

CEMEX
CC12 Tugboat
Mexico



Fuel: Diesel

Machine/Type: Boat/Engine

Test: Fuel Efficiency and Maintenance

Xp Lab, Inc.

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CASE STUDY



Source: Report by Engineer Juan Pedro Lopez Rojas, the Machine Operations Manager for CEMEX's CC-12 tugboat. (Report 02/99 JP)

OBJETIVE

Confirm the initial test results and determine the fuel efficiency and savings generated by using Xp3 fuel additive in the FAIRBANKS MORSE 38 D 8-1/8 engine tugboat. Testing will be conducted during work hours and with the motor running 24 consecutive hours.

BACKGROUND

A previous test was conducted (01/99 JP) on a short stretch haul: Ensenada – Punta China – Ensenada. Xp3 fuel additive was used during this test lasting 30 days, which amounted to 20 hauls in normal operating conditions and good weather. Below are the results from the initial test.

- A total of 49,212 liters of fuel were consumed; 2,460.6 per trip and 378.4 lts/hr.. This equaled a reduction of fuel consumption of 43 lts/hr., equivalent to 10.2% compared to the previous use of 421.6 lts/hr.
- We could also see the exhaust gases were clearer and white color emissions were reduced. The diesel RACCOR filters were also changed less often than usual and upon cleaning the gas chamber, we found a drier and thinner coat on the machine.

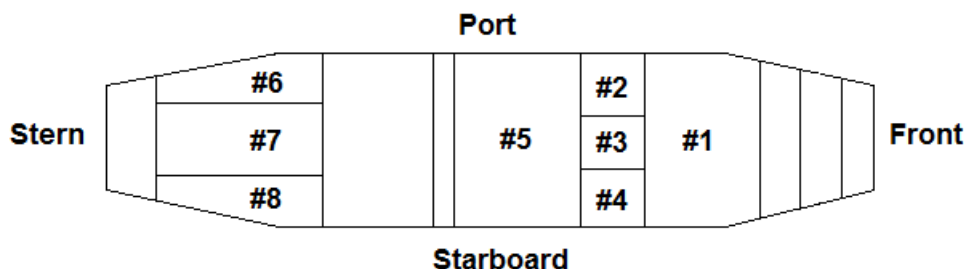
Based on the positive results generated, we will conduct another test to reevaluate the positive results from using Xp3 additives during the haul to Santa Rosalía, B.C.S. (Ensenada-Santa Rosalía-Ensenada).

METHODOLOGY

Equipment

Xp3's effect was evaluated using the same equipment as in the initial test 01/99 JP.

- Storage tank, total capacity 274,755 liters
- Tanks #1,2,3,4 and 7



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Main Machines (2)

FAIRBANKS-MC, MODEL: 38 D 8-1/B
OPPOSED PISTON CYL 12
DIESEL MARINE ENGINE SERIE C 423, AR4 PORT & C-424 AR3
STBD
HP: 1920, RPM: 720

AUX. GEN. (2) Y AUX HIDRAHULICO
GENERAL MOTOR (DETROIT DIESEL ALLISON)
TYPE: 6 CYLS. "N" SERIE 71 DIESEL
MODEL 6061
RATING: 140 HP at 1200 RPM
SERIAL .6A-1288 76
6A-1268-69

Measuring Instrument

31 ft. bronze measuring probe

Addition of Xp3 Fuel Additive

For the Santa Rosalía, B.C.S. haul, the tank was filled with 100,000 lts of diesel and 25 lts of Xp3, in accordance to the directed 1/4000 ratio. The rest of the diesel already had Xp3 additive mixed in.

Evaluation Parameters

Same as in the previous test (01/99 JP):

- Fuel consumption, cleanliness, temperature, exhaust gases, and color
- Observe how the machines operate during work hours and throughout the entire trip.

Other Considerations

The Xp3 representative did mention that it was possible that the fuel consumption could go up at different stages, however after a period of time using Xp3, the consumption would drop and stabilize

Actions Taken

Before adding Xp3, the amount of fuel existent in the tanks (#1 and 3) was measured. Based on the amount, the dosage principle of 1 part Xp3 to 4000 parts fuel was applied by the engine operators.

- Total amount of fuel: 284,462 lts
- Total amount of Xp3 used: 71.1 lts

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Results: Fuel Consumption

Ensenada to Santa Rosalía haul:

With engines running at a cruising speed of 8 knots, 38,690 lbs. of diesel were consumed in 118 work hours. The average fuel consumption per hour was 327.8 lbs which when compared to previous days, it was a net savings of 9.3%.

Santa Rosalía to Ensenada haul:

With engines running at a cruising speed of 8.5 knots, 43,970 lbs. of diesel were consumed in 120 work hours. The average fuel consumption per hour was 366.41 lbs which when compared to previous days, it was a net savings of 4%.

Total for all hauls:

Total Consumption 82,640 lbs.

Travel Time: 238 hours

Consumption per hour: 348.31 lbs/hr

Net Savings of 6.65%

Other Observed Results

- Exhaust gases were clearer
- Temperatures were normal
- RACCOR filters were only changed out once
- Duplex Diesel filters were changed however they were less dirty and with less rust.
- Crank shaft boxes were much cleaner

Observations

We observed that maintenance and preventive measure were important in order to observe all the benefits.

Conclusion

It is recommended that Xp3 be used in all the ships.

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