Karpowership Continues with MAN Engines
Turkish global powership market leader
> Page 3

Classification Societies
Rubberstamp MAN 175D
Serial type approval opens for global use
> Page 4

Cost-Optimised FGSS Designs for ME-GI Engines aboard LNG Carriers
New technical paper
> Pages 6-7

Nicaraguan Power Plant Project Completed
Eight 48/60 engines generate 140 MW
> Page 9

MAN Reveals 45/60CR, the New Four-Stroke Marine Flagship

New 45/60CR marine engine features best-in-class SFOC with 166 g/kWh and 1300 kW/cyl power rating with focus on cruise business, RoPax, RoRo and dredger segments.

MAN has revealed the successor to its 48/60CR engine in the company’s 4x line of high-performance diesel engines. The MAN 45/60CR marine diesel engine will initially be available as 12V and 14V versions that boast power outputs of 15,600 and 18,200 kW respectively, with inline versions following at a later stage. For land-based power generation applications, MAN has developed the maximum power version, the 20V45/60 with 26 MW.

Wayne Jones, Chief Sales Officer of MAN Diesel & Turbo, said: “The new engine combines the best features of the current 48/60CR, such as MAN’s common-rail system with ECOMAP capability, and adds new technologies such as two-stage turbocharging for an unrivalled specific fuel oil consumption. The resultant reduction in operating expenses and positive environmental impact are sure to attract strong market interest.”

MAN Diesel & Turbo states that the 45/60CR’s power increase and low consumption are particularly aimed at such key, lifecycle-cost-oriented applications as cruise liners, RoPax ferries, RoRo vessels, and dredgers. The company is making the 45/60CR engine available first as 12V and 14V versions with 6L to 10L variants to follow later. It reports that the engine has been conceived from the beginning as a family concept that will accommodate future derivatives, for example, such as a dual-fuel derivative.

The first set of V-type engines will be available from the end of 2020 with delivery of the first L-type engines due from 2022.

Continued on page 2

Partners Win Special Russian Order
MAN Diesel & Turbo and AKA to provide diesel-electric propulsion package for federal vessel

MAN Diesel & Turbo and AKA have received an order in connection with the building of a multi-purpose supply vessel for a federal Russian agency.

Delivery is scheduled for March 2018 in St. Petersburg and marks the first successful collaboration between the two partners since MAN Diesel & Turbo bought a 40% share in AKA – the electric- and hybrid-systems company – in June 2017. The order comprises 4 × MAN 7L21/31 GenSets, including alternators, with AKA’s scope of supply for the order covering:
• complete 690V main switchboard
• 690V-to-400V transformers
• electric motors for main props and thrusters
• frequency converters for electric motors
• the drive control and power-management systems.

Wayne Jones, Chief Sales Officer – MAN Diesel & Turbo, said: “This specialist vessel, with its unique operational demands, showcases MAN Diesel & Turbo’s competence as a solution provider and the broader capability we now possess with AKA’s energy-management expertise. Encouragingly for our new partnership, the previous vessel in this series was equipped with...”

Continued on page 2
We are excited to deliver on this age, but from a different supplier. Continued from front page

WIN-WIN-WIN between our partnership and this client.

Turbo, said: “Next to a frontloading approach, using thermodynamic engine-digital Safety and Control systems approach which reflects all over the world and we have lists exactly where we wanted to go in engineering the next generation of this global success story! We were aiming for a game-changing level in power density and efficiency, and we accomplished that.”

Dr. Gunnar Stiesch, Head of Engineering Engine MAN Diesel & Turbo, said: “Next to a frontloading approach, using thermodynamic engine-digital Safety and Control systems approach which reflects all over the world and we have lists exactly where we wanted to go in engineering the next generation of this global success story! We were aiming for a game-changing level in power density and efficiency, and we accomplished that.”

The new engine is also a new centerpiece of MAN's extended systems approach which reflects in the company’s latest generation digital Safety and Control System, SAGo 3500. Following a decentralized design concept, SAGo 3500 offers unprecedented data availability and optimized alarm visualization and diagnosis. Thanks to the new SAGo, the MAN 45/60CR is not only unrivaled but also adopted for the digital future of power generation, stated Stiesch.

The two-stage turbocharging module rounds off the MAN 45/60CR's superior profile. MAN Diesel & Turbo is the pioneer in developing and operating two-stage turbocharging for large-bore engines, a concept which achieves excellent efficiency thanks to a low-pressure and a high-pressure turbocharger arranged in series. “We are the only company in the market that develops both engines and turbochargers”, says Stiesch. This unique, in-house competence allows us to truly tailor design the engine for optimized two-stage turbocharging and to unleash its full potential. It’s also noteworthy that, despite the turbocharging being two-stage, load pick-up behavior in the same as for the single-stage turbocharged 45/60CR engine. Operations that profit from maximized peak pressure and optimal utilization of the Miller cycle.

The perfect fit for shipping.

Modern shipping faces constant demand to increase efficiency and comply with ever more stringent emission regulations. The growing public awareness of its environmental role.

The MAN V45/60CR engine enables owners and operators to meet such demands, while simultaneously optimizing operating expenses with unrelentingly low levels of fuel consumption. Through increasing standardization and using modular sub-components, the new MAN V45/60CR engine also allows faster installation and easier maintenance.

The new four-stroke unit meets IMO Tier 1, while IMO Tier 2 is met with MAN’s in-house, compact SCR system. The engine is shortlisted already for approval by all major classification societies.

The 45/60CR is suitable for use in a wide range of marine applications, especially applications with high power demands such as modern cruise vessels, large RO-RO and Feeder terminals, and ingrediencers. Its primary focus is on reliable power generation, performance flexibility and superior efficiency in either diesel-electric or diesel-mechanical configurations.

Calculations, based on a representative load profile of a cruise vessel, show that a ship operating with an MAN 45/60CR engine can enjoy a fuel cost benefit of 5 to 10% in comparison with a vessel powered by an equivalent engine from other manufacturers. For a cruise vessel of around 120,000 - 150,000 gross tonnage with 85 - 87.5 MW of installed power and an assured fuel price of 500 EUR/ton this translates into annual savings of 0.5 to 2.6 EUR/ton when employing the 45/60CR.

Extending the possibilities.

This new engine continues the proven characteristics of its predecessor the MAN 45/60CR including its in-house common-rail injection system, with the latest innovations in diesel-engine technology such as two-stage turbocharging and as previously mentioned here.

The MAN V45/60CR can also be combined with the Innovative MAN ECOMAP 2.0 technology that grants operators the flexibility to run an engine following different SFOC power characteristics, facilitating optimal efficiency for different load points. The latest development with this innovative technology is the integration of the MAN 32S35 engine into ECOMAP offering even further possibilities to optimize the efficiency of the propulsion system, taking into account fuel and engine prices.

This offers operators a whole new dimension of unmatched operational flexibility, and completely new opportunities for optimal emission operation - regardless of prevailing consumer prices.

The Turkish energy company Karpowership has placed an order for a total of 10 engines of the type MAN 55/50, 10 of the units will be multi-fuel engines, which can run on gas or liquid fuel. Another 20 are diesel engines, including the MAN 45/56/60, currently the most powerful and efficient gas engine in the world. The engines each have a power output of 18.5 - 20.4 MW, and deliveries are due to start later this year. Installation and commissioning will take place in 2017 and 2018. The total volume of the order is in the three-digit million range.

The engines will be employed in Karpowership’s power stations. “Power stations perform an important function in the power-generation segment. They quickly and reliably make power available, which not only enables economic growth but also assures the livelihood of millions of people around the world,” explains Hayri Jonas, Chief Sales Officer of MAN Diesel & Turbo. “We are proud to open a new chapter of our partnership with Karpowership, a strong relationship that now spans nearly ten years. Karpowership is the world’s only company that operates a whole fleet of power stations. A total of 13 ships currently generate a total capacity of more than 2.7 gigawatts. Further ships with a power capacity of 2.5 GWe are currently under construction. Countries where ships with MAN engines are in operation include Lebanon and Mozambique.”
**Thumbs Up to MAN 175D**

Classification Societies Give DIESELFACTS 2/2017
dieselfacts 2/2017

essentially eliminating any gap entails. With this move, MAN

PrimeServ On-site Recovery’s mission remains the same as always to minimize the
downtime of our customers’ equipment.”

About MAN PrimeServ On-site Recovery

Established in 1992, Metalock Denmark was acquired by MAN Diesel & Turbo in 2013. As MAN PrimeServ On-site Recovery, it offers innovative, on-site-machining repairs worldwide within the marine, offshore and industry segments both for MAN Diesel & Turbo and all other diesel-engine brands.

MAN PrimeServ On-site Recovery’s headquarters is located in Copenhagen where it maintains its space and auxiliary operation for a worldwide business. It also operates a workshop at the same site with the capability of manufacturing turn-key tools as assignments demand. It maintains an international presence through the global MAN PrimeServ network and after-sale workshops.

**Classification Societies Give Thumbs Up to MAN 175D**

Successful serial-type approval opens door for global use

MAN Diesel & Turbo has announced that its 175D marine engine pro-
duction has achieved another milestone with its 17,000th unit being produced. The engine will be supplied to various customers in a range of different applications, including ships, power plants, and industrial processes.

**SaCoS 5000 Represents Major Upgrade of Engine-Control System**

Function-oriented architecture addresses complexity of modern four-stroke engines

SaCoS 5000 is a response to the increasing complexity and growth in functionality of modern engines. It is its function-oriented architecture that makes it suitable for the tasks assigned to it, allowing us to answer the challenges of the market.

**Dual-Fuel Engine Continues Strong Market Performance**

Texas shale-gas deals confirm popularity of ME-GI engine within LNG carrier market

Knutzen OAS Shipping, the Norwegian owner-operator, has placed an order for four MAN ME-GI engines with 2,750 MW of electrical power. These are the largest order for ME-GI engines ever placed with MAN Diesel & Turbo.

The order follows the increasing popularity of the ME-GI engine within the LNG carrier market. The order is part of the ME-GI engine family, which has seen a significant growth in recent years. The engine is designed to run on low-grade gas, such as LNG, as well as on natural gas. It is a response to the growing demand for dual-fuel engines in the maritime industry.

**Metlock Denmark Changes Name to MAN PrimeServ On-site Recovery**

Full integration into MAN PrimeServ organisation finally achieved

The well-known Danish specialist in field machining within the marine, wind and industry segments, has changed its name to MAN PrimeServ On-site Recovery.

**SaCoS 5000** is a key element of our digitisation strategy and enables a new line of digital solutions which will be available from the year 2018 on. This will offer distinct benefits to our customers, enabling us to deliver the highest level of services.

The development of SaCoS 5000 is a response to increasing complexity and growth in functionality of modern engines. It is its function-oriented architecture that makes it suitable for the tasks assigned to it, allowing us to answer the challenges of the market.
The centrifugal pump submerged into the drum, some of the excess fuel gas of the submerged pump may be re-circulated and recycled to the gas compressor.

The typical layout of FGSS designs shows the FGSS for an LNG carrier based on multiple smaller compressors driven by a common variable frequency drive, in contrast to the single large compressors driven by a single large AC or DC drive.

The five-stage Laby®-GI fuel gas compressor is designed with a single-stage pump and two compressor strings. The layout of the FGSS for an LNG carrier can be designed in a way to avoid the need for a suction drum. The five-stage Laby®-GI fuel gas compressor is designed with a single-stage pump and two compressor strings.

The system provides efficient part-load operation and delivers full redundancy of BOG delivery, a significant advantage for marine applications where full redundancy is required.

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The two companies are longstanding partners, with multiple previous deliveries of equipment. They have agreed to deepen mutual activities within the production, sales and marketing of EPC (engineering, procurement, construction) processes, to benefit from the other business fields to be added in the future, and which will allow them to enhance mutual business opportunities and consolidate their attractiveness.

Mitsui Engineering & Shipbuilding and MAN Diesel & Turbo can look back on almost a century of successful cooperation in many fields of business, for example, two-stage and four-stroke engine for marine and stationary applications, and at the Caterpillar, with “We agree not only to continue these cooperative efforts, but we also extend them to include the steam turbine and compressor segment”. Along with the ongoing implementation of our technology in power plants and marine projects, we have also agreed to set up a common sales and marketing organization,” said Dr. Laubin.” “By partaking in both trends of decentralized energy and digitalization, we are able to continue to combine our strengths to offer propulsion and energy systems that help our customers to tackle tomorrow’s challenges. We will also include working more closely in the field of Floating Production Storage and Offloading systems (FPSOs), as well as steam turbines and compressors – mainly for the offshore market."

Old acquaintances
Mitsui Engineering & Shipbuilding’s relationship with MAN Diesel & Turbo started in 1895, when the companies signed a license agreement for the production and sale of two-stroke, marine, diesel engines. In 1958, the company was established in Shanghai, China. The new business cooperation between both companies will see the launch of the Shanghai Zhenhua Heavy Industry Co., Ltd. (ZPMC) shipyard.

The new COMBINE® product portfolio for the cement sector includes state-of-the-art equipment for power supplies for indirect and direct firing systems. The EPC and DTG engines be started up and reach full load in 3.5 minutes, they also operate efficiently at partial load. In the event of low wind levels or even no wind at all, our MAN48/60 engines had to cross more than 60 °C and under increased volcanic activity, and in a highly flexible manner in coping with various power demands, making them the ideal solution for reliable power supplies from renewable sources by 2030. Renewable sources, primarily wind power, already account for 57% of the country’s electricity demand. Wind levels, however, are subject to considerable fluctuations. “Engine power plants are ideal as a back-up to wind and hydro power,” explains Thorsten Dradrach, Head of the company’s Division Engine Power for Latin America. “They are thus the ideal solution for reliable power supply in Nicaragua.”

By 2030, Nicaragua has ambitious plans with regard to power generation, it is aiming at 40% renewable energy from renewable sources. According to the Energy Ministry, two power plants will be built, which are due to be operated by PU CREST.

A video documentary about the engines being transported can be watched on YouTube. 

Allan Generation G.A. is a subsidiary of ALBA Nicaragua S.A. (ALBANIC), which is owned by the Bulgarian Alliance for the Protection of Our America (ALBA). ALBA is an economic and political alliance of countries in Latin America and the Caribbean, including Nicaragua. ALBA’s aim is to achieve greater independence from the USA and Europe by means of economic cooperation between the countries in Latin America and the Caribbean. The energy sector has a particularly important part to play in the mission.

MAN Diesel & Turbo has delivered 1200V 3000kW engines, including EPC contracts to a global cement company. Malaysia has a population of around 30M and is located on the River Esplanade half way between Baghdad and the Persian Gulf. A mere 100 mn of rain can over the course of a year, producing about 500mn of light rain, some 20 coatings of heavy rain. The highest temperatures cause forming conditions for power supplies for industrial processes. “The MAN 32/40 engines are particularly robust. They are the ideal solution for reliable power supplies under extreme climatic conditions,” explains Waldemar Weisser, MAN Diesel & Turbo’s Head of the company’s power plants business in the UAE market. As a country, Iraq has the fifth largest of reserves and the largest natural gas reserves in the world. Nevertheless, various regions experience regular power shortages. The unstable security situation and complex import policies make it a great challenge to develop the infrastructure.
MAN Diesel & Turbo Signs Cooperation Agreement with MM-Offshore

Progress/manoeuvring specialists agree to develop and optimize ship solutions for future ship designs

The impetus for the agreement stems from the marine industry’s constant efforts to enhance operational performance. These have resulted in highly efficient propulsion and manouevring systems with both manufacturers – individually as well as jointly – making significant progress.

The agreement aligns the two companies’ strategies so they can jointly develop and offer solutions to the maritime market related to:

- the development of the complete propulsion system, including the interaction of propulsion and rudder in order to create a partnership between both systems;
- the provision of optimized propulsion solutions based on MAN Diesel & Turbo’s proprietary Kaplan propeller design, optimized rudder bulb and test tool for developing and assessing propeller and rudder interaction;
- the application of energy-saving manouevring solutions for different ship types using each company’s unique experience and know-how, and are already proving very much forward-looking.

The agreement stipulates that the two companies’ strategies should be closely aligned to develop and offer solutions to the maritime market related to the development of the complete propulsion system, including the interaction of propulsion and rudder in order to create a partnership between both systems. The provision of optimized propulsion solutions based on MAN Diesel & Turbo’s Kaplan propeller design, optimized rudder bulb and test tool for developing and assessing propeller and rudder interaction are also key areas of focus.

The company has more than half a century of experience and is a world leader within the gas-turbine technology. But there is always room for improvement. "We are proud that we achieved the expected results already," says René Sejer Laursen – Sales & Promotion Manager, MAN Diesel & Turbo – and "This confirms the ME-GIE technology’s potential and demonstrates its flexibility as a fuels switcher that enables it to run on virtually any gas quality – with no additional injection pressure."

The ME-GIE engine is the first in a series of so-called dual-fuel engines, which are designed to run on any fuel, even with a high sulphur content. MAN Diesel & Turbo has already supplied several units to various customers, and this new reference and feeling very much forward-looking.

The ME-GIE engine is well-suited for two-stroke propulsion, and its twin-cylinder configuration enables it to run on almost any gas. This makes it an excellent choice in the marine industry, where flexibility and reliability are key.

The benefits of the ME-GIE's Diesel principle make it an attractive option for ship owners. Its ability to burn almost any fuel makes it highly versatile and adaptable to different market conditions. This flexibility is crucial in the ever-changing marine fuel market, where regulations and fuel prices can fluctuate.

The ME-GIE engine's proven track record in various applications, from container ships to ferries and beyond, highlights its versatility and reliability. Its fuel flexibility allows it to adapt to changing market conditions, making it an ideal choice for ship owners seeking a reliable propulsion solution.

The ME-GIE engine's dual-fuel capability is a significant advantage in the current marine fuel market. By using a combination of gas and diesel, ship owners can take advantage of the lower prices of gas while still ensuring the engine's reliability. This flexibility is crucial in a market where fuel prices can vary widely.

In conclusion, the ME-GIE engine is a valuable addition to MAN Diesel & Turbo's propulsion portfolio. Its fuel flexibility, reliability, and ability to run on almost any gas make it an excellent choice for ship owners looking for a versatile and reliable propulsion solution in the dynamic marine fuel market.
PrimeServ Courses Prove to be Big Hit with Argentinian Navy

The ARA Almirante Irizar is an Argentinian Navy (Armada Republica Argentina) icebreaker and was built in 1975 in Finland. During the Falklands war (1982), the ship served as a troop transport and, later on, a hospital ship. In 2002, the icebreaker became known for its attempted rescue of the vessel ‘Magdalena Oldendorff’, a support ship for the 20th Indian Antarctic Expedition which became trapped in pack ice. Even though the Almirante Irizar ultimately failed to free the vessel, it successfully managed to move it to a safer position for overwintering and supply it with medicine and food until the ice melted and it could sail free. In 2007, the Almirante Irizar went out of service due to a serious fire outbreak in its auxiliary generator compartment. After a long journey back to the dock, the Argentinian Navy made it to their mission to repair the Almirante Irizar. During repairs, they made the decision to replace the original engines with new 32/40 and 23/30 units from MAN Diesel & Turbo.

To optimise the maintenance of their new engines, the Armada Republica Argentina participated in six different courses at the MAN PrimeServ Academies in Augsburg and Holeby during 2017. They started with a “32/40 engine advanced maintenance” course where the participants learned how to perform difficult maintenance jobs such as the exchange of bearings and cylinder-head maintenance. Subsequently, the Navy participated in a “Turbocharger maintenance” course to learn the theory behind, and practical methods of, maintaining an NR turbocharger. ARA personnel also picked up a basic understanding and knowledge of speed-governing systems during a “Four-stroke engine speed governor Heinzmann” course. Two further “Four-stroke engine simulator” courses familiarised the participants with the operation of the engine and how to react to different failures. Finally, the training programme concluded with a “23/30 maintenance course”. Overall, the different courses ran for five weeks with four spent at the PrimeServ Academy in Augsburg and one at the Academy in Holeby (Denmark). Both academies cooperated to ensure attendees received the optimal training experience.

In receiving the engine-simulator courses, the ARA contingent gained the benefit of the engine simulator recently installed by Augsburg’s PrimeServ Academy with special attention devoted to fault finding. The simulator is based on two thermodynamical modules from a standard engine and a diesel-electric system. The modules enable the simulation of failure scenarios to empower the participants to interpret the engine data, to draw the correct conclusions and to react correctly to abnormalities. It was the first time that the PrimeServ Academy in Augsburg had used the simulator for a tailor-made course for customers and it proved to be a success.

ARA feedback also proved to be positive: “Excellent training courses and execution”, “It was a great experience and training for future tasks on board” and “Awesome course, the teaching abilities and qualifications from the instructors are at a very good level” were just some of the statements the Argentinian Navy made about the courses that they participated in. Especially the two simulator courses received excellent feedback like “Excellent course. I gained a deeper knowledge about the engine as it was shown in different perspectives. I understood how the new input of information can change the engine”.

The ARA personnel from the maintenance courses at the MAN PrimeServ Academies in Augsburg and Holeby

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Publisher: MAN Diesel & Turbo
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