



## Fine Fuel Filtration Truckers' Next Challenge?

STREET SMARTS IS A MONTHLY COLUMN DEVOTED TO THE ON-HIGHWAY ENGINE MARKET. JIM WINSOR IS EXECUTIVE EDITOR OF *HEAVY DUTY TRUCKING* AND DIRECTOR OF MARKETING FOR NEWPORT COMMUNICATIONS.

**By Jim Winsor**

The overall cleanliness of diesel fuel, or lack thereof, coupled with poor storage and house-keeping practices may be the next big problem the trucking industry may have to deal with. Evidence is pointing in that direction. Much of the problem is related to micron filtration size and water accumulation in diesel fuel as it reaches pumps and injectors.

Problems are likely to hit the trucking industry first as this segment of the diesel engine business is the first to deal with EPA's low exhaust emission regulations and with it, the families of new or redesigned engines and especially pump and injection systems. Ten years ago, maximum diesel fuel system pressures rarely exceeded 3000 psi. Today's advanced systems can be as high as 30,000 psi and therein lies the problem.

The issue first surfaced about 20 years ago in newly developed high-pressure hydraulic systems that utilized servovalves whose service life was dramatically shortened for no apparent reason. Pumps and valves which lived tens of thousands of hours in low-pressure systems began failing after just hundreds of hours in the new high-pressure systems. Investigation showed that ultra-fine particles in the hydraulic oil were no problem in systems operating at 1000 psi or less, but were the culprit in high pressures.

Lab work revealed that particles in the 5 to 10 micron sizes were the most

abrasive size group and were the cause of shortened component life. It turned out the 7 micron particle was the perfect fit between micro-machined clearances and would actually grind away on metal surfaces, causing accelerated wear resulting in a drop in pump pressures and causing servovalve orifice erosion.

Ultimately, the International Standards Organization (ISO) developed a cleanliness code system, allowing lubrication engineers to target cleanliness levels for high-pressure hydraulic systems. It worked and by following recommended ultra-fine fluid filtration, system life returned to acceptable levels.

A modern diesel engine fuel system is closely related to an ultra-high hydraulic system other than hydraulics are a closed loop system and the same fluid is refiltered in each pass. With diesel, except for onboard fuel which is recirculated in the fuel tank to engine loop, there's only one chance once onboard the truck to filter the fuel on its way into the injection system.

Experts in the lube and fuel industry tell me that, at best, fuel leaves the refinery around 30 microns. Particles sized smaller are unfiltered. It then passes through pipelines, barges, rail cars and tank trucks. Sometimes it goes into long-term storage. Along the way, there are "opportunities" for dirt and water to creep into the fuel — not intentionally, of course. Fuel filters at truck stops are typically no finer than 30 microns and when filters start to plug which slows down fueling rates, unscrupulous or ignorant operators may remove the filter or punch holes in it so as to speed up truck fueling. Fleets have been known to do the same thing.

I'm told most onboard truck fuel fil-

ters are a nominal 15-micron rating. This means that quantities of ultra-fine dirt passing through high-pressure pumps and injectors silently and gradually may be degrading them until performance and a gradual decrease in fuel mileage becomes evident. By then the damage is done.

Caterpillar appears to be leading the way by requiring super-fine onboard filtration. Cat truck engines, are now using 2-micron fuel filters. This means that such fine filtration products are now available in the marketplace.

Fleets, for the most part, are still unaware of the impending problem because few are having pump and injector failures — yet. Many fleet managers are more concerned about plugging fuel filters, especially in cold weather, which will shut a truck down. Some have been known to remove filters as their solution. Poor maintenance practices add to problems by allowing water to collect in a fleet's diesel storage tanks.

Some fleets are adding on-board low-micron secondary fuel filters in combination with fuel-water separators and fuel heaters. Some are draining off tank bottoms at PM service. Some during freezing temperatures use an old New England fleet manager's trick: add 1 pint of isopropyl alcohol (common drugstore rubbing alcohol) to every fuel tank monthly. Alcohol absorbs water and it's cheap!

I'm sure you will be hearing more about these fuel and filtration issues as the months go by. The Technology and Maintenance Council (TMC) will be addressing this subject at its annual conference next March. It's that important. ★