EMISSIONS AND FUEL ECONOMY TEST
FINAL REPORT
DDC Series 60

FITCH FUEL CATALYST

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Background: Ocean Air Environmental LLC (OAE) was retained to evaluate the impact of the Fitch Fuel Catalyst on an in service vehicle operated on transportation diesel fuel purchased in the State of California at the time of the evaluation, November 2004.

Advanced Power Systems International, Inc. (APSI) the manufacturer of the product describes the product in product literature as follows:

"The Fitch Fuel Catalyst is a polymetalic alloy housed in a canister and connected into an engines fuel system between the fuel tank and the engine after the fuel filter and before the fuel pump. Its purpose is to reformulate fuel on board the vehicle prior to combustion. It performs its function at the temperatures experienced by vehicles in normal service.

The Fitch Fuel Catalyst is not a fuel additive. It is a special alloy that does not dissolve in fuel. The fuel is reformulated by the alloy catalyst to a state where it is capable of a more complete combustion. As a result, an engine converts the chemical energy in the fuel to mechanical energy in a more efficient manner. The engine power is increased as a result and the toxic exhaust emissions are decreased."

Units used for the test were supplied by APSI.

Purpose of the Program: To evaluate the effect of Fitch Fuel Catalyst on emission of NOx, CO, HC, PM, Smoke Opacity and fuel economy.

Test Set Up: A haul truck operated by Lindeman Brothers in Sacramento, CA was used for evaluation. The truck was baseline tested using the procedures outlined in Appendix A. The results are presented in Appendix B. After the baseline test, the truck was equipped with a Fitch Fuel Catalyst installed in the fuel supply line to the engine. The test was repeated after 600 miles of service. The operator did not perform any preventive maintenance between the Baseline and Retrofit tests.

Testing Location: Testing was done at Holt Equipment Company in Sacramento, California, using their Superflow chassis dyno.

Test Results Discussions: The testing was performed in a controlled environment where the same baseline operating parameter can be duplicated for post-Fitch vehicle evaluation. Fuel economy testing on the road can introduce many more variables, like road conditions, driver input, and traffic pattern. The results of testing are as follows:

Baseline Data

Five mode weighted results:

H.P. 208.6
Fuel Consumption: 10.8 gal/hr
Bsfc: 0.0518 gal/bhp-hr
NOx: 9.57 gms/bhp-hr
THC: 0.02 gms/bhp-hr
PM10: 0.12 mg/filter (based on 10 lit/min exhaust flow to PM collection system for five minutes on the filter at each mode)

Snap Idle Opacity: 7.3
Single point fuel economy (374 HP roll power) = 0.05 gal/bhp-hr

Retrofit - with Fitch Data

Five mode weighted results:

H.P. 207.6 (horsepower was maintained the same on purpose to be able to compare the two results)
Fuel Consumption: 10.18 gal/hr
Bsfc: 0.049 gal/bhp-hr
NOx: 9.47 gms/bhp-hr
THC: 0.02 gms/bhp-hr
PM10: 0.12 mg/filter (based on 10 lit/min exhaust flow to PM collection system for five minutes on the filter at each mode)

Snap Idle Opacity: 2.3
Single point fuel economy (423 roll power) = 0.049 gal/bhp-hr

Discussion of Results

Effect of Fitch Catalyst

PM emissions from the baseline vehicle and post-Fitch were negligible, which is typical of electronic engines from DDC and Cat. The PM filters looked white with almost no smoke when sampled. The filter weight was within the measurement error band therefore OceanAir decided not to do PM filter analysis in post-Fitch as the result would have been same, no PM collected. However, the snap opacity was reduced in post-Fitch test indicating transient smoke reduction. Five mode PM is more an indication of steady state smoke.

All emissions were reduced and fuel economy was improved as a result of the installation of the Fitch Fuel Catalyst unit on the test vehicle.

NOx + THC (ozone precursors) = 1.13% reduction
PM10 = 0% reduction
Five mode weighted fuel economy = 5.8% improvement

Single point (max power) fuel economy = 1.44% improvement. Roll HP at the wheel increased from 374 HP to 423 HP, a 49 HP increase from baseline to retrofit in conjunction with this fuel economy improvement.

Snap Idle Opacity = 68.49% reduction

References:

Ocean Air Environmental LLC 805-386-1882 http://www.oceanairllc.com/
Test Location Holt Equipment Company Sacramento California
Chassis Dynamometer - Superflow SF-601602 http://www.superflow.com/
Engine DDC Series 60 http://www.detroitdiesel.com/Public/specs/3sa353.pdf