; however, its effects on the combustion process are just the opposite. Octane retards the combustion process, encouraging gasoline to burn rather than explode (this is why higher octane gasoline reduces knocking; the knocks are small explosions inside the cylinder), while cetane makes diesel fuel more likely to ignite. Diesel fuel relies on

heat generated by the compression of air within the cylinder to ignite the fuel. Encouraging this process with higher cetane minimizes the delay between the moment the fuel is injected into the cylinder and the point at which it begins producing power. This makes starting easier, reduces smoke, and *generally* improves engine performance. Higher cetane content can also reduce engine noise as well as the formation of crankcase oil sludge and combustion chamber soot.

Cetane content, expressed as a number often between 40 and 55, is one measure of a fuel's ignition quality. Most diesel engines benefit from higher cetane fuel, however, high-speed diesels stand to benefit the most because the rate at which their pistons move necessitates the quickest possible combustion process. All diesel engine manufacturers specify a minimum cetane requirement for their engine design.

If it's necessary to crank your engine for long periods (anything longer than about three seconds is too long) to attain self-sustaining combustion and if the start-up process is accompanied by billowing clouds of white smoke, shaking, and heavy vibration, then it may be worth trying a tankful of fuel doped with a cetane booster. Typically, cetane boosters will raise the cetane level by three to seven points. Anything over 50 offers no additional performance enhancement or value.

As useful as it is, a cetane booster isn't a mechanic in a can. It won't remedy valves that are out of adjustment, carbon-clogged piston rings, weak batteries, or undersized battery cables—all maladies that will produce symptoms similar to low-cetane fuel. Before using a cetane booster to remedy one of these issues, it's important to make sure your engine is in proper working order.

Even if your engine is new or expertly maintained, while it may not be necessary, it will nearly always benefit from fuel with higher cetane content. Cetane sold at fuel docks is often either 40 or 45. If you have the option of choosing, the 45 is worth the small increase in price as you will likely realize a slight increase in fuel economy. Otherwise, buy the cleanest fuel you can get and, if you choose, use a cetane improver to obtain the fuel economy, starting, and running characteristic benefits it provides.
—Steve D'Antonio