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Case Study

Application of FuelSpec® 114-05 on ULSD 2007 Volvo Tractor with Cummins ISX 400 ST Engine

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Introduction

Mr. Greg Benkert owns Benkert Trucking, based in Houston, Texas. Greg drives for the “Landstar System” transportation company.

Benkert Trucking operates a 2007 Volvo tractor with a Cummins ISX 400 ST (EGR) engine. At the time of the inspection of the truck on September 16, 2014, the tractor had about 675,000 miles on it.

The truck has only been driven by Greg, who bought it new. Greg has been using FuelSpec® 114-05 for about five years on this tractor.

The tractor has two (2), one hundred and fifty (150) gallon tanks. Greg uses a total of 10 ounces of FuelSpec® for 300 gallons of ULSD (at a dosing ratio of 1 ounce of FuelSpec® 114-05 added to 30 gallons of ULSD; or, 1 part catalyst to 3,840 parts of fuel).

This study is authoritative for several reasons –

- ordinarily, this kind of long-term “longitudinal testing” is impractical due to the cost involved in observing and opening the vehicle’s engine
- most trucks are operated by multiple drivers and a continuous performance observation of the same vehicle under similar conditions of operation, is generally not available
- Greg is extremely diligent about operating and maintaining the vehicle and has kept meticulous records of the tractor’s performance
- the lack of carbonization and soot deposition on a truck engine with 675,000 miles is so remarkable, that Diesel mechanics who are knowledgeable in this field find these results to be noteworthy

Summary Results ¹

At 600,000 miles of service, a visual inspection of the exhaust spaces and the exhaust ports showed no carbon deposition or soot buildup (for example, exhaust valves stems were shiny and clean and the exhaust ports were also clean). EFS confirmed these results by undertaking another inspection of the tractor’s exhaust spaces at 675,000 miles (details of this inspection, including borescope pictures are reported under the section **Truck Inspection**).

Chemical analysis of lubricating oil shows no soot levels, with oil changes occurring at intervals of over 100,000 miles.

¹ background and additional information pertinent to this Case Study (including original borescope pictures with a higher resolution than represented herein) is available upon request



Engine runs quieter, more smoothly, and without black smoke during high acceleration periods.

Greg uses an online fuel consumption program (“Kevin Rutherford Online”) to determine average mileage; he calculates his average mileage to be about 7.75 to 8.0 miles per gallon of fuel, when hauling about 36,000 to 40,000 pounds of load. This average mileage is significantly higher for the given load than what would be expected for this engine, and in comparison with other equivalent tractors.

Performance Benefits

Greg has observed the following benefits since using FuelSpec® 114-05 –

1. The engine runs quieter and more smoothly
2. No black smoke in exhaust, specially under high throttle conditions (Greg keeps his truck clean and stated there was no soot deposition around the exhaust, after he started using the catalyst)
3. Greg uses the “OPS-1” oil purification system since before using the catalyst and chemically tests his lubricating oil between changes (oil tested for soot, metal, water and other contaminants); Greg stated that before using the catalyst, he was changing his oil at around 80,000 miles, and as a result of the catalyst, he is now changing the oil at intervals of over 100,000 miles; the levels of soot in the oil are now “non-existent” as a result of using the catalyst
4. About one year ago, as part of routine maintenance, the truck turbocharger and EGR valve were replaced, the exhaust manifold was dismantled and a new gasket was put on the exhaust manifold –
 - a. As part of this work, the mechanic (at Sweeten Volvo Truck Center in Houston) noticed that the exhaust manifold was remarkably clean with no soot and carbon buildup anywhere on the manifold
 - b. This was so unusual the mechanic called to show this to Greg; the mechanic shined a light inside the cylinder head and showed Greg the exhaust valves and the combustion chamber were completely clean with no soot buildup and carbonization
5. Greg also reported that about seven months after he bought the truck, and before he started using FuelSpec® 114-05, the truck’s EGR valve had failed –
 - a. At the time of the repair, he noticed the EGR valve was completely clogged with soot, to the extent it was stuck and could not function properly
 - b. Greg was told the water jacket in the EGR valve was too small and that was the cause of the failure, and a new valve with a larger water jacket was installed

- c. The new valve also failed within less than one year, and upon inspection was also found to be clogged with soot
 - d. A third EGR valve was installed; around this time, Greg started using FuelSpec® 114-05
 - e. Subsequently, after two years of trouble-free operation, Greg went in for routine maintenance and opened the EGR valve to see it's condition (not because it had failed); upon inspection, Greg observed no soot or carbon deposition but only a light carbon film of the consistency of "baby powder" on the EGR valve surface
6. An inspection of the exhaust and emissions side of the engine provided the following results –
- i. EGR cooler inside is cleaner
 - ii. EGR valve is not clogging up and failing
 - iii. The turbocharger insides are cleaner
 - iv. The exhaust pipe insides are cleaner without the heavy soot buildup experienced earlier
7. Overall Greg reports a reduction in his maintenance and operating costs, and he has recommended the product to several other truck owners

Truck Inspection

EFS performed an inspection of Greg's truck (**Picture 1**, below) on September 16, 2014 (the inspection was conducted at the Sweeten Volvo Truck Center, at 10111 East Freeway, Houston, Texas 77029).



Picture 1

The truck had about 675,000 miles on it at the time of this inspection.

The tractor's exhaust side was opened and a borescope (**Picture 2**, below) was used to inspect the exhaust spaces.



Picture 2

The pictures of Greg's truck (Truck 1), taken using the borescope were compared to similar views taken from another truck (Truck 2), also with a Cummins ISX engine with about 700,000 miles on it (Truck 2 was in the shop at the time of the inspection, and according to the mechanic and Greg, Truck 2 is representative of what the exhaust spaces should look like after 700,000 miles of service). A comparison of similar borescope views shows that Truck 1 has an extraordinary lesser amount of carbon deposition than Truck 2. The carbon deposits and flakes can be easily seen in each view for Truck 2, whereas Truck 1 has no carbon build-up.



Picture 3 – bottom of exhaust valve stem, Truck 1



Picture 4 – bottom of exhaust valve stem, Truck 2



Picture 5 – bottom of exhaust port, Truck 1



Picture 6 – top of exhaust valve stem, Truck 2



Picture 7 – bottom of exhaust valve stem, Truck 2



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Picture 8 – bottom of exhaust port, Truck 1