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Australian Dual-Fuel Project Nears Completion

First of three high-efficiency 12V51/60DF engines arrives on-site

MAN Diesel & Turbo Australia's 33-MW Owen Springs Project, featuring the new 51/60DF dual-fuel engine, has taken a significant step with the arrival of the first of three generator sets at the new power plant. MAN Diesel & Turbo is constructing the Owen Springs plant, located near Alice Springs in Australia's Northern Territory, for Power and Water Corporation (PWC), a major Australian public utility, with commissioning of the first engine expected in July 2010.

The current project phase, covering the construction of the power house, control room, switch room, administration centre, tank farm, pump house and maintenance workshop buildings, is set for completion on schedule in May 2010.

Power-house construction commenced in October 2009 utilising an innovative concrete-panel design to form the exterior and interior walls. These panels were formed onsite and are characterised by their excellent sound attenuation properties, low construction costs and fast installation. Once installed, a supporting steel framework was then erected and fastened, and the exterior painted to complete the building.

The installation of mechanical and electrical systems is also currently underway. Piping is already largely complete while the installation of lube-oil and fuel-oil modules has started.

The entire project has been modelled using 3D CAD software which in turn generated the isometric drawings necessary for pipework construction. "Not only does this approach allow for a greater degree of accuracy and product control, but also results in improved site productivity," notes Paul Howarth, Engineering Manager at MAN Diesel & Turbo Australia.

MAN Diesel & Turbo Australia has also formed partnerships with local Australian suppliers and stakeholders as much of the equipment for the Owen Springs project must comply with Australian Standards. Niel Halvorsen, General Manager of MAN

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Diesel & Turbo Australia, says: "For many of our clients, our local engineering capability and supplier relationships are perceived as high-value attributes of our business."

Milestone

The arrival of the first of Owen Springs' three 10.9-MW generator sets marks a significant milestone in the project. The engine was originally loaded aboard a ship in Saint Nazaire, France in February 2010. It subsequently arrived in Darwin, capital city of the Northern Territory, in early April from where its 230-tonne bulk was transported to the site using multiple prime-movers and a low-loading trailer. The land journey took some six days via a carefully planned 1,500-km route.

This first engine is scheduled for commissioning in July 2010 with the complete power station to be handed over to Power and Water Corporation in October 2010. Once operational, the Owen Springs power station will provide the highest efficiency open-cycle power supply in Australia.

The Owen Springs Project

PWC is a Northern Territory Government-owned corporation that services more than 80,000 customers and has 360 MW of existing power-generation capacity. The Owen Springs plant is based on three 10.9 MW_e generator sets, each powered by a twelve-cylinder, vee-configuration 12V51/60DF engine. The generator sets will supply baseload power to the local grid in their gaseous-fuel mode, that is, burning natural gas ignited by a distillate fuel "micropilot".

At the time of signing the contract in 2008, PWC said: "MAN Diesel [& Turbo] Australia is an experienced company in power-station construction and its parent company in Germany specialises in dual-fuel engines in the size range required for this project. The contract specifications were technically complex as Power and Water was seeking world's best practice in fuel efficiency and the lowest emissions of carbon dioxide per unit of electricity generated."

The MAN 51/60DF engine

For power-generation applications, the 51/60DF is available in a nine-cylinder, inline version and in vee-configuration versions with 12, 14 and 18 cylinders. The engines have mechanical ratings of 1,000 kW per cylinder for 60-Hz power generation (514



rpm) and 975 kW for 50-Hz applications (500 rpm). These give an overall generator-set rating range of 8,560 to 17,550 kW_e.

With its fuel flexibility and low emissions, the MAN 51/60DF engine targets applications where operation on a back-up fuel is either essential or desirable. The engine's fuel flexibility centres on the capability to operate on either gaseous or liquid fuel, and to switch between them seamlessly at full-rated output. In the gaseous-fuel mode, an air-gas mixture is ignited by injection of distillate diesel fuel. On the 51/60DF, the liquid fuel micro-pilot amounts to 1% of the quantity of liquid fuel needed to achieve full-rated output.

It is injected via a common-rail system that allows flexible setting of injection timing, duration and pressure for each cylinder. This flexibility allows the engine to achieve low emissions and to respond rapidly to combustion knock signals on a cylinder-by-cylinder basis. In back-up, liquid-fuel mode, the 51/60DF engine operates as a normal diesel engine injecting distillate or heavy fuel oil (HFO) through a separate, normally dimensioned injector in a camshaft actuated, pump-line-nozzle system. At 500 mg/mn³ at 5% O₂ on gaseous fuel, the 51/60DF readily achieves emissions of oxides of nitrogen (NO_x) in compliance with both Germany's TA Luft clean-air regulations and the World Bank Pollution Prevention and Abatement Handbook.



Principal Data: Four-stroke dual-fuel engines V51/60DF and L51/60DF	
Engine cycle	Four-stroke
Turbocharging system	Constant pressure
Number of cylinders, V-engines	18, 14, 12
Number of cylinders, L-engines	9
Bore	510 mm
Stroke	600 mm
Swept volume per cylinder	122.6 dm ³
Cylinder output (MCR)	
◦ at 514 r/min, 60 Hz	1,000 kW _m
◦ at 500 r/min, 50 Hz	975 kW _m
Cooling	
◦ Cylinder cooling (single stage)	Fresh water
◦ Charge air cooler (two-stage)	Fresh water
◦ Fuel injector cooling	Fresh water
Starting	Compressed air

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The 51/60DF dual-fuel engine pictured on its low-loader on the journey between Darwin and Owen Springs, Australia



The 12V51/60DF engine arrives at the Owen Springs plant

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The Owen Springs site is approaching the end of its construction phase

MAN Diesel & Turbo

MAN Diesel & Turbo SE, based in Augsburg, Germany, is the world's leading provider of large-bore diesel engines and turbomachinery for marine and stationary applications. It designs two-stroke and four-stroke engines that are manufactured both by the company and by its licensees. The engines have power outputs ranging from 47 kW to 97 MW. MAN Diesel & Turbo also designs and manufactures gas turbines of up to 50 MW, steam turbines of up to 150 MW and compressors with volume flows of up to 1.5 million m³/h and pressures of up to 1,000 bar. The product range is rounded off by turbochargers, CP propellers, gas engines, engines for locomotives and chemical reactors. MAN Diesel & Turbo's range of goods includes complete marine propulsion systems, turbomachinery units for the oil & gas as well as the process industries and turnkey power plants. Customers receive worldwide after-sales services marketed under the MAN PrimeServ brand. The company employs around 12,500 staff, primarily in Germany, Denmark, France, Switzerland, the Czech Republic, Italy, India and China; it has a presence in around 150 countries. MAN Diesel & Turbo is a company of the Power Engineering business area of MAN SE, which is listed on the DAX share index of the 30 leading companies in Germany.

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