

A combustion catalyst system was recently installed on the tug *Ocean Navigator*.

# Burning Sensation

Add-on catalyst system should make fuel consumption cleaner and more efficient.

By **MICHAEL CROWLEY**,  
CORRESPONDENT

Ever since Western Towboat's *Ocean Navigator* was built in Seattle in 1986, the engine room installation of its two 1,550-hp Caterpillar 3516 engines was similar to hundreds of other conventionally powered tugs. Late this summer, however, a new device was attached to panels behind the tug's starboard engine with a feed connected to the engine's intake.

Two black cases on the panels hold several clear bottles containing finely ground platinum held in suspension in propylene glycol and distilled water. Above the bottles are pumps with hour meters.

These items are the key ingredients of the Eco Emissions combustion catalyst system from **Eco Star** in Monroe, Wash. If things work as planned, the *Ocean Navigator's* Cat engines should see a drop in fuel consumption along with an improve-

ment in air emissions, said Eco Star's Paul Masson.

Over 5,000 of the combustion catalyst systems have been installed on land-based engines, including trucks, off-highway earth moving machinery and generators. "But this is the first major marine client," said Masson, who added that the equipment hasn't had to be adapted for marine engines. "It's treated just like a normal installation."

## NOT A FUEL ADDITIVE

Masson emphasized that the combustion catalyst system is not a fuel additive. It's not mixed with the fuel in any way.

The platinum-based catalyst is injected as a vapor into the engine intake. At low speeds and idling, the pumps provide the vapor, but as the

Eco Star

turbo boost spins up, the “engine overcomes the pump, drawing out what it needs to satisfy itself,” Masson said.

When the engine’s intake valve closes, the catalytic vapor is trapped in the cylinder prior to the combustion process. As the piston is driven up into the cylinder, the air in the cylinder is heated and the platinum catalyst starts giving off oxygen oxides that ensure a better burn and more complete fuel consumption when ignition takes place.

Along with a more complete burn, a couple of other things also occur. First, the layer of soot in the engine from unburned hydrocarbons is burned up, which cleans up the top of the piston, the face of the head, cylinder walls and piston rings. This cuts friction.

Second, with not as much unburned fuel in the exhaust, the exhaust temperature is lowered, which has a tremendous effect on engine longevity. Masson said it helps extend the time between engine rebuilds from 20 percent to 30 percent.

A more complete fuel burn, less soot, lower exhaust temperature — take all those things together and you have a much more efficient engine.

“Depending on the engine and its application, you could reduce the fuel consumption by six to 14 percent,” Masson said.

Another benefit is improved air emissions. There will be a 50 to 60 percent



Eco Star

The system is designed to ignite a better fuel burn.

drop in NOx emissions and particulate matter, according to Masson.

### FUEL SENSORS

Needing accurate fuel consumption by the two Cat diesels, Masson equipped each engine with an Austrian-made **Kral** flow meter system. The problem with most electronic monitoring systems on modern diesels, Masson said, is “they just take readings that are constant averages,” whereas the Kral flow meter system “is spot specific.”

“It takes whatever that moment is, under whatever the load factor is. It tells how much fuel is going through sensor A — and notes the temperature — and tells how much is coming back through the return sensor. You get a true burn rate and a true gallon consumption.”

Masson added that Eco Star paid to have the Kral system and its sensors ISO 9000 certified, which guarantees “all the sensors have an accuracy within one-tenth of one percent,” he said.

Between Aug. 25 and Sept. 2, the *Ocean Navigator* made a nine-day trip that allowed Masson to establish base lines on the two engines for fuel and temperature readings. The combustion catalyst system was not used on either engine during this trip.

On the next three trips, the starboard engine will have the combustion catalyst system engaged while the port engine will be operating without it. Relative fuel consumption will be carefully monitored. The first 10-day trip began on Sept. 5. “This trip will burn out the soot and clean up the engine. On the next two, we should see differences in fuel consumption and see the engine stabilize with the unit on it. We’ll get more accurate numbers of what is happening,” Masson said.

Another thing the three trips will show is how much catalyst is required for a Cat 3516 in a marine application. The combustion catalyst system is on about 80 land-based gensets with Cat 3516s, but since the gensets aren’t pushing a hull through the water, the catalyst requirements will undoubtedly be different for a tug.

Once the catalyst requirement is determined, a canister will replace the box with the bottles and pumps. Masson wants the system to be nearly invisible once it is finally mounted in the *Ocean Navigator*.

“We’ll end up with a canister with each turbocharger. It will be sized to match the oil-change interval. So when they change the oil and filters, they will change the canister,” Masson said.

It all sounds convenient and cost-effective, but the “after” numbers have yet to be tabulated. We’ll report on the results in an upcoming edition.

WB



Each engine is equipped with a Kral flow meter system.

Eco Star