



10701 Corporate Dr., Suite 150
Stafford, TX 77477
Phone: 281-240-1787 Fax: 281-240-1828

April 20, 2009

Purpose of Evaluation

Moran Towing of New Canaan, CT was interested in finding ways to improve fuel efficiency for their fleet of offshore towing vessels given the increasing price of diesel fuel. The evaluation was led by Peter Keyes, Vice President of Tug Operations. The objective was to prove whether utilizing the EnerBurn Diesel Fuel Catalyst improved their fuel consumption and reduced emissions in their offshore vessels.

Product Tested: EC5932A - EnerBurn® Marine

Evaluation For:

Peter Keyes
Vice President, Tug Operations
Moran Towing New Canaan, CT

Equipment Evaluated

Vessel: Marion Moran 4610hp
Engines: 2 x EMD 12-645-E7C 2305 BHP @ 900 RPM
Propellers: 107 x 82 -- 4-blades
Propeller Shafts: Grade 2 Forged Steel
Shaft Dims: 10.8725" diameter
Lufkin Gear Ratio: 3.958:1

Evaluation Analyst:

Janelle Engineering Inc.
Gerard L. Janelle
2190 Pagoda Lane
Punta Gorda, FL 33983

Evaluation Protocols

Baseline readings were taken while the vessel was towing the fully laden barge “Carolina” while transiting from Tampa, FL to New Orleans, LA.

Measurements were taken to record shaft horsepower (SHP), torque, fuel flow, RPM’s and for emissions data, Opacity, NOx, Sox, and CO2 were recorded. Readings were taken during 5 minute runs where the vessel was held at a steady RPM and power setting. Seas conditions at the time were 2-4 ft. seas light winds ambient temperature. The conditions were replicated as close to the baseline conditions as possible during the benchmarking process.

The vessel began EnerBurn treatment immediately after the base-lining process. The treatment period will continue for a minimum of 5 months at which time the vessel will be benchmarked to determine the effects, if any, of EnerBurn on emissions and fuel efficiency.

Evaluation Summary

The original benchmarking took place in August 2008 and outsized anomalies were recorded in the Port engine. This was indicative of an engine problem and the test results were deemed invalid. The data was sent to the engineering group at Moran and the vessel was later determined to have a defective turbo in the Port engine.

The final benchmark was run in late February 2009.

The recorded results showed an approximate 8.8% improvement in fuel consumption on the starboard and port engines. Moran’s own internal fuel recordings were showing an 8-9% decrease in fuel usage, which corroborates the results shown from the evaluation.

	Port				Starboard			
<i>Measurement</i>	<i>RPM</i>	<i>SHP</i>	<i>Torque lb-ft</i>	<i>Fuel gals</i>	<i>RPM</i>	<i>SHP</i>	<i>Torque lb-ft</i>	<i>Fuel gals</i>
<i>Baseline</i>	875	2250.5	53496	9.425	879	2061	48733	9.495
<i>Benchmark</i>	893	2126.5	49530	8.83	883	1949	45965	8.422
<i>Improvement</i>				6.3%				11.3%

Table 1 – Fuel efficiency data – Marion Moran

Emissions Results

Baseline measurements were taken with the vessel operating at a consistent 900 RPM. Both engines were operating and at the same RPM. Measurements are taken with a Wager Model 6500 Meter. This meter is SAE compliant for these measurements by both the EPA and CARB. The baseline and benchmark readings are outlined in the table that follows.

<i>Emissions</i>	Port		Starboard	
<i>Measurement</i>	<i>Opacity</i>	<i>NOx</i>	<i>Opacity</i>	<i>NOx</i>
<i>Baseline</i>	0.354	1212	0.251	1134
<i>Benchmark</i>	0.087	1076	0.0979	1040
<i>Improvement</i>	75.4%	11.2%	61.0%	8.3%

Table 2 – Emission readings -- Marion Moran

The full report from Janelle Engineering can be viewed by clicking [here](#).