Million Mile Teardown

On May 18, 2017, Dave Marti Trucking's 2007 Peterbilt 379, featuring a Cat C15 diesel engine, turned 1,000,000 miles without issue. The engine was torn down in December 2017, and almost every part was analyzed. The engine was in outstanding condition. We sincerely appreciate Dave's loyalty to FS and his willingness to help us tell the story about his truck. While not everyone can or will choose to run equipment to a million miles, we want you to know it can be done. Dave did it! This article is dedicated to highlighting the results of Dave's meticulous maintenance coupled with high-performance FS fuels and lubricants**.**

Engine Wear

Cylinder liners sit inside the block and house the pistons. A critical element of the cylinder liner is honing, otherwise known as crosshatch. Honing creates microscopic peaks and valleys on the liner wall that help retain a protective film of oil for better long-term protection of engine parts. It enhances the engine's cooling capacity, protects the ring's ability to seal, improves heat transfer capabilities, defends against combustion gas leakage, prevents piston skirt scoring, and helps maintain better compression to assure power.

Low-quality diesel engine oils allow lacquer and sticky deposits to form in the honing grooves of the cylinder liner, resulting in a smooth, glazed liner surface finish. The glazed finish is caused by wear and deposit buildup and ultimately leads to a dramatic increase in oil consumption along with a decrease in torque and horsepower.
Even after 1,000,000 miles, the cylinder liners exhibited outstanding honing retention. Dave had used FS Suprex Gold ESP® the entire time, and it had done its job of protecting the liners.

In addition to leading viscosity modifier technology that lasts longer than competing brands, Suprex Gold ESP contains a unique detergent system that retains a high level of total base number (TBN) to neutralize corrosive acids throughout the oil drain interval. It also contains robust anti-wear chemistry that coats metal surfaces to prevent metal-to-metal contact, antioxidants to limit the rate of acid production caused by oxidation, and dispersants to hold soot particles in suspension instead of allowing them to build up on liner walls and pistons. The result is a balanced formula, longer-lasting protection, and the potential to safely extend oil drain intervals. *

How did the other parts look? Watch highlights from the two-day teardown and hear from the JX Peterbilt mechanic yourself: https://youtu.be/Tq6QVrN1DZw.

*FS always recommends utilizing Used Oil Analysis if looking to safely extend oil drain intervals.

Complete Combustion

The teardown also gave us the opportunity to evaluate evidence left behind by fuel combustion in the combustion chambers. Dave's truck is used primarily for short hauls, providing opportunity to routinely fuel up with Dieselex Gold® additized diesel fuel.

Figure One shows the piston and combustion chamber once the head had been removed. The lack of carbon buildup was evident on these parts even before they were removed from the block. The pistons and cylinder liners only look slightly used even after a million miles.

Figure One

Figure Two looks closer at the piston crown. The spray pattern of the fuel can easily be seen here. This is significant because a uniform pattern indicates the injector was free and clear of deposits and working properly, as intended. With the piston removed, we also see no carbon packed into the rings around the edge, allowing them to move freely as designed and eliminating "blow by" of oil into the combustion chamber.

Figure Two

Figure Three

Figure Three is a close-up view of a piston from a typical engine overhaul, but from a vehicle not using Dieselex Gold and with only about 300,000 miles of operating time. The carbon buildup on the piston crown was partially removed with a grinder to show the contrast of the original piston surface and the amount of carbon. Comparing this with **Figure Two** highlights the stark difference between Dave's piston and the typical scenario of using lower-quality fuels in terms of the amount of carbon buildup that can be expected on the piston crown. Also note the lack of spray pattern.

It's one thing for us to talk about the benefits of Dieselex Gold but showing the real-world results of one of our customers is much more convincing. The components of Dieselex Gold unquestionably improve fuel system performance. They keep engines clean while reducing fuel consumption and emissions. Engines perform more like new, and for Dave Marti, even after a million miles.

Total Fuel System Protection

While Dave Marti's million-mile truck provided real-world evidence of the benefits of quality products and meticulous maintenance, it didn't tell the whole story regarding Dieselex Gold. Complete combustion, clean engines, maximized power and efficiency, and wear-protected engine parts are only part of the story.

Clean, dry fuel is essential to the operation and efficient combustion within engines utilizing a high-pressure common rail (HPCR) fuel system. Fuel quality management (FQM) is important and can work synergistically when used in tandem with a fuel like Dieselex Gold.

Moisture, mainly from condensation, is the beginning of most fuel quality problems. Excessive condensation leads to free water at the bottom of the tank, creating an ideal environment for bacteria and corrosion. Tactics to reduce the amount and effects of condensation include keeping the tank full, tilting the tank away from the suction pipe, installing proper venting, and providing shade for the tank. A regular check of storage tank bottoms is recommended.

Filtration is another useful tactic for keeping fuel clean and dry. Today's HPCR engines contain moving parts with very tight tolerances. Even small particles can get stuck between moving parts and cause sticking and wear. Filters effectively remove rust, corrosion, and other particles that can harm engines. Using a Hydrosorb® filter can also remove small amounts of water and provide an indication of more significant water problems.

So how does Dieselex Gold make FQM even more effective? Demulsifier chemistry in Dieselex Gold encourages free water in the fuel to drop to the tank bottom for easy removal, ultimately preventing corrosion and sludge. Another technology, commonly used in the aviation industry, increases the fuel's capacity to hold dissolved moisture, allowing it to keep tanks dryer. Dispersant chemistry in Dieselex Gold keeps solid particles that are not caught by the fuel filter small enough to pass through the fuel system without causing harm. Its lubricity component helps prevent wear on pumps and injectors as well.

Regularly following FQM procedures coupled with the performance and protection of using Dieselex Gold can improve the quality of the fuel entering the engine's fuel system and ultimately optimize combustion within the cylinder. See your local FS Energy sales professional for more information on FQM and Dieselex Gold.