

Dynos Help Keep Coast Guard Going

The U.S. Coast Guard operates a fleet of 49 Island Class patrol boats from a variety of bases around the world, including Guam, Puerto Rico and the states of Alaska, Washington, North Carolina and Maine. Part of the overhaul requirement for the vessels' Paxman Valenta 16RP 200M diesel engines, rated at 2300 kW, includes significant post overhaul testing to ensure the engines' proper operation at sea. To meet that requirement, Kahn Industries, of Wethersfield, Connecticut, U.S.A., has supplied its model 302-280 dynamometer system to the Coast Guard rebuild facility in Baltimore, Maryland.

Developed primarily for load testing of industrial, marine, and locomotive diesel engines, the Kahn series 302 line of low-speed, high-torque hydraulic dynos includes three basic models with power ratings from 2000 to 4500 kW. By adding an additional stage to the basic models, power ratings can be increased to 7455 kW per unit, the company said.

In development of the series 302 units, the company recognized that downtime has become a major cost factor in modern engine test cell operations. Thus, Kahn focused on ways to extend the service life of the dynamometer, reduce the time required for engine setup, and eliminate the need to return the dynamometer to the factory for overhauls. This goal was achieved, Kahn said, with the help of modern computer-aided design and analysis techniques and by applying the technology gained in the design and operation of the company's high-speed hydraulic dynamometers.

Derived from the company's established 301 flange-mounted dynamometers, the power elements (rotors and stators) of the series 302 units are manufactured from nickel-aluminum-bronze castings. Because of its outstanding cavitation and erosion resistance, the same material is used for the manufacture of marine propellers. Operating in a water environment, Kahn said the nickel-aluminum-bronze material has a life expectancy up to five times longer than ductile iron or steel castings.



Kahn Industries has supplied its series 302 dynamometer to the U.S. Coast Guard for post overhaul testing of patrol boat engines.

The series 302 dynos are fully bidirectional and can be driven from either end of the shaft in either direction of rotation without requiring repositioning of the equipment. This design feature eliminates the time-consuming and costly engine setup and alignment procedures associated with unidirectional dynamometers, the company said.

Featuring an integrated stator/housing design concept, the series 302 dynamometer incorporates only 25 major components. Selective assembly procedures and cumbersome hydraulic or heat shrink fits are eliminated. Bearing replacement can be accomplished from both ends of the shaft without requiring disassembly of the housing. This permits simplified field overhaul with minimum downtime, Kahn said.

In the Coast Guard application, the post overhaul testing includes several hours of operation at partial loads and full power and is performed on every engine that goes through the overhaul shop. In order to simulate actual shipboard conditions, the engine is tested with all auxiliary equipment, such as heat exchangers and tube oil coolers, in

place. During the performance test, all major engine parameters are measured and recorded, providing the future basis for quick diagnosis of engine problems and trend analysis.

Special precautions were taken to assure smooth operation of the equipment during performance testing. Both engine and dynamometer are installed on a massive steel-reinforced concrete foundation with pile supports. This foundation absorbs the vibration forces from the engines and maintains alignment between the two machines. Additionally, to prevent transmission of damaging torsional vibration from the engine to the dynamometer, a torsional vibration damper is installed in-line with the coupling shaft.

Kahn said a similar model 302-280 dynamometer was recently delivered to an aircraft engine manufacturer where it will be used for development work on a new turboprop engine. In addition to steady-state load tests and endurance tests, this unit is also designed to perform rapid transient loading procedures to explore the engine characteristics during emergency conditions.

Other series 302 dynamometers are in service in Asia, Europe and South America, the company said. They are used for development, production and post overhaul testing of locomotive diesels, industrial gas turbines and turboprop engines.