ADVANCED POWER SYSTEMS INTERNATIONAL INC.

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Technical Bulletin #7

ASTM Test Series of Low Sulphur DF-2 Treated by the Fitch Fuel Catalyst

OBJECTIVE

The objective of the experiment is to measure the impact of Fitch Fuel Catalyst on Low Sulfur DF-2. The ASTM test series selected included all tests employed for DF-2 sold for transportation use in the US, plus the additional tests listed in the DoD Policy Guidelines for Use of Aftermarket Fuel and Lubricant Additives. While the Fitch Catalyst is a permanent fuel treatment device and not an additive it is helpful to military customers to have the additional tests performed.

EXPERIMENTAL METHODS

A 5 gallon sample of LS DF-2 was procured. 8.5 liters of this fuel was exposed to the In Line Fitch Fuel Catalyst in a lab scale circulating system designed to treat the fuel in a manner representative of the exposure the fuel would experience in an engine application. ASTM tests were performed on samples of the blank untreated fuel and the treated fuel exposed to the fuel catalyst.

FUEL PREPARTION

A re-circulating system was constructed including a variable flow pump and flow meter. (Figure 1). The system was placed under a chemical hood. The system included a ball valve to allow removal of fuel samples of the treated fuel at the desired exposure time. The purpose of the system is to circulate fuel at a controlled and known rate through the fuel catalyst and return it to a reservoir in a manner similar to that in a fuel handling system on a vehicle or gen set.

Date of Treatment Wed May 10, 2006

Fitch Fuel Catalyst - Model Number F 300
8.5 liters of fuel in Pyrex / glass reservoir
Pump flow rate between 0.70 and 0.725 liters per minute. (1 complete turnover of fuel every 12 minutes.)

Start of circulation: 12:00 noon.
At 3 hours fuel was withdrawn for from the system and the tests were performed on treated fuel and the untreated blank.

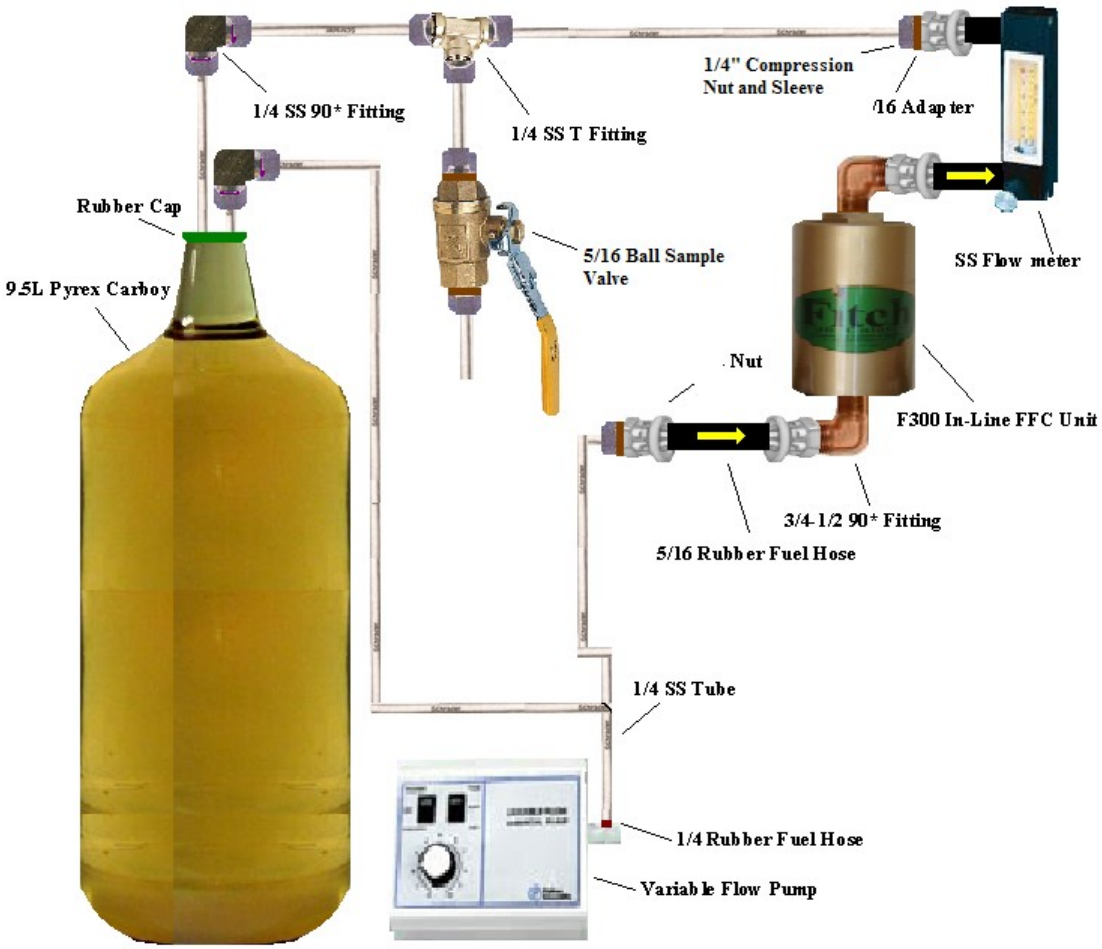

Figure 1
Fuel - Fuel Catalyst Treatment Circulating System

RESULTS

Intertek Caleb Brett

Date 05/26/06

Advanced Power Systems International, Inc
558 Lime Rock Rd
Lakeville, CT 06039

Re: Fitch Fuel Catalyst experiment - Low Sulfur Diesel Fuel DF-2

We have performed the series of ASTM tests required for transportation diesel fuel plus additional ASTM tests requested by APSI, on a sample of low sulfur diesel fuel LS DF-2. A portion of the fuel sample was exposed to a Fitch Fuel Catalyst at our laboratory in New Haven CT under our supervision. After exposure to the fuel catalyst, the ASTM tests were performed on the blank untreated fuel, and the treated fuel. Results are on the following page.

Discussion of Results
Both the untreated and treated fuel are within specification and suitable for commercial use. The fuel treated by the fuel catalyst had superior characteristics compared to the untreated fuel in the following categories:

ASTM D5291 Ultimate Analysis Ratio of Hydrogen to Carbon
ASTM D613 Cetane Number
ASTM D6079 Lubricity
ASTM D86 Distillation Points
ASTM D6591 Polyaromatic Hydrocarbons

The fuel exposed to the Fitch Fuel Catalyst is preferable from the perspective of the consumer and would be our recommendation compared to the untreated fuel.

Syed N. Naqvi
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Intertek Caleb Brett

Port/Terminal :	New Haven CT			
Our Reference :	26-000412			
LS DF-2 Fuel				
Date Sample Taken :	10-May-06			
Date Tested :	10-May-06			
Test	ASTM Method	Untreated Blank	Treated	Units
API Gravity @ 60°F	D4052	40.42	40.41	Deg. API
Sulfur	D4294-98	0.0027	0.0035	% Wt.
Flash Point	D93A	136	131	Deg. °F
Cloud Point	D2500	<-30 / <-22	<-30 / <-22	Deg. °C (°F)
Pour Point	D97	<-30 / <-22	<-30 / <-22	Deg. °C (°F)
Viscosity, Kin @ 100°F	D445	1.81	1.82	cSt
Viscosity, Say @ 100°F	D2161	32.0	32.0	SUS
Cetane Index	D4737	45.0	44.8	
Cetane Number	613	54.2	54.4	
Accelerated Stability	2274	0.1	0.3	mg / 100ml
Acidity	D974	0.031	0.032	mg KOH /gm
Ultimate Analysis : Carbon	D5291	86.32	85.71	Wt%
Hydrogen	D5291	13.31	13.91	Wt%
Nitrogen	D5762	194	200	PPM
Particulate Contamination	D 5452	2.8	3.0	mg/L
Lubricity	D6079	254	180	um
Ash Content	D482	<0.001	<0.001	% Wt.
Polyaromatic Hydrocarbon	D 6591	0.11	0.10	Wt. %
Copper Corrosion	D130	1a	1a	
Carbon Residue Ramsbottom on 10% bottom	D524	0.1	0.1	% Wt.
Distillation: IBP	D86	334.0	333.3	Deg. °F
Distillation: 10%		372.4	370.6	Deg. °F
Distillation: 50%		436.1	435.2	Deg. °F
Distillation: 90%		521.4	520.9	Deg. °F
Distillation: FBP		580.8	576.3	Deg. °F
Recovery / Residue / Loss		98.1 / 1.0 / 0.9	97.8 / 1.2 / 1.0	Vol. %

Acknowledgements:

Dr. Al Berlin Director Research Advanced Power Systems International, Inc.
Dr. Steven Suib, Board of Trustees Distinguished Professor
Dept of Chemistry - University of Connecticut
Syed N. Naqvi Laboratory Manager Intertek Caleb Brett New Haven CT
Chris Finnegan - Lab Tech - Intertek Caleb Brett New Haven CT
Rob Andrighetti – Technician - Advanced Power Systems

References:

ASTM D 975 Specification for Diesel Fuel Oils
DoD Policy Guideline for Fuel and Lubricant Additives
MIL PRF-16884K Performance Specification, Fuel Naval Distillate