Doosan Engine Passes 100m BHP Milestone
MAN Diesel & Turbo participates in Korean ceremony to mark unique achievement

MAN Diesel & Turbo recently signed a contract with Stena Line to provide its online service to two vessels. The 'Stena Hollandica' and 'Stena Britannica' are both conventional passenger-and-vehicle superferries that sail the daily route between the Hook of Holland and Harwich and are each powered by 4 × MAN 48/60CR engines.

Dan Sten Olsson, CEO and owner of the Stena Sphere, and Bjørn Kistrand, Stena Line Technical Director, visited Augsburg, Germany to meet MAN Diesel & Turbo’s Dr Uwe Lauber, CEO, and Wayne Jones, Chief Sales Officer and agree the new deal.

Olsson said: “Digitization is the direct communication of the truth and opens up for fast adjustments and improved performance through automation or improved human judgment.”

Wayne Jones commented: “We have a clear strategy regarding the development of our digitization program where we already monitor over 200 installations worldwide. We can even keep track of the assets on our smartphones. We will shortly move into Phase 2.0 where we will further extend our online services to our two-stroke installations. Our customers are extremely pleased with our concept and who else is better placed than MAN Diesel & Turbo to support the customers’ business in an agile and efficient manner?”

As part of this digitization strategy, MAN Diesel & Turbo recently appointed a Chief Digitization Officer, Audi Lucas, to further drive the development and integration of digital offerings with its portfolio.

In connection with the new appointment, Dr. Uwe Lauber – CEO MAN Diesel & Turbo – stated: “As a creative mission, digitization goes way beyond the development of technologies. It is an approach and way of thinking that involves interdisciplinary networking, data analysis and interaction. More than ever before, we want to embed this mentality at all levels within MAN Diesel & Turbo – from corporate..."

Continued on page 2

Stena Line Signs Up for Online Service
Agreement covers two superferries in Stena fleet

MAN Diesel & Turbo’s licensees, Doosan Engine Co., Ltd., held a ceremony in Changwon, Korea on January 2017 to celebrate the production of 100 million two-stroke bhp. The milestone was achieved with the successful test operation of an MAN B&W 11G95ME-C (103,000 hp) engine, the world’s most powerful engine type per cylinder.

MAN Diesel & Turbo drafted its first licence agreement with Doosan in 1983.

Thomas Knudsen, Head of Two-Stroke, led a company delegation to Korea and spoke at the event, noting that Doosan Engine had celebrated the cumulative production of 50 million bhp just nine years previously. He stated that Doosan Engine had mastered the production of diesel technology and developed into a valued partner in the continuous development of diesel engine technology.

He continued: “There have been a lot of major milestones to celebrate at Doosan Engine over the many years past, and there will undoubtedly be many more. But for now, I would just wish Doosan hearty congratulations on the 100 million bhp – and we are looking forward to the 100 million kW mark!”

Knudsen concluded his speech by mentioning the current, turbulent marine market and said..."
Stena Line Signs Up for Online Service

Continued from front page

...strategy through to customer service and product development.

Online Service

PrimeServ Online Service is MAN Diesel & Turbo's service for monitoring engines and turbochargers automatically and continuously. Constant monitoring of key engine and turbocharger performance data facilitates the optimization of any inefficient operation modes in good time, increasing the availability and reliability of MAN hardware.

Since 2000, all MAN Diesel & Turbo engines have been delivered with integrated data interfaces, which can be upgraded to complete local systems for engine monitoring.

If online access is facilitated via this data interface, all of the engine and turbocharger operating data and additional information can be made available to PrimeServ specialists for analysis.

PrimeServ Online Service transmits key engine data from any place in the world via secure data connections. PrimeServ experts analyze the data and provide recommendations for maintenance.

About Stena

Stena Line is one of the world's largest ferry operators and the largest privately owned shipping company in the world. With services serving much of northern Europe, Stena Line is a major unit of Stena AB, itself a part of the Stena Sphere. The Stena Sphere consists of the three parent companies, wholly owned by the Sten A Olsson family: Stena AB, Stena Sessan AB and Stena Metal AB and their wholly or partly owned subsidiaries. Together they constitute one of Sweden's largest family-owned corporate groups.

Doosan Engine Passes 100m BHP Milestone

Continued from front page

...strategy through to customer service and product development.

Doosan and MAN B&W

Doosan Engine Co. is a core member of the Doosan Group, the South Korean industrial conglomerate. Founded in 1963, the same year as its first licence with MAN Diesel & Turbo, the company produced its first MAN B&W-branded engine the following year. Doosan Engine reached a cumulative total of 10m BHP in 2000, and the year after began producing medium-speed MAN engines. 2003 saw the company produce its first MAN B&W ME engine. In 2014, Doosan Engine delivered the world’s first dual-fuel, low-speed ME-GI engine to the American National Steel and Shipbuilding Company (NASSCO) shipyard in San Diego, USA to power the first of two 3,100-ku container ship for TOTE, the American marine transportation company.

The FM-MAN 14V48/60CR engine (T-AOX will use 2 x 12V48/60CR Engines)

The US Navy has chosen the Fairbanks Morse MAN 48/60CR engine as main propulsion for a new series of 17 ships as it plans to phase out existing tanker fleets. Known colloquially as ‘oilers’, the existing aging fleet of 15 tankers is used to transfer fuel from coastal ports to naval vessels at sea.

Lee Nilson – Head of Four Stroke Licensing – MAN Diesel & Turbo, said: “The U.S. Navy knows out 48/60 series engines very well, especially our L48/60A variant, and this played a key role in Fairbanks Morse PM winning this contract. The 48/60CR is the next generation of this proven engine with a further optimized performance, featuring improved fuel-efficiency, reduced emissions and increased reliability.”

In studying the replacement of the existing tankers, the U.S. Department of Defense performed detailed design studies with specific ships capable of building the new tanker class. The FM-MAN 48/60CR engine was chosen on the basis of the set programme goals of energy efficiency, equipment reliability and cargo-handling efficiency.

Nilson concluded: “This new order comes just two months after the US Coast Guard (USCG) selected multiple FM-MAN 28/60D STC engines for its Offshore Patrol Cutter Programme. The Navy and Governmental segment is very important to us, and none more so than that of the United States.”

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Old acquaintances

MAN Diesel & Turbo engines built by Fairbanks Morse, and the FM-MAN 48/60CR in particular, have an enviable and very solid history of use by the United States Navy, mainly aboard a number of cargo ships. Through many years of cooperation, MAN Diesel & Turbo’s license partner, Fairbanks Morse, has delivered a total thus far of 72 units to the Navy with the engine’s reliability and after-sales support key to the successful relationship.
PrimeServ Signs Maintenance Deal with Prominent Teekay

Engine Management Concept agreement set to run over next 10 years

The close cooperation between MAN PrimeServ’s global network means that it can pool common resources and exchange know-how, and is able to offer customers a considerably higher level of service than individual PrimeServ hubs would otherwise be able to provide. The new EMC (Engine Management Concept) contract is for the care of maintenance themselves and the sensing of each vessel’s 2 × 5G70ME-C (Gas Injection) dual-fuel main engines.

Jeffrey Ang, Head of CoC – Engine & Marine Systems, Aqua Pacific – MAN Diesel & Turbo, said: “This agreement is significant in that it is the first market agreement that MAN PrimeServ has closed involving our dual-fuel, two-stroke MGI engines. Furthermore, with Teekay nominating us as their preferred service provider, this contract will undoubtedly add momentum to our efforts to expand the EMC’s reach within the gas-engine segment.”

According to the terms of the contract, MAN Diesel & Turbo, Coopetition will deliver maintenance management and spare parts, while MAN Diesel & Turbo, Shanghai will take care of the service provision for the engines. Jens Seeberg, Head of Retrofit & Upgrade, and Engine Management, further praised the cooperation between two locations in PrimeServ’s global organisation and its headquarters in Copenhagen, "an essential prerequisite for the EMC concept’s success.”

MAN Diesel & Turbo reports the adoption of the EMC by the shipping industry as a paradigm change within maintenance services, and praise the positive effects of maintenance themselves in which it is generally a conservative industry.

The new EMC Engine Management Concept contract is to be maintained in the framework of the "Coral Spirit" and "Torben Spirit", sisters from Teekay’s 173,400-m³ LNG carrier series. The agreement covers the provision of spare parts, maintenance management and the sensing of each vessel’s 2 × 5G70ME-C gas-injection dual-fuel main engines.

New Two-Stroke Engine Utilises VOCs as Fuel Type in New Move

The world’s first ME-GI engine combining two-stroke engine has been delivered MAN Diesel & Turbo licensee Mitsui Engineering & Shipbuilding Co., Ltd (MESC) in Japan. The Hino-MAN B&W TS90ME-C6-GIE is in the first engine in a series of three.

Further research has led to new possibilities for this engine leading to exciting new prospects for multi-fuel combustion including the combination of waste gas. “The ME-GI engine was originally designed for the combustion of ammonia, however, research has revealed that it is possible to operate the engine on volatile organic compounds (VOCs) as fuel,” said René Sejer, Head of Retrofit & Upgrade, and Engine Management at MAN Diesel & Turbo.

The benefits of the diesel-type combustion process are now fully exploited in the ability of the two-stroke engine to run on almost any gas mixture, without efficiency reductions, and in the complete combustion maintained by a relatively high gas-injection pressure. The engine will be able to run on a mixture of LPG, among which are included VOCs and methane or ethane with uncharged gas side efficiency. The mixture can contain as much as 50% LPG and the findings so far indicate that even larger amounts of LPG may be added to the gas side.

MAN Diesel & Turbo sees significant opportunities in the development of this engine since the engine can also run on almost any form of waste gas. The waste gas could be the light hydrocarbons or volatile organic compounds (VOCs) emitted from crude oil distillation storage and when blending or loading of crude oil.

This opens up the opportunity for new applications of the engine in, for example, shuttle tankers, for power generation in remote power plants or in other applications such as floating production storages and offloading vessels (FPSO), where waste gas is abundant and a potential environmental hazard.

The operation can be met in combination with selective catalytic reduction (SCR) systems, either low- or high-pressure SCR.

The engine can be delivered in the power range 6.25 MW.

Royal Australian Navy Conscripts MAN

Fleet support tankers to receive main and GenSet engines from Germany

Navantia, the major Spanish shipbuilder, chosen MAN Diesel & Turbo to supply-tender navalization of a primarily newbuild in the framework of the Royal Australian Navy (RAN) under the auspices of the RAN’s SEA 1054 Programme. Phase 2 of which is establishing the replacement of existing supply ship, HMAS Sirius – powered by MAN Diesel & Turbo two-stroke engines, Navantia offered the RAN a design proposal based on the Spanish Navy’s proven auxiliary oil-replacement ship SPS Cantabria.

FPSO: Fleet support tankers play a dual role in navies and are classed as part logistic and part supply vessels. Also known within their segment as replenishment ships, they are naval auxiliary ships with fuel tanks and dry cargo holds, which can conduct undersea replenishment on the high seas.

Replenishment ships are frequently one of the largest vessels in a modern navy and are such as designed to carry large amounts of fuel and dry stores for operational support for forces at sea. Such ships have multiple replenishing stations to supply fuel and other store to multiple ships simultaneously.

The Royal Australian Navy is the naval branch of the Australian Defence Force. Currently, the RAN consists of 47 commissioned vessels, three non-commissioned vessels and over 16,000 personnel. The Navy is one of the largest and most sophisticated naval forces in the South Pacific region, with a significant presence in the Indian Ocean and worldwide operations in support of military campaigns and peacekeeping missions.

Navantia is a Spanish state-owned shipbuilding company that offers its services to both military and civil sectors. It is the largest ships designer and shipbuilder in Europe, and the fifth largest in the world with shipyards all over Spain.
Efficiency Improvements to Main Engine Auxiliary Systems

A technical paper by Karsten Elland, Senior Engineer, Marine Installation Department – Marine Low Speed, Engineering – MAN Diesel & Turbo

In the design process of main engine auxiliary systems conducted by the shipyard, options that could improve efficiency and reduce fuel oil consumption and consequently CO₂ emissions are available. The ultimate power efficiency improvements of electric auxiliary equipment, for example fans, pumps, etc., serving the main engine, but also efficiency improvements related directly to the main engine specific fuel oil consumption.

This technical paper describes each of the different main engine auxiliary systems and the options available for efficiency improvements. Different solutions are mentioned for each system, some of these can be combined and the savings potential added up, while others will exclude each other depending on the selected option.

To illustrate the potential savings obtained by installing the suggested efficiency improvements, a specific engine type has been chosen and an annual operating profile has been defined. Some of the efficiency improvements may also have a beneficial impact on the common auxiliary system for other consumers. This is not accounted for in the description and calculation of the savings potential.

Basic data
In this document the identified savings potential is illustrated by an annual HFO saving based on a specific main engine and a specific annual operating profile. The annual HFO savings potential is not converted to operational expenditure (OPEX), savings as fuel oil prices differ according to bunker oil quality, location and the world financial situation. Furthermore, the capital expenditure (CAPEX) for each suggested efficiency improvement has not been estimated, since it will differ for each contractor’s supplier.

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Main engine
To reach the specific savings for the suggested efficiency improvements, the engine type MAN B&W BGM50C-L5 T5 has been chosen.

The specific fuel oil consumption (SFOC) versus engine load for the engine is depicted in Fig. 1.

This engine type is installed in for example large container vessels operating worldwide.

FGS Experts MAN Cryo to Supply Fuel Gas Supply Systems for LNG-Powered Norwegian RoPax Ferries

MAN Cryo, MAN Diesel & Turbo’s marine LNG fuel gas system manufacturer, has agreed a contract with the Norwegian shipyard, Multi Maritime, to deliver a fuel gas supply system (FGSS) to two ferries for Inerter AS, and ferry operator, Torghatten Nord.

Each ferry will be equipped with a gas-electric, hybrid propulsion system that features optimal heat charging from shore. Major efforts have been put into the design to deliver an energy-efficient propulsion system with low pollution and high share of state-of-the-art environmental performance, comfort and reliability.

The ferries are designed by Multi Maritime, a Norwegian ship designer with extensive experience within the design of such advanced vessels.

Mikael Adler, Managing Director of MAN Cryo, said: “We are very happy to have been chosen as supplier for the fuel gas systems for these vessels. We see a clear trend in the market with an increasing number of orders for fuel gas systems. This clearly points towards LNG as a positive growth as a choice of fuel.”

Thor Inge Sko, Purchase Manager at Vard Group AS in Brevik, said: “We are committed to delivering two excellently performing ferries to Torghatten Nord, and its very important reason to why we have chosen MAN Cryo as fuel gas supplier.”

The FGSS
The LNG supply system consists of a 115 m vacuum-insulated storage tank, with auxiliary equipment and delivered advanced technology. The hydrogen is produced by the gas industry, for over half a century, it develops efficient and economical solutions for demanding maritime applications in the form of cryogenic equipment for marine fuel gas systems, as well as for offshore and onshore bunkering systems.

Multi Maritime is also involved with the delivery of the ferries that will operate between Halvøya and Sandvik, off of Bergen in SE Norway. The 134 m long and 21 m wide ferries will have identical capacities of up to 180 cars and 550 passengers.

About MAN Cryo
MAN Cryo has built its reputation, and delivered advanced technology and systems for marine fuel gas supply systems, as well as for offshore and onshore bunkering.

Situated in Gothenburg, Sweden, MAN Cryo is one of the world’s leading manufacturers of marine fuel gas systems, as well as for offshore and onshore bunkering systems.

MAN Cryo has become an established name in its field due to its experience and well-proven products for LNG and other cryogenic technology and cryogenic tank engineering. MAN Cryo provides comprehensive after-market services in association with MAN PrimeServ (MAN Diesel & Turbo’s after-sales division).
The Impact of NO\textsubscript{x} regulations on MAN Diesel & Turbo’s Business

In light of the importance of emissions in modern-day shipping, and especially the IMO Tier III regulations, MAN Diesel & Turbo has developed a multipronged strategy to make its portfolio as environmentally-friendly as possible. This strategy covers the development of efficient, fuel-efficient machinery engines – including dual-fuel- and engine-capable systems in marine gas, gas retort to existing engines, and the development of after-eficient, pre-technology.

Today, compliance with IMO Tier III regulations basically requires an 80% reduction in NO\textsubscript{x} emissions – compared to Tier I – within the designated emission control areas (ECAs) over a defined test cycle. Additionally, a 100% “not-to-exceed” limit restricts the emissions permissible at every given load point – exceeding the 15% limit cannot be compensated for by better-than-required results at other engine loads. Outside of the ECA zones, the requirements are released on Italian Gavaro.

However, emission reduction cannot be achieved by internal engine optimization alone but, rather, requires additional add-on technologies known as secondary measures.

Secondary measures

There are two basic ways to reduce NO\textsubscript{x} emissions (NO\textsubscript{x}) in diesel exhaust: either to remove the NO\textsubscript{x} from the exhaust gas, or to hinder its formation in the first place.

The first option is to use selective catalytic reduction (SCR) after treatment: the second is to use exhaust gas recirculation (EGR).

The SCR system is available in different sizes, in this way fully covering its entire portfolio of medium-speed engines.

Special system features include:

1. Communication with the engine control system that optimizes the temperature for the SCR catalyst and at individual load points.
2. Integration of the SCR control system into the overall engine control system.
3. Adaptation of injection control from MAN with electronic fuel injection.

General system reliability.

The LNG fuel system consists of a double-stacked insulated tank, with auxiliary equipment including the MAN SGM10C2 engine, a waste heat recovery unit, and a sealing system.

The MAN LNG system is available in several sizes and can be customized to suit various load requirements.

Maintenance.

The LNG fuel system is designed to withstand the wear and tear of the harsh marine environment, with a focus on easy maintenance and longevity.

The LNG fuel system is available in several sizes and can be customized to suit various load requirements.

About MAN Cryo

MAN Cryo earned its formidable reputation and delivered advanced cryogenic equipment to the gas industry for over a half century. It develops efficient and economical solutions for demanding marine applications in the form of cryogenic equipment for marine fuel gas systems as well as for offshore and onshore burning systems.

MAN Diesel & Turbo acquired the former Cryo AS in 2010. Sweden-based, MAN Cryo is one of the world’s leading manufacturers of cryogenic equipment for the storage, distribution, and handling of liquefied natural gas (LNG).

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America’s Tropical Shipping Orders
Complete MAN Diesel & Turbo Packages

The company has ordered 4 x 1,100-teu container vessels, each equipped with an MAN 6L23/30 Holeby GenSets.

The 1,100-teu container vessels are equipped with the latest generation of CP propellers, the VBS1550-5 Mk 5. The CP-designed design (1,200 mm diameter), combined with the MAN Alpha rudder bulb and fairing-cone concept, offers the highest efficiency over a wide operating range, and simultaneously low noise and vibration levels. For environmental protection and elimination of the risk of stern-tube oil leakage, a water-injected stern-tube system has been specified. The system includes a water supply/water quality package to ensure a steady flow of non-abrasive water to the stern-tube bearings. The shaft propulsion unit is fitted with bronze liners, coated in between with an anticorrosion primer.

The MAN 23/30 GenSet is a two-stroke SCR system. Due to the high-energy efficiency of MAN 23/30 below about 30% of full load, exhaust gas temperatures after the turbocharger are typically low. In order to achieve the highest possible fuel flexibility, and ensure that the engine produces in natural gas with the high temperature for the SCR, the SCR is placed on the high-pressure side of the turbine in the turbocharger (T/C) and the SCR is sealed by two valves. This makes it possible to obtain exhaust gas temperatures between 20°C to 175°C higher. Accordingly, when NOx reduction is needed, the exhaust gas is guided to the SCR. And when not, the exhaust gas is passed directly to the turbine in the turbocharger (T/C) and the SCR is sealed by two valves.

The propeller features a conic rudder bulb and fairing-cone concept in engine control room.

The 23/30 engine is one of MAN Diesel & Turbo’s most successful workhorses, and has a half-century history of operational stability with over 12,000 takes to date. The engine is popular with shipowners for its reliability and “longer” service demands.

Applications for the engine include tankers, bulk carriers and product tankers as auxiliary engines. The engine is the most powerful engine with diesel fuel and marine oil also used in special environmental areas.

The 23/30 engine is optimised for part-load operation, typically at 40-65%, and features an engine map that is 20-30% bigger than the engine experience reduced operating costs – compared to its competition – meaning a decreased demand for spare parts and significantly reduced running costs over its lifetime.

The MAN B&W engine type 6S60ME-C8.5-TII

The MAN 23/30 GasSet

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Hyundai Extends Two-Stroke Licence with MAN Diesel & Turbo

At a recent ceremony in Copenhagen, the Engine & Machinery Division of Hyundai Heavy Industries (HHI-EMD) signed a contract extending its two-stroke licence agreement with MAN Diesel & Turbo. This latest extension continues a long-standing collaboration that first began in 1970.

MAN Diesel & Turbo was represented at the signing ceremony by Klaus Engberg (Senior Vice President and Head of Two-Stroke Licensing, Thomas Knudsen (Senior Vice President, Head of Low-Speed), Bjørn Folgstad (Executive Vice President, Promotion & Sales, Two-Stoke Business) and Sven H. Jensen (Vice President, Sales & Promotion, Two-Stroke Business) and J. D. Yu (Hyundai Senior Engineer).

Knudsen said: “MAN Diesel & Turbo has enjoyed a long working relationship with Hyundai, one that we are delighted to continue. Hyundai has always played an important role in the development of two-stroke innovation, and I’m sure it will continue to do so in the future.”

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MAN Diesel & Turbo Presents New High-Pressure SCR for Two-Stroke Engines

Compact, MAN-developed SCR-HP based on proven, four-stroke counterpart

At an event in Tamano, Japan on April 11th, MAN Diesel & Turbo and its licensee – Mitsui Engineering & Shipbuilding – introduced its new high-pressure selective catalytic reduction system – MAN SCR-HP – to the market in front of a select group of industry invitees.

The MAN SCR-HP is available for two-stroke engines of all bore sizes and reduces – through internal catalytic reaction – NOx, exhaust emissions to IMO Tier III limits. With specially developed honeycombs and honeycomb materials, as well as an integrated mixing unit, the outer diameter of the reactor has been drastically reduced compared to typical market designs and its medium-speed counterpart. MAN Diesel & Turbo expects to deliver the first system from the beginning of the first half of 2017.

Bjarne Foldager, Vice President MAN Diesel & Turbo and Head of Sales & Promotion Two-Stroke Business, said: “The development of our new SCR-HP is an important step on the path to a more sustainable future of shipping and global trade. At the same time it offers additional choices to ship owners worldwide, who can now choose from all NOx reduction technologies and select the optimal solution for their MAN Diesel & Turbo two-stroke engines. Furthermore, it serves to strengthen our position as the world’s leading system provider in the field of marine propulsion.”

Dr. Gunnar Stiesch, Vice President MAN Diesel & Turbo and Head of Engineering Engines, said: “The successful technology transfer from medium-speed design to two-stroke is this project’s major achievement. The reactor design has been driven by the desire to reduce the SCR system’s overall size, while still maintaining the effectiveness of a much larger design. Reaching this target was only possible by focussing on key cornerstones of the design – the honeycombs as well as the reactor concept. For both components, we have collaborated with worldwide stakeholders to ensure that we offer the best possible design to the market, something I’m confident we have achieved.”

Development

The development of the SCR-HP system was based on MAN’s in-house competence with four-stroke engines, for which it can already reference more than 650,000 operating hours. The newly-developed system comes in six frame sizes, covering up to 25 MW per reactor.

A major milestone in the development of the MAN SCR-HP was reached during the approval certification and engine shop test. The test was carried out in close collaboration with MAN licensees and partners. Mitsui Engineering & Shipbuilding, at its engine works in Tamano under the observation of ClassNK.

NOx solutions

MAN Diesel & Turbo offers two alternative methods to meet IMO Tier III NOx requirements for MAN two-stroke engines. The first, exhaust gas recirculation (EGR), is an internal engine process that prevents the formation of NOx by controlling the combustion process. The second method, selective catalytic reduction (SCR), is an after-treatment method that uses a catalyst and an additive to reduce the NOx generated by the combustion process.

Next steps

After the technical presentation and a demonstration of the new SCR system in operation on an engine test-bed, Ralf Klaunig, Vice President MAN Diesel & Turbo and Head of Turbocharger Sales, spoke to the audience about the product’s next steps and its timeframe for market introduction.

“The market has expected MAN to offer its own SCR system for two-stroke engines for some time now. For us, it was clear from the start that we should focus on a high-pressure solution in order to give more flexibility to ship owners. The improved and compact design, compared to conventional reactors, leads to considerable benefits for engine builders, shipyards and ship owners.”

Klaunig further stated: “Being the engine designer, it’s clear that we possess the greatest competence to design the best possible concept. Our customers gain a great advantage in relying on MAN as a full solution provider as no other company can align our competences and design an engine-room from propeller layout up to the funnel. Especially the Scheme B approval will lead to remarkable cost reductions in the engine-approval procedure.”

The MAN SCR-HP Series

The SCR-HP comes in six frame sizes, covering engines up to 25 MW with one reactor for the entire exhaust stream. Larger engines will require two reactors, which can be arranged in a multi-setup similar to turbochargers. The SCR-HP system consists of the reactor – including mixing unit, urea injection lance, honeycombs and soot blowers – along with a module-based supply system, as well as the reactor’s control unit that communicates with the engine-control system.

The SCR-HP system is available for Scheme A and Scheme B classification approval. Scheme A approval includes a certification of the complete system on the engine test bed, SCR and original piping. Approval via Scheme B reduces complexity for all involved parties. The engine is tested in IMO Tier II mode on a test bed. MAN Diesel & Turbo then models the SCR system and calculates the Tier III mode. On the parent engine, this mode is certified on board during engine commissioning. This Scheme B approval is confirmed by several classification societies and reduces the test demands required of the engine licensee. The process is well established in MAN’s medium-speed sector, and over 100 systems are already in the order book awaiting Scheme B certification.

Table showing the flexibility of the SCR-HP system

<table>
<thead>
<tr>
<th>ME (3.5% S)</th>
<th>ME (0.1% S)</th>
<th>ME-GI</th>
<th>ME-GI(U)</th>
<th>ME-LSI</th>
</tr>
</thead>
<tbody>
<tr>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>LP SCR</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>EGR</td>
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<td>✔</td>
<td>✔</td>
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</tbody>
</table>

For further information

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Publisher:
Peter Dan Petersen, MAN Diesel & Turbo

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