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MTU Engine with SCR Meets Stringent Emissions Standards for California Ferry

Paired with a custom-designed exhaust-treatment system, MTU Series 2000 marine engines help ferry builders meet the stringent pollution requirements of a San Francisco transit authority. Actual emissions are nearly 97 percent below EPA emission standards for Tier 2 marine engines, easily surpassing the transit authority's 85 percent requirement.

San Francisco, CA (Vocus) February 22, 2010 -- A pair of the nation's greenest ferries have recently been launched by the Water Emergency Transportation Authority (WETA), an agency created by the state of California and Bay Area municipalities to develop and operate a waterborne transit system connecting communities on San Francisco Bay. The vessels feature an eco-friendly propulsion system that includes a compact pollution-control unit and a powerful but clean-running marine engine from MTU.

The vessels are part of a new ferry fleet meant to improve both emergency response and passenger transportation in the Bay Area. Despite the potential benefits of the new fleet, however, the ferries were originally opposed by some environmentalists who contended that they generate more pollution per person than other means of transportation. Studies conducted on three ferries in the Bay Area provided evidence that the diesel engines actually generated less pollution than projected by those opposing ferries. As a compromise, WETA agreed to a strict pollution specification for new ferries. The specification requires cruise emissions to be 85 percent below the Environmental Protection Agency's Tier 2 marine requirements at a vessel speed of 25 knots and 85 percent load—an emissions level one-tenth that of any other ferry operating in California waters.

Emissions challenge falls to local MTU distributor

The emissions specification was placed in the contract WETA offered for four new ferries for San Francisco Bay. After the contract was awarded, the task of meeting the stringent pollution requirement fell to local MTU distributor, Pacific Power Products Company, Ridgefield, Washington. Pacific Power is the MTU distributor in the Pacific Northwest and provides sales and aftermarket support to marine, industrial and power generation markets. "Pacific Power was confident that an environmentally friendly MTU marine engine could do the job with an assist from an accompanying pollution-treatment system," says Bill Mossey, corporate sales manager, Pacific Power.

For the engine, Pacific Power chose the MTU Series 2000, which can operate on a blend of biodiesel and ultra-low-sulfur diesel fuel. Even without a pollution-treatment system,

the MTU engine exceeds EPA Tier 2 marine emission requirements. “The Series 2000 engine was a key part of our solution to this tough emissions problem,” says Mossey,

Besides being environmentally friendly, the Series 2000 engine features the highest horsepower in its class. A pair of these powerful engines helps each ferry meet WETA’s demanding 25-knot speed requirement.

SCR aftertreatment controls emissions

“The penalty for failure to meet the standard was complete rejection of the vessel—not just financial penalty, as is customary,” said Mossey. “That represents a much greater risk for boat builders, so it was an absolute must to meet the requirement. Nevertheless, we felt comfortable committing to meeting the WETA requirements.”

That meant deciding what type of pollution-treatment system would be paired with the MTU engines to bring emissions down to the required level. The firm had previous experience equipping a ferry with a system for selective catalytic reduction (SCR), an aftertreatment that uses an aqueous urea solution to form ammonia for converting smog-producing NO_x in diesel engine exhaust into harmless nitrogen gas and water vapor. “An SCR system can be thought of as a catalytic converter for a diesel engine,” Mossey explains.

When used to treat diesel exhaust, SCR can reduce NO_x in excess of 95 percent and can allow for combustion optimization for lowest fuel consumption and particulate matter emissions. SCR has long been used to reduce pollution from stationary sources. But the size and weight of SCR systems have made them impractical for many mobile applications. “For stationary applications, space and weight aren’t a concern. But on a ship, they’re important factors,” Mossey notes.

Nevertheless, Pacific Power decided that SCR would be the best pollution-treatment option to package with the MTU engines. But the WETA ferry application would require a custom-designed treatment solution that would be less bulky and lighter than conventional SCR equipment. So the distributor worked with one of its suppliers to design a “Compact SCR” system about one-fifth the size and weight of SCR systems developed for stationary pollution sources.

Pacific Power conducted extensive emissions testing in their dynamometer test stand to ensure that the system was feasible and could meet the WETA requirement with room to spare. In the end, “we were able to adapt SCR technology to meet our needs, something that wouldn’t have been possible five years ago,” Mossey says.

Results satisfy demanding customer

Acceptance testing done by WETA confirmed that Pacific Power’s MTU engine/SCR package did the job—and then some. Actual emissions were nearly 97 percent below EPA emission standards for Tier 2 marine engines, easily surpassing WETA’s 85 percent

requirement. What's more, Mossey notes, no particulate filter was required to reach the emissions target due to the exceptionally clean-running MTU engine. The MTU engine/SCR package is so clean, he adds, that it would meet the WETA requirement even if the engine were burning low-sulfur No. 2 diesel fuel rather than the ultra-low-sulfur diesel fuel mandated by California.

The testing results equate to net tailpipe emissions that would approximate EPA Marine Tier 4 standard levels which go into effect beginning in 2016 for marine diesel engines. Tier 4 requires reduction in NOx and HC emissions of up to 75 percent and a reduction in particulate matter of 80 percent from current Tier 2 requirements.

With the MTU engine/SCR pollution-control package approved for duty, two of the ferries ordered by WETA, Gemini and Pisces, are now in operation in San Francisco Bay. The other two vessels should be plying the same waters by the middle of this year. Equipped with their capable and super-clean power systems, the four ferries should please both environmentalists and passengers for years to come.

About MTU: MTU Detroit Diesel, Inc. is the North American regional headquarters of MTU Friedrichshafen GmbH, one of the world's most important providers of diesel engines and drive and propulsion systems for ships, heavy-duty land and rail vehicles, and distributed energy. It offers a complete line of power solutions from 30 to 12,200 bhp (20 to 9,100 kW) for applications in the marine, rail, power generation, oil and gas, agriculture, mining, construction and industrial, and defense markets. MTU Detroit Diesel is part of the MTU Engines division of Tognum AG. www.mtu-online.com

About Tognum: With its two business units, Engines and Onsite Energy & Components, the Tognum Group is one of the world's leading suppliers of engines, propulsion systems and distributed energy systems. These products are based on diesel engines with up to 9,100 kilowatts (kW) power output, gas engines up to 2,150 kW, fuel cells up to 360 kW and gas turbines up to 45,000 kW.

The product portfolio of the Engines business unit comprises MTU engines and propulsion systems for ships, for heavy land, rail and defense vehicles and for the oil and gas industry. The portfolio of the Onsite Energy & Components business unit includes distributed energy systems of the brand MTU Onsite Energy and fuel-injection systems from L'Orange. The energy systems comprise diesel engines for emergency standby power, prime power and continuous power, as well as cogeneration power plants based on gas engines, fuel cells and gas turbines that generate both power and heat.

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