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Testing Methods Using In-House Fuel Records vs. Steady-State Carbon Balance Testing

Determining Fuel Consumption from In-House Fuel Records

Fleet operations are replete with a myriad of uncontrolled variables that influence the rate of fuel consumption for each individual vehicle. These include changes in weather, road, engine and vehicle condition, changes in drivers, routes, equipment and engine load, road conditions, fuel quality and energy content, and idle time. The use of heaters, lights, wipers, air conditioners, compressors, etc., create parasitic horsepower drain, and rob the engine of efficiency. Any one of these variables can mask the benefits of FPC® Catalyst use. All of these combined can give the appearance that the catalyst is ineffective, when in reality; fuel consumption would be much greater without it.

For example, a colder than normal weather pattern will cause an increase in idle and cold engine operating time over the same time period for the previous year. Further, the colder weather would force fleet operators to use winter blend fuels longer. These winter grade diesels have a lower energy content, and therefore, could contribute to reduced fuel mileage. Colder weather would likely worsen road conditions, have a negative impact upon tire pressure, and cause lower intake air temperatures and pressures, all of which are detrimental to engine and vehicle efficiency. Colder, harsher weather would most likely increase parasitic horsepower drain from headlamps, heaters, and wipers.

Laboratory test methods were instituted specifically to eliminate these variables and provide adequate enough controls to confidently and reliably determine actual fuel consumption changes created by altering a single parameter, such as the addition of a fuel additive. The method applied by RDI to test FPC® products is a laboratory method adapted for use in the field.

Carbon Mass Balance vs. Fleet Records Analysis

The Carbon Mass Balance (CMB) is a steady-state engine test that controls or monitors all variables that affect fuel consumption. Instantaneous readings are taken that determine the efficiency of the engine at a given moment while the engine is operating under fixed and known conditions. These conditions are reproduced several weeks later, after full engine preconditioning is complete, therefore, the CMB accurately documents the change in fuel consumption between baseline and treated fuel.

Analysis of fleet records is far more complex. Although it is easy to measure fuel consumption and distance traveled, it is next to impossible to determine the impact of other unknown variables upon the rate of fuel consumption over time. Some of these variables are discussed above. **None of these variables affect the CMB, or are monitored and corrected for in the calculation for fuel consumption.**

Suggested Methods for Determining Fuel Consumption from Records

If determination of fuel savings from in-house fuel records is considered mandatory, RDI suggests the baseline fuel consumption records be forwarded to our offices. RDI engineers will do a statistical analysis of these data to determine if the records are reliable enough to make a comparison possible. If so, fuel treatment can begin, however FPC® testing should continue for a minimum of six reporting periods past the 500-hour engine-conditioning period. These data should be forwarded to RDI at the end of each reporting period.

Also, the most accurate way to determine fuel consumption change in an operating fleet (non-CMB test) is to split the fleet into two identical groups. The two groups should have identical mpg's, and operate over similar routes. Treat one fleet with FPC®, and leave the other untreated. Operate the fleets as usual monitoring fuel consumption on a daily basis. From this test, and with enough data, two trend lines can be developed. The FPC® treated fleet will show better fuel economy than the untreated fleet.

Here again, in order to prevent the introduction of variables into the test procedure, RDI must be involved in the selection of the test and control fleets, and in the analysis of the data.

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