Evaluation of the Fitch F500 Fuel Catalyst for use in marine diesel engines

Background

E. P. Barrus was approached by Fuel Harmonics to test a fuel catalyst made by Fitch on a marine diesel engine. The test was to evaluate the improvements in fuel economy and emissions with the use of this catalyst.

E. P. Barrus sell many engines ranging from marine and industrial engines to horticultural machinery and motorcycles. E. P. Barrus was chosen as they have an in house computer controlled dynamometer system and technical expertise for testing engine power and torque outputs.

Advanced Power Systems International, Inc. (APSI) the manufacturer of the Fitch Catalyst 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." The US Armed Forces have certified the Fitch as MIL F901D compliant for use in battlefield conditions. We have also seen copies of ASTM standard tests conducted on behalf of the US Department of Defence to confirm the Fitch Unit's ability to arrest fuel algae and the problems caused by it.

Figure 1 Yanmar 4LHA Engine used for the fuel catalyst test

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Figure 2 Fitch F500 Fuel Catalyst

Test procedure

The test was applied to a Yanmar 4LHA engine which had been used for a military evaluation engine prior to the test.

After an initial warm up period, the engine was run at four different speeds for two hours at each speed. The measurements were all taken during the tests. The engine speeds and loads were kept constant by the computer controlled dynamometer.

The engine was first tested with no catalyst and the fuel consumption and emission results were recorded for a baseline result.

The catalyst was then fitted to the engine and it was run for sixteen hours for a conditioning period. The manufacturer of the catalyst advised this so that accurate results could be obtained. During this conditioning period the fuel consumption, and emission results actually get worse as the fuel system and combustion chamber go through a cleaning period. We can confirm that this was also the case on another trial that was carried out on four motor vehicles using an exterior mounted fuel catalyst. In simple terms the results actually get worse before an improvement is seen.

Test Results

The Fitch catalyst was then fitted inline into the fuel system prior to the fuel injection pump. A test run was then carried out taking measurements at two

hour intervals at identical speeds and loads as the base line test. These results were recorded.

All the results were recorded on to an the Excel spread sheet.

It was found that the Fitch catalyst gave from 2.5 to nearly 5.7% improvement in fuel consumption throughout the entire speed range tested.

It was also found that some pollutants were reduced. These were NO2 CO and NO. This was probably due to a more complete combustion of the fuel. SO2 and H2 were increased after the catalyst was fitted. This was due to the build up of pollutants inside the engine from burning uncatalysied diesel, burning off due to the higher combustibility of the fuel. If the engine was run for much longer it would become much cleaner as all the by-products would have burnt off.

Conclusions

The Fitch fuel catalyst did make an improvement in fuel consumption. The total period of the test with the catalyst in place was 24 hours. The assumption is is that the catalyst was still in the conditioning stage and that a longer period of running would have shown further improvements in both fuel consumption and emission levels. This assumption is made on the basis of another trial that was carried out using an external pipe fuel catalyst on four of the company motor vehicles where as previously mention the results got worse before there was an improvement. These improvements took approximately 2000 Kilometres which equates to a run time (at an average speed of 60 Km/hr) of approximately 33 hours.

It can therefore also be assumed that as the combustion chamber is kept cleaner there will be additional benefits with regard to the injection equipment life and reduced quantities of sulphur from unburnt fuel finding its way into the engine lubricating oil so extending the service life of engine components. It would take a much longer trial of many thousands of hours to accurately confirm this which is outside the scope of this report

Barrus has also been carrying out two further ongoing trials using the Fitch Fuel catalysts.

One to measure smoke emission levels on an engine fitted into a boat. A base line set of results have been taken using a Bosch smoke meter. The boat owner has reported a visual improvement, however we cannot confirm this until we take the next set of readings when the engine has reached the agreed test period of 200 hours.

The second test has been to monitor fuel consumption in a large twin engine RIB (rigid inflatable boat) used by an operator in a commercial application. The operator has reported an improvement, however the results are

somewhat subjective. At this stage it was decided in conjunction with Fuel Harmonics (the supplier of the Fitch Fuel Catalyst) to carry out this trial to accurately confirm these findings.

Using the results from this test EP Barrus is now going to offer this device for sale to diesel engine customers as an emission improvement and fuel saving device.

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