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MAN Engines Smooth Passage For Spanish Ro-Ro

MAN Diesel & Turbo supplies main and auxiliary engines for José María Entrecanales, a state-of-the-art, roll-on/roll-off cargo vessel

Navantia, the Spanish shipbuilder, recently completed the ‘José María Entrecanales’, a modern roll-on/roll-off (ro-ro) vessel, at its Bahía de Cádiz facility in southwestern Spain. Built for Spanish shipping line, Acciona Transmediterránea, the ship is powered by four MAN 9L48/60B main engines and three MAN 8L21/31 auxiliary engines.

Navantia is Spain's leading shipbuilder with interests in both military and civil projects. The ninth-largest shipbuilding group in the world, the shipbuilder has interests all over Spain and is currently finishing a second ro-ro vessel for Acciona Transmediterránea – the ‘Superfast-Baleares’ – whose delivery is planned for May 2010 with the same engine configuration.

Acciona is a major Spanish group that operates in more than 30 countries within the fields of infrastructure, energy, water and services. Its motto – “Pioneers in development and sustainability” – reflects its commitment to achieving economic growth, social progress and environmental protection in all its activities. Acciona Transmediterránea is a division of the Acciona group and is the main Spanish shipping line as well as a major player in European terms. Last year, it carried 3.3 million passengers, 778,000 vehicles and 5.8 million lane metres of cargo.

The twin vessels are the biggest in the Spanish market in terms of ro-ro cargo capacity and speed. Thanks to their lateral propellers and articulated rudders, they can also boast of unrivalled manoeuvrability.

Technical specifications

The José María Entrecanales is powered by four nine-cylinder MAN 48/60B main engines, each delivering 10,800 kW at 500 rpm. This configuration is widely used in tankers, cruise liners and container ships as the successful 48/60 series is well-known for its excellent performance and flexibility.

MAN Diesel & Turbo SE
Teglholmegade 41
DK-2450 Copenhagen SV
DENMARK
www.mandiesel.com

Group Marketing
Further information:
Peter Dan Petersen
Tel.: +45 33 85 14 70
peterd.petersen@man.eu

Graphics and images:
Mia Glarborg
Tel.: +45 33 85 15 90
mia.glarborg@man.eu



The 48/60 series has been redesigned recently with a focus on further improving performance. Primarily, this concerns the cylinder head where a higher-pressure injection results in improved atomisation and better combustion, ultimately reducing both fuel consumption and emission levels. The cylinder head also contains a system for automatically adjusting injection timing (VIT) to minimise NO_x emissions.

The TCA axial-flow turbocharger that MAN Diesel & Turbo initially introduced to the market in 2001 also plays a vital role in the success of the 48/60B engine and the José María Entrecanales has integrated the TCA66 model into its propulsion system. The turbocharger's components have been optimised with regard to flow control and stress reduction through 3D-modelling, CFD and FEM calculations, resulting in highly resistant turbine blades. In addition, the removal of the turbocharger's damping wire has also improved efficiency and facilitates maintenance.

Another new design feature is the incorporation of high-performance thrust bearings and floating bushes to minimise mechanical losses and improve turbine performance. Furthermore, inspection of the thrust bearing no longer requires removal of the shaft.

Auxiliary engines

The new ro-ro cargo vessel features three eight-cylinder, auxiliary MAN L21/31 engines, delivering 1,935 kW per engine at 1,000 rpm and characterised by a pipe-less design that includes:

- a front-end box housing cooling-water pumps, thermostatic valves, fuel-oil and lube-oil pumps, a lube-oil cooler and a lubricating-oil filter
- a cylinder-unit concept including cylinder heads, liners, pistons, connecting rods and fuel-injection valves. This enables the swapping in of a spare cylinder unit aboard, dispensing with the need to break voyages to return to the workshop in the event of breakdown

The José María Entrecanales

The new ship's keel was laid down in June 2007 and it was first floated in March 2009. Final delivery took place on 18 March, 2010.

The José María Entrecanales is now operating on the Barcelona – Alicante - Las Palmas de Gran Canaria (Canary Islands) - Santa Cruz de Tenerife – Agadir



(Morocco) – Barcelona route. As such, Acciona Transmediterránea’s large investment in the ship reflects the need for a design able to cope with the demanding nature of a route that requires a significant cruising speed to complete the weekly round-trip of 1,500 nautical miles.

Acciona Transmediterránea has done business with MAN Diesel Spain on several occasions in the past, and has now chosen MAN technology again for the latest additions to its fleet. The following table shows the vessels in the Acciona Transmediterránea fleet powered by MAN engines and turbochargers:

Ship Name	Built	Main Engine	Main Turbocharger	Auxiliary Engine	Auxiliary Turbo-charger
Superfast Canarias	1998	2 x MAN 9L58/64	2 x NA57/TM9	3 x MAN 6L28/32	2 x NR20/R
Superfast Andalucia	1999	2 x MAN 9L58/64	2 x NA57/TM9	3 x MAN 6L28/32	2 x NR20/R
Santa Cruz de Tenerife	1994	4 x MAN 12V28/32	4 x NR24/R	4 x MAN 6L23/30	4 x NR15/R
Las Palmas de Gran Canaria	1993	4 x MAN 12V28/32	4 x NR24/R	4 x MAN 6L23/30	4 x NR15/R
Milenium Tres	2006	4 x MAN 16V28/33D	4 x TCA66	-	-
Jose María Entrecanales	2008	4 x MAN 9L48/60B	4 x TCA66	3 x MAN 8L21/31	3 x NR20/S056
Superfast Baleares	2008	4 x MAN 9L48/60B	4 x TCA66	3 x MAN 8L21/31	3 x NR20/S056



José María Entrecanales	
Principal Data	
Shipyard	Navantia Puerto Real, Spain
Overall Length (metres)	209
Breadth (metres)	26.5
Design Draught (metres)	7
Scantling Draught (metres)	7.10
Depth to Main Deck (metres)	9.60 m
Displacement (tonnes)	22,140
Deadweight (tonnes)	10,140
Main Engines	4 x MAN 9L48/60B
Propulsion Power (kW)	4 x 10,800
Crew Capacity	28
Test Speed (knots)	26 (82% MCR)
Classification Society	BV



View of the engine room aboard the José María Entrecanales showing two of the MAN 9L48/60B main engines

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Alternate view of engine room



The José María Entrecanales at dock in Las Palmas



The new ro-ro vessel at dock in Tenerife

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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.