



## Where Fuel and Engine Technology Collide

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As winter comes to a close (if you even can call it a winter), I often hear many premium winter diesel fuel buyers and sellers deliberately transitioning to generic diesel to save a point or two. Or as Charlie Sheen calls it, “winning.” It is this mindset that raises concern that these individuals clearly do not understand the value or the purpose for continuing to invest in premium products year round. I frequently speak to change, diversification and the need to evolve, but when it comes to talking diesel and the changes surrounding it I cannot say enough about how much this market segment has and will continue to evolve. Many believe that the only real change specific to diesel has been the transition to Ultra Low Sulfur Diesel many years ago. I wish it were that simple.

The technology at the core of the modern diesel engine is very sophisticated, and developments like high pressure common rail (HPCR) direct fuel injection systems have transformed vehicle performance beyond your wildest imagination. Today’s engines are undisputedly more powerful and more efficient, resulting in lower emissions. Law makers presented engine manufactures with the challenge to improve fuel economy while reducing emissions, a job well done. Unfortunately no one consulted the manufactures of the fuel beyond demanding lower sulfur products, and this is where fuel and hardware collide. Since the introduction of ULSD in 2006, the transition to sophisticated high-tech diesel engines has been plagued by a number of issues such



as injector failures, filter plugging, loss of power and poor fuel economy.

The problem is that under the extreme conditions that exist in vehicles equipped with High Pressure Common Rail (HPCR) and High Pressure Fuel Injector (HPFI) engines, ULSD fuels are not as stable as first thought. The basic principles of removing sulfur from the fuel have had severe effects on fuel properties. Removing the sulfur not only affects a fuel's natural lubricity. The process also removes nitrogen and oxygen. Without these naturally occurring components there can be problems with the fuel's low-temperature handling, thermal stability and corrosion potential.

This presents the fuel industry with the challenge of extracting maximum performance from today's super-efficient engines while working with more problematic, yet environmentally friendly, ULSD fuels. High performance diesel engines operating on ULSD can be negatively affected by deposit contamination because of the extreme heat and high pressures generated by advanced fuel injection equipment. In this high pressure, high temperature environment, a fuel is thermally stressed. This causes it to break down and create a black soot-like material.

Under these conditions, carefully engineered components no longer work as intended. The deposits not only foul injectors, but they also get returned back to the saddle tank via the return fuel line. This circulates dirty fuel throughout the fuel system causing premature fuel filter plugging, loss of horsepower and significant loss of fuel economy.

To meet the demands associated with these widely recognized operational issues research and development teams of some of the largest additive manufacturing companies set out to develop technologies that not only conditions the fuel to prevent this in-engine thermal stressing, but also cleans up existing deposits and keeps the injectors and filters in like-new condition. Years ago when we would discuss fuel system performance, or lack of it, we would focus on carbon deposits built up on the injector tip. Today stubborn deposits build up around the injector valve seat, nozzle injector tip and control valve, inhibiting fuel flow and adversely affecting engine performance.



Through the exhaustive and thoughtful research and development of these solutions there are now strategies available to help stabilize diesel fuel to withstand the extreme temperatures and pressures of these injection systems. These next generation fuel solutions are engineered to address this specific phenomenon. Field and laboratory tested formulas exist that contain advanced diesel detergents as well as a unique component recognized today as antifoulant chemistry. Once the fuel has been stabilized, carbonaceous deposits are not created; the filters remain clean as it removes any existing deposits to prevent injector failure.

Essentially this treatment strategy is the ultimate fuel system cleaner. Professional fleet managers who have adopted this fuel treatment strategy are enjoying the benefits of a clean engine. This not only improves horsepower and restores lost fuel economy, but also emits fewer pollutants from the exhaust system. Simply stated if you provide diesel fuel for on-or-off road use or are a diesel fuel customer yourself, you need to investigate strategies to reduce harmful exhaust emissions by conditioning the fuel to help restore an engine to its optimum state. This has important environmental benefits and can be a course of action to help both you and your customers reduce operational expenditures.

I shared the story of the buyer who elected to drive into the generic diesel fuel loading rack position on April 1. The intention was to save a point or two, and everything being equal, the savings probably amounted to \$50.00 on this trailer load going to an unsuspecting fleet buyer. As I close I would like for you to weigh what aborting year-round treatment ultimately costs a fleet. We know it will cost you your credibility but for the actual user there is an economic loss. A failed injector can run \$1,000. I have been advised that when that injector is serviced they generally service them all, so add the labor of \$9-10 thousand, fuel filters, \$30 - \$200, chasing a vehicle with a hook, \$600 - \$1000. So I ask you, are you really "winning?" Is the customer you saved the \$50 - \$150 dollars "winning?" Short term - yes, long term, I think you know the answer.

It's easy to say that your customers want the lowest cost diesel and heating fuel, that they shop you, beat you down and only ask about the price. Having a strong background in dis-



tillate fuel sales, I'm inclined to agree with you on the surface. Regardless, we owe it to our customer to share what we know about the evolution of the diesel and the engines which are combusting it, and make them aware that these deficiencies necessitate a closer look and a more ratable commitment to purchase a quality fuel to help minimize downtime and to reduce their total investment on fuel.

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