

MT30 powers naval electric propulsion demonstrator

The US Navy intends to adopt electric propulsion for its next generation of destroyers and is evaluating the MT30 as a gas turbine alternator drive



The MT30 gas turbine and alternator package is assembled at the Philadelphia test facility (DD(X) Image courtesy of Raytheon)

The adoption of transformational technologies for the DD(X) future multi-mission surface combatant has put it centre stage in the US Navy's future programmes. The revolution in design, development and construction are ground breaking and are set to demonstrate that the future of naval propulsion is electric.

Northrop Grumman is responsible for the total DD(X) ship system design, as well as development and testing of 11 associated engineering development models. While the DD(X) system design work is proceeding, the engineering development models are being built and

tested in parallel for key systems that include the integrated power system, the advanced gun system, and an integrated radar suite.

Rolls-Royce has now supplied the 36MW MT30 generator set package and a 4MW RR4500 generator set to Northrop Grumman to power the integrated power system (IPS) engineering development model (EDM) located at the US Naval Surface Warfare Centre's land-based test facility in Philadelphia. The MT30 generator set has more than 75 per cent US content across design, manufacture, assembly and test, and the MT30 marine gas turbine has 80 per cent component commonality with its aero parent, the Trent 800.

The integrated power systems design allows flexible energy management to suit the tactical requirement

The main aim of the IPS EDM is to provide risk mitigation and integrate an advanced electric propulsion system and the ship's electrical services into a single system. Most equipment has now arrived on site and assembly is well advanced. System testing is scheduled to commence in the summer.

The design of the DD(X) electric drive system is based on just four prime movers, two large and two small. Two MT30 marine gas turbines each capable of generating over 36MW are complemented by two smaller 4MW gas turbine generator sets. This represents over 10 times the electrical power available on today's DDG-51 destroyers. It is anticipated the DD(X) system will be able to operate with just two small gas turbines most of the time.

The integrated power systems design allows flexible energy management, to match the connected supply to the tactical requirement. For the rare situations demanding maximum top speed the bulk of the power will be directed for propulsion. At lower speeds the surplus shipboard power and energy management flexibility will enable the Navy to field new and remarkable weapons, such as high-power microwave systems for both non-lethal and lethal applications, lasers for active ship defence, and rail guns for super-long-range strike.

Total ship power will be distributed to where it is needed, conserving energy with savings realised through reduced fuel consumption and more efficient engine operating powers.

MT30 achieves US Navy milestone

The Rolls-Royce MT30 received American Bureau of Shipping (ABS) certification, a US Navy requirement for operation in early 2005. Completion of 1,500 hours endurance testing at 100°F (38°C), followed by strip down and detailed inspection, proved the MT30's ability to maintain its rated power at high ambient temperatures

The 36MW marine gas turbine is already well positioned for two US Navy programmes, having been selected for the Lockheed Martin Flight 0 Littoral Combat



Sectional view of the navalised MT30 package

Ship (LCS) and the DD(X) multi-mission destroyer engineering demonstrator model.

The MT30 is also included in the baseline design for the two proposed Royal Navy aircraft carriers and is being actively considered for the French PA2 Aircraft Carrier and the Franco-Italian FREMM frigate programme.

DNV (Det Norske Veritas) design approval, to DNV's rules for classification of High Speed, Light Craft and Naval Surface Vessels, was received in 2004.