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Purpose of Evaluation

Ingram Barge was interested in evaluating the EnerBurn® Diesel Fuel Performance Catalyst in order to demonstrate the positive benefits the technology provides on a vessel in full operation in the field. The Eileen Bigelow was selected as the evaluation vessel.

Product Tested:

EnerBurn® Marine EC5931A (EnerBurn)

Evaluation For:

David Sehr
Chief Operating Officer
Ingram Barge
Paducah, KY

Equipment Evaluated

Vessel: Eileen Bigelow
Engine Manufacturer: EMD.
Model Number: 12-645-E7B
Engine Speed: 900RPM
Power Output: 2280hp per / 6840hp Total

Evaluation Analyst:

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

Evaluation Protocols

Janelle Engineering Inc. (JEI), Punta Gorda, FL was contracted to measure the positive effects of EnerBurn usage on the performance of the Ingram vessel Eileen Bigelow. The vessel being measured must be mechanically sound and in good working order so that a proper baseline can be established to compare to the subsequent benchmark runs to measure the difference in the parameters being measured. The Eileen Bigelow was selected by Ingram as the test vessel.

An initial run would be conducted to establish the baseline. EnerBurn would then be introduced into the vessel's fuel and the vessel would be continuously treated for a minimum of three to six months to allow the full catalytic effect of EnerBurn to be established

Parameters measured:

- Fuel Consumption
- Shaft Horsepower
- Foot Pounds of Torque
- Engine Revolutions per Minute (RPM)
- Gear Ratio
- Fuel Temperatures
- Exhaust Temperatures
- Air Temperature
- Relative Humidity
- Exhaust Smoke (Opacity)
- Oxides of Nitrogen (NOx)

Fuel Consumption Protocol:

To measure the effects of fuel consumption reduction accurately, the vessel transits up river and we will measure the "Dead Rack" fuel consumption baseline for each engine. Dead Rack is a term used when the engine has achieved maximum RPM and the governor will not allow the engine to go higher in RPM. When this occurs, the fuel injectors are delivering the maximum amount of fuel. To achieve Dead Rack we would bring the other two engines to a low RPM or idle to place the maximum load on the engine being measured.

This procedure is repeated on each engine a minimum of three times. Each engine is measured for (3) five minute runs to achieve a consistent overlap in fuel consumption. It is desirable to have no more than a 2% difference in the three runs. If there is an anomaly in one of the three runs, then a fourth run will be added so as to have three low variability readings. The horsepower, torque and fuel consumption as well as the other parameters are recorded. The results of the baseline run will be compared to the final benchmarking run.

During the benchmark run each engine will be measured individually. The engines are run as close as possible to the baseline horsepower measurements recorded during the baseline run. Fuel consumption is measured and compared to the baseline fuel consumption to show the improvement in fuel efficiency.

Horsepower Improvement Protocol:

To measure the horsepower improvement each engine is again brought to Dead Rack and the subsequent horsepower is recorded and compared to the baseline measurement. The fuel consumption will remain nearly the same as the baseline because no mechanical changes are made.

Equipment used to record the measurements:

- TTS Fuel Flow meter (3)
- UEI Technologies NOx Meter
- Omega Scope hand held Infrared Thermometer (Pyrometer)
- Humidity Air Temperature Meter
- Wager 6500 Opacity Meter
- JEI Proprietary Equipment

The following results will be determined by comparing the baseline measurements to the final benchmark measurements.

1. Fuel Consumption
2. Maximum Available Horsepower
3. Oxides of Nitrogen
4. Smoke (Opacity)
5. Propeller Horsepower demand

Evaluation Summary

Upon conclusion of the benchmark runs the data was evaluated and compared by Janelle Engineering.

The following observations were noted in the Janelle report and are the result of the presence of the EnerBurn catalyst in the engines.

- 8.1% Decrease in Fuel Consumption**
- 68% Reduction in Smoke (Opacity)**
- 14% Reduction in Oxides of Nitrogen (NOx)**
- 271 More Horsepower at no Penalty in Fuel Consumption**

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