SSA Terminals

Fitch Fuel Catalyst Dyno Test Report – Rev 6.14.11

Test Engine

Edlebrock Chevy 454, gasoline powered EFI, Hustler yard tractor
Supplied by SSA Terminals, Pier J, Long Beach, CA

Test Facilities

Harbor Diesel and Equipment – 537 West Anaheim St. Long Beach, CA on 5/10/2011
SSA Terminals, Pier J, Maintenance Facility, Long Beach, CA on 6/14/2011

Testing Equipment

SuperFlow - Chassis Dyno

Participants at Harbor Diesel Test Site on May 10, 2011

Mr. Steven Clark	SSA Terminals
Mr. Clyde Fifer - Dyno operator	Harbor Diesel & Equipment
Mark Phillips - Owner	Power Fuel Savers LLC

Participants at SSA Terminal's Test Site on June 14, 2011

Mr. Bob Kelly SSA Terminals
Mr. Daniel Noriega- Mechanic SSA Terminals
Mark Phillips - Owner Power Fuel Savers LLC

Purpose

Verification of fuel savings and HP and Torque obtainable by retrofitting the Hustler gasoline powered yard tractor (manufactured by SSA Marine) with a Fitch Fuel Catalyst

Objective

Measure fuel consumption without and retrofitted with Fitch Fuel Catalyst under comparable load.

Measure chassis horsepower and torque data "at the wheel" collected at vehicle equivalent speeds of approximately 20 mph and 2700 RPM. Fuel economy was measured at approximately 2700 RPM and 145 to 150 HP to simulate a heavy load cycle for the vehicle. Additionally to measure fuel consumption under idle conditions.

Description of Dyno Test Procedure

The procedure for collecting fuel consumption data involved bypassing the ***Hustler's*** fuel tank and supplying the fuel to the engine from 5 gallon containers filled with fuel drawn from the fuel tank. As illustrated in several photos included in this report, both the supply line to the fuel pump and the return line from the fuel rail were placed in 5-gallon containers through access holes in the air tight lid.

To measure the quantity of fuel at the beginning and end of each data run, an electronic scale, supplied by HDI was employed. As shown below, this scale displays weight in kilograms to 3 significant digits with a resolution of 1:100000 (or 1 gram in 100 kilograms). One gallon of gasoline weighs 6.073 pounds, 1 gram represents less than 0.00315 gallon (or 0.315%). This means that a 3% reduction in fuel consumption could be measured with an accuracy of +/- 1 tenth of a percent (0.1%).

The Fitch Fuel Catalyst (Model F-400) was mounted on the chassis frame inside the engine compartment. Fuel lines were attached to both ends of the FFC in preparation

for connecting them to the engine supply line and fuel rail intake after completing baseline testing of the fuel consumption the next day.

On the morning of May 10th, Unit H603 was chained down to the dyno and a tachometer was installed and connected to the dyno monitoring unit. The fuel line was connected to the supply side of the fuel pump located underneath the ***Hustler's*** fuel tank.



The other end of this line was inserted into the top of the 5-gallon buckets to supply fuel to the engine. The return line was inserted into the top of the plastic buckets. Six plastic buckets were filled with about 12 Kgs of gasoline (standard regular 87 octane gas) drawn from the fuel tank. One bucket for each of the 6 runs (3 baseline and 3 retrofit)

The vehicle was brought to operating temperature. The engine was operated through the power curve for 3 cycles and baseline data collected. This was followed by a re-set of the engine's electronic control module (ECM) and then a CARB approved relearn cycle. The FFC was then connected into the vehicle fuel system and the engine cycled for 3 more sets of data collection.

Dyno Tests



Results

Fuel Measurements

Run #	Beg Weight	End Weight	Diff (kgs)	Time Duration		Consumption Rate		Consumption Rate	
	kilograms	kilograms		seconds		kilograms/hour		gallons/hour	
Baseline								6.073#/US Gallon	
1	12.600	4.947	7.653	582.8		47.273			
2	12.000	4.360	7.640	568.1		48.414			
3	11.880	4.160	7.720	586.4		47.394			
						47.694	Average	**17.28**	
With F-400 FFC									
4	12.250	4.600	7.650	597.9		46.061			
5	12.250	4.600	7.650	594.0		46.364			
6	12.500	4.900	7.600	590.0		46.373			
						46.266	Average	**16.76**	
							Difference	**0.52**	
							Change	**-3.0%**	

A. Power & Torque

Top end power and torque increased with the Fitch installed
Torque was higher in the lower end of the power curve with the Fitch unit installed.
(Data sheets are available).

Baseline					With Fitch			
RPM	HP	TORQUE	SPEED		RPM	HP	TORQUE	SPEED
2781	141	3681	21.6		2781	145	3790	21.5
2740	149	3956	21.2		2740	151	3994	21.2
2760	149	3911	21.4		2760	152	3997	21.4

Results – 6-14-2011

Fuel Measurements at Idle Speed

Run #	Beg Weight	End Weight	Diff (kgs)	Time Duration		Consumption Rate		Consumption Rate	
	kilograms	kilograms		seconds		kilograms/hour		gallons/hour	
Baseline								6.073#/gal	
1	13.400	11.400	2.000	2020		3.564		1.291	
With F-400 FFC									
2	10.000	8.000	2.000	2089		3.447		1.249	
							Difference Change	**0.042 - 3.3%**	

Analysis of Results

These savings results are consistent with other engine tests performed in the past under similar conditions. A 3% fuel savings was achieved as well as a 2% increase in horsepower under load conditions and a 3.3% fuel savings at idle by implementing Fitch Fuel Catalyst. This would equate to approximately 1,850 gallons saved over the 10,000 hour operating life of the Fitch and the current duty cycle of the Hustler.[1]

Authorized Fitch Dealer:

Power Fuel Savers, LLC
Website: www.pofussa.net
Email: Mark Phillips at mark@pofusa.net
Telephone: (562) 537-0165

Footnote 1

Savings at idle speed (~800rpms):

5,000 hours x 0.042 gph = 210 gallons

Estimated Savings at mod-hi load(~2,000rpms) where 2800 rpms represents max-load from dyno results:

5,000 hours x [(2000-800)/(2800-800) x (0.520 – 0.042)+0.042] gph
5,000 hours x [(0.60 x 0.478) + 0.042] gph
5,000 hours x [0.2868 + 0.042]gph = 5,000 hours x 0.329 gph = 1,645 gallons

Total of above = 1,855 gallons saved.