

German marine suppliers – trends and technologies



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Jörg Mutschler, Managing Director, VDMA – Marine Equipment and Systems

TECH-INNOVATION powered by VDMA – Marine Equipment and Systems: This new section within the HANSA magazine features brief updates on technical developments, innovations and market launches from the powerful marine equipment industry organised in its association VDMA.

»Visible recovery after major effort« – this is the very brief summary of the latest report of VDMA – Marine Equipment and Systems, describing the economic situation of the shipbuilding and offshore supply industry. The maritime suppliers in Germany now expect good business developments in the current

year, despite the still ongoing imponderables. Due to the pandemic and the short-term slump in the order situation, the industry did not achieve the sales targets last year. However, the current development in the markets with a significant increase in incoming orders makes the industry optimistic, and expectations for the future are positive.

CO₂-neutral fuels and new drive systems are the key to the maritime energy transition. German marine equipment suppliers are the »enablers« that implement ideas as innovations – they also contribute solutions in all maritime areas to make shipping cleaner and more competitive. In the current situation, it is becoming increasingly clear that digitalisation is the main driver in the maritime industry. Those who set the standard in this field have a competitive advantage. This is precisely where Europe, and Germany in particular, want to lead the way.

The VDMA, Europe's largest industrial association, represents approx. 3,300 German and European companies in the engineering and plant construction sector. VDMA – Marine Equipment and Systems represents the export-oriented maritime sector serving the global markets of shipping, shipbuilding and the offshore oil & gas industry.



Industry and Business Events

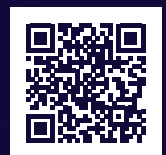
- INMEX Vietnam
07.–10.07.2021 | Saigon
- OTC
06.–19.08.2021 | Houston
- German business initiation tour – shipbuilding in Finland
23.–27.08.2021 | digital
- Husum Wind
14.–17.09.2021 | Husum
- NEVA
21.–24.09.2021 | St. Petersburg
- Seatrade Cruise Global
27.–30.09.2021 | Miami
- German business initiation tour – shipbuilding in Vietnam
04.–08.10.2021 | digital
- Power-to-X- experts' conference
»From production to application«
12.–13.10.2021, VDMA, Frankfurt/Main
- Kormarine
19.–22.10.2021 | Busan

For more information on the events or participation – please contact VDMA: nord@vdma.org. +49 40 50 72 070

SISHIP BlueDrive Eco – electrical power system

With SISHIP BlueDrive Eco, the SISHIP BlueDrive Family is now offering scalable solutions for all propulsion requirements, covering diverse performance graduations for small to medium-sized propulsion systems, from 5 KW in auxiliary mode up to 5.5 MW in main propulsion per shaft line.

SISHIP BlueDrive Eco is well known as a flexible, compact, high-power electric propulsion system based on DC technology. The power electronics of the SISHIP BlueDrive Eco main drive unit are designed as a stand-alone unit that integrates converter, energy management and control. These solution reduces footprint, weight and volume while providing very high reliability and availability.



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STEULER ANLAGENBAU

Mobile system for emission reduction of soot, sulphur oxides and nitrogen oxides



© Steuler Anlagenbau

Steuler's flue gas treatment systems can be dimensioned compactly in order to be suitable for use on ships

For engines powered by heavy or light oil, Steuler Anlagenbau has developed a process that keeps the pollutants soot, SO_x and NO_x in the waste gases safely below the legal emission values in a single dry process step without preconditioning.

According to the supplier from Höhr-Grenzhausen, the system is designed in such a way that – depending on the requirements – it can safely remove all these environmental pollutants from the waste gases at the same time or individually and in all combinations. The process works completely on a dry basis. The reaction substances are converted into natural components of the ambient air or returned to the raw material cycle in form of dry, recyclable residues.

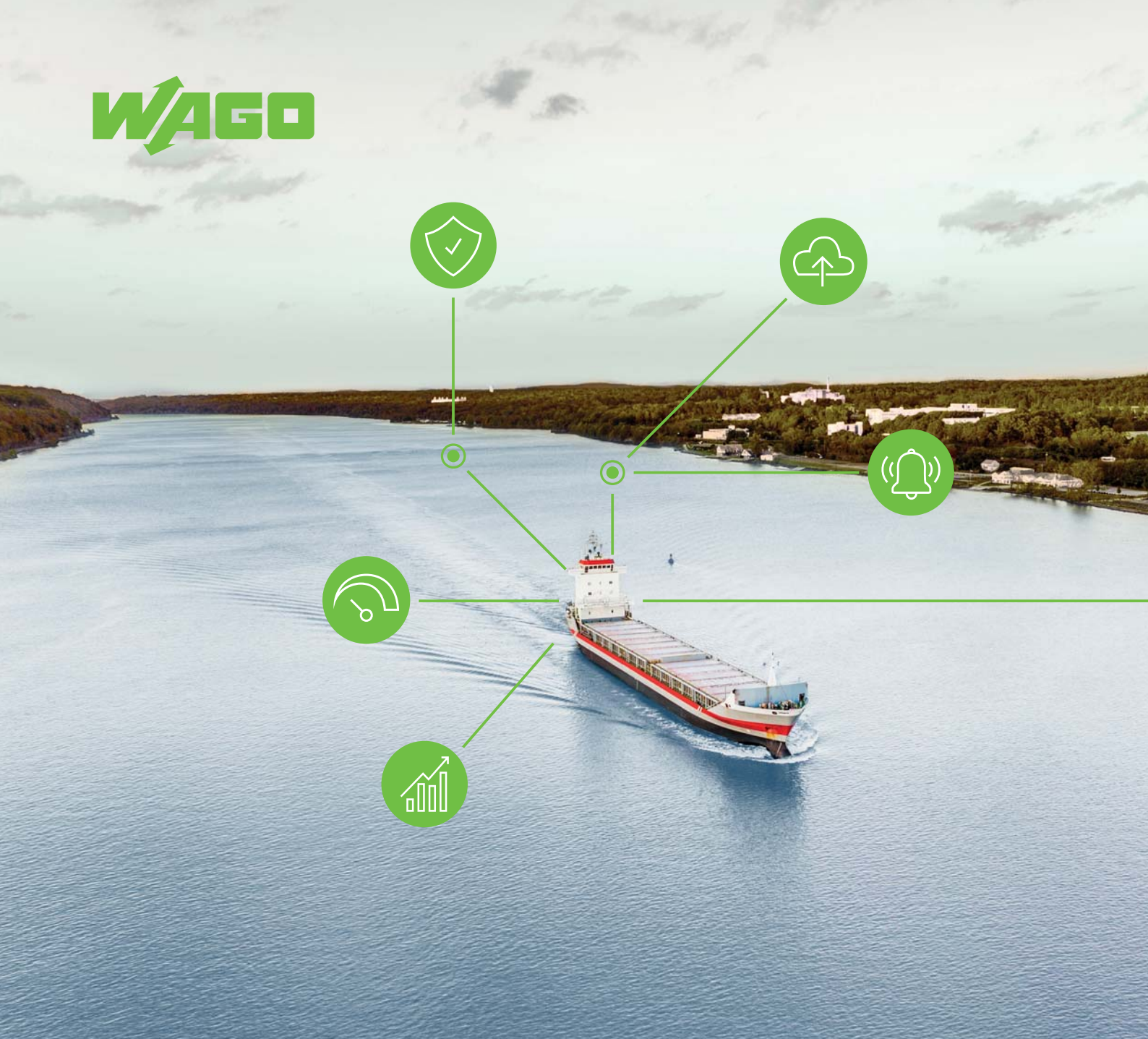
All chemicals required are used in the form of powder, granules or pellets.

The flue gas treatment system, which has proven itself in stationary systems for many years, has been further developed for use as a mobile system or in very limited space (e.g. on ships).

Steuler states, it brings numerous advantages:

- the entire flue gas treatment takes place in one housing
- easy handling and minimal operating, maintenance and service costs
- high operational reliability and availability
- low costs
- no accumulation of residues to be dumped
- filtration and catalysis in separate stages (levels?) to reduce investment and operating costs

The system essentially consists of ceramic filter cartridges, DeNO_x catalytic converter modules, a housing in which the filter cartridges and catalytic converter modules are integrated, as well as handling elements for storing and dosing the required chemicals. The system components can be installed and operated for the entire waste gas flow in one housing or distributed over several housings – whereby the handling elements are only required once.



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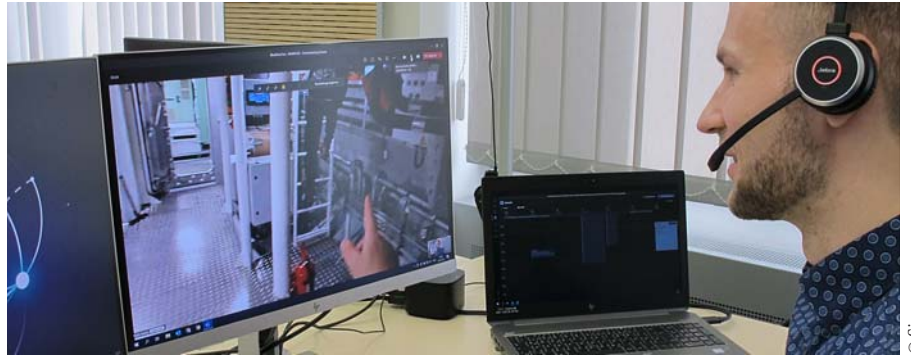
SIEMENS

Efficient remote commissioning of the new Kiel Canal ferries

The Kiel Canal is the highest traffic artificial sea shipping route in the world. The Federal Waterways and Shipping Administration (WSV) is responsible for its operation – including ferry traffic. To make ferry transportation as future-proof, efficient, and sustainable as possible, WSV began replacing the existing ferries with new models with hybrid drives in 2021.

Sustainable drive system

The three new models will receive diesel-electric SiShip BlueDrive Eco hybrid drives from Siemens Energy, the batteries of which can be charged via both on-board generator and connection to shore. The speed-controlled drives run efficiently even at a lower total output and can be easily combined with alternative energy sources from solar power to fuel cells. They achieve significant reductions



© Siemens

in costs and emissions through fuel savings and a longer service life.

The commissioning of the first ferry was carried out particularly efficiently via remote maintenance: With their »Remote Support+« service, the Siemens Energy engineers were able to guide the technicians at the shipyard in Estonia

through the process in real time using HoloLens technology and augmented reality applications – time- and cost-efficiently as well as independent of external factors such as corona restrictions.

Two ferries with the same technology are currently under construction; more will follow after the trial run.

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SB BRONESKE

New design – exhaust gas flap



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As specialists in elastic support, SB Broneske develops different and customized solutions for funnel tops. The Quickborn-based company designs exhaust gas flap variants proven and in use over the last 20 years. Four-flap exhaust gas flaps are a new design already in use and available – as well as exhaust gas flaps with one or two flaps. They prevent rain or splash water from getting into the exhaust system.

The flaps protect engine and exhaust pipe system from the corrosive effects of rain, snow and adapt to the operating condition of the engine: Opening or closing when the engine is started or stopped. Considering results of in-house 3D print-

ing, FEM (Finite Element Method) analysis for vibration, flow or structure, SB Broneske develops what it calls »the best solution for customers«. By having expanded the portfolio with adapted CFD (Computational Fluid Dynamics) simulations, the CFD and FEM analysis enables the experts to identify and exploit potential for improvement in early development phases.

SB Broneske (Schwingungstechnik-Broneske GmbH) is an internationally operating specialist for exhaust pipe systems as well as SCR/scrubbers. Established in 1972, the company manufactures all products at its factory in Quickborn near Hamburg.

AQUATHERM

DNV certification for use in »essential systems«

Aquatherm products may now be used in shipbuilding in systems which are essential for the operation and safety of the ship. This is certified by the international classification society DNV with the issue of type examination certificate TAK00001WZ. The DNV certification was preceded by a 15-month process which included three audits and six virtual meetings. In addition, numerous internal and external tests were carried out. For example, burst pressure tests on various assemblies in dimensions 250 mm and 450 mm, buckling pressure tests for the calculated determination of the buckling pressure on all dimensions, as well as flame spread tests according to ASTM D635.

The current certificate is an extension of the certification in shipbuilding for »aquatherm blue pipe MF RP«. Up until

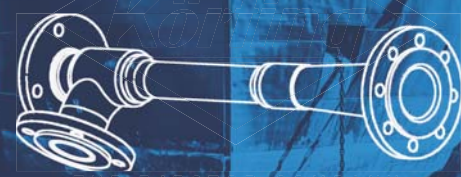
now, aquatherm blue pipe and aquatherm green pipe were only approved for »none essential systems«, such as hot and cold water distribution.

They have now been added, to a limited extent, to the so-called »essential systems« on board a ship, such as main and secondary lines for bilge water and supply lines for sprinkler systems. This considerably expands the areas of application in shipbuilding.

DNV also certified the external pressure resistance of the pipes in shipbuilding. Based on a test report of a materials research and application technology institute (IMA Materialforschung und Anwendungstechnik GmbH Dresden), aquatherm blue pipe SDR 11 MF RP can be loaded with an external pressure of up to 7.2 bar. The certification includes dimensions up to 450 mm.

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MMG

EEXI – The wind of change towards a decarbonized shipping

The IMO supports the United Nations Sustainable Development Goal in reducing greenhouse gas emissions by 40 % until 2030. Hence the »Energy Efficiency Existing Ship Index« (EEXI) will come into force from 2023 onwards. To support shipowners MMG offers engineering services as calculation of your vessels EEXI value and comparison of required and attained EEXI value.

Besides the initial EEXI certification and the obvious motivation of fuel savings, the continuous reduction of CO₂ emissions will be an additional requirement for the operational fleet. The regular optimization of the vessels efficiency will be monitored by the »Carbon Intensity Indicator« (CII). In recognition of these regulations, MMG supports the different stakeholders of the vessel with efficiency analyses based on state-of-the-art numerical simulation methods and the prepara-



© MMG

tion of detailed redesign and propeller retrofit reports.

An engine limitation complemented by a propeller retrofit together with the optimized fin cap solution ESCAP is the most promising measure to reduce CO₂ emissions, achieve the EEXI targets and

to increase propulsion efficiency at the same time.

MMG can look back on a reference list of about 400 redesign/retrofit projects for numerous customers world-wide. MMG retrofit propellers have proven the potential for fuel savings of up to 14%.

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AMS.SOLUTION Developing into a system supplier

Since all technical and commercial project information is pooled on the single platform ams.erp, the steel manufacturer Ostseestaal from Stralsund in Northeast Germany is able to plan its capital-intensive customer orders economically and deliver them on schedule.

3D cold forming – with this core competence, the company Ostseestaal has become one of the leading producers of shape-independent metal plates within two decades. In particular, yacht, cruise and naval shipyards rely on the expertise of the Stralsund-based medium-sized company.

And the success story continues. Almost every year, the company enters new business fields in which the knowledge of its 220 employees about fluid dynamics is just as much in demand as in the maritime industry – for example, in architecture, renewable energies or aerospace technology. In the process, Ostseestaal is transforming itself from manufacturer a semi-finished products to a provider of complete system solutions.

In order to be able to plan and control the increasingly complex project business in an integrated way, the company has been relying on the order management system ams.erp since 2019, which ams.Solution AG has designed for the requirements of make-to-order, contract and variant manufacturing.

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WAGO

Secure communication

Ships are increasingly networked. The exchange of data on board and from board to shore is increasing. To enable a secure exchange here, the automation specialist Wago and the Finnish company Tosibox have jointly developed a solution.



© Wago

With the »Tosibox Lock for Container« software, a solution has been developed to enable secure communication on board and to systems outside the ship. With the help of the software, users can access their industrial IoT devices via an encrypted VPN connection over the internet and most LAN and WAN networks.

For this software, Tosibox uses Wago's PFC200 controllers with so-called Docker® technology. According to Wago, the Linux-oriented Docker container technology makes it easier and faster to use applications on the PFC200. In addition, different applications can run separately on one device. Furthermore, Docker grants users many degrees of freedom, so software from third-party suppliers in particular can be used with it.

The software solution offers an infrastructure to monitor, analyse or optimize

the components of an automation system – for example controllers, operating units or condition monitoring systems – at a higher level. To do this, the software uses Docker to open up secure connectivity between the devices in the form of machine areas or system monitoring on site and streaming or storage services above them, as well as tools for data analysis. These can be, for example, visualizations or solutions from the field of machine learning.

According to the developers, an essential added value of the overall solution, apart from secure data transmission, is to enable users to access the data in the simplest possible way. It is irrelevant which hardware is used to connect to the devices: the Tosibox key is available in the form of a USB stick for the computer as well as a soft key for laptops or as a mobile client for pads and smartphones.

3 questions to...

Steffen Friedrich

Global Industry Manager Marine & Offshore – Wago Kontakttechnik, Minden

»Flexible installation«

Could you explain Docker technology in a few words?

Friedrich: Docker technology enables software applications to be isolated in so-called containers. All the files needed to run an application are packed into a handy package. Applications can thus be distributed, installed and operated more quickly. Docker containers are comparable to a virtual machine; applications are separated from the underlying operating system as well as from other applications. Docker containers are very resource-efficient and their origins can be found in the IT world. In the beginning, server applications were managed, but today the technology has found its way into the automation world and quickly and easily offers an extended range with management functions on controllers or edge devices.

For which applications on board can the technology be used?

Friedrich: Various systems can be found on board ships. For example, it can be a Wago PLC control system with a Linux operating system and a Microsoft Windows computer. In the past, applications had to be compiled at great effort so that they could run on the respective operating system. With Docker technology, proven applications, such as a VPN client from leading providers, can now be flexibly installed on other systems in a container. Future applications can also be efficiently managed in the expanded area, for example an analysis tool for preventive maintenance and optimizing ship operations. Complete isolation of PLC programmes is also conceivable.

What advantages does it bring to the crew or the owner?

Friedrich: Docker containers are very resource-efficient and inherently bring good management functions. With the



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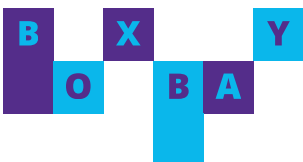
quick and easy distribution of applications (so-called deployment), software can be flexibly added, for example for a secure internet connection. Existing systems can thus be used and expanded or updated with different containers. This means that there is no need for new installations on board, which saves costs. In the future, it will also be possible to optimize ship operation and open up new possibilities with regard to the digital maintenance of equipment. The most important thing, however, is that a classified system remains untouched in its origin.

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LIEBHERR

Largest slewing drive

Inspired by Jacques-Yves Cousteau, Liebherr customer eConowind develops an innovative sailing system. Up to 40 m in height, futuristic metal sails serve as propulsion support for cargo ships. The world's largest slewing drive units turn these huge sails. Using wind power in this way, fuel costs can be reduced by up to 20%.

When used on the high seas, the Liebherr products fully demonstrate their advantages, the company says. The slewing drive units are self-contained systems consisting of a drive and a bearing unit. This makes the components particularly resistant to extreme environmental influences, such as salt water or dust. Special sealing systems and surface coatings also add to the high resistance of the large components and make them ideal for use at sea. The massive, worm-driven components from Liebherr measure 1,720mm in diameter each and weigh together over 1.4 t. A worm shaft weighing over 40 kg, which already enables a notable 218,500 Nm of torque at module 8, drives the components. For more power, the slewing drive can be configured up to module 14. It is also



© Liebherr

possible to design slewing drives with two drive trains. In the construction and design of the slewing drives, Liebherr draws on »its many years of experience as a manufacturer of drives and slewing bearings, venturing at the same time into new dimensions«. For the manufacturing process, for example, the company uses its own special tools, such as the diamond milling head. It was specifically developed for the worm gearing.

GEA GROUP

Net-zero GHG emissions by 2040

GEA Group today announced a comprehensive climate strategy. With the corresponding climate targets, GEA is making a clear commitment to achieve net-zero greenhouse gas (GHG) emissions along its entire value chain by 2040. The company has submitted its net-zero commitment and 2030 interim targets to the Science Based Targets initiative (SBTi), the globally recognized, independent body for reviewing climate targets. Validation of GEA's interim targets by SBTi is expected in the second half of 2021, confirming GEA's targets are aligned with the latest climate science and are effectively contributing to the 1.5 degrees Celsius target of the Paris Agreement.

»We are pursuing the most comprehensive and ambitious climate strategy in the mechanical engineering industry,« says Stefan Klebert, CEO GEA Group. By investing globally in Gold Standard-certified projects to generate clean energy from wind, sun, biomass and waste gases, GEA's own operations are already climate-neutral

since the beginning of 2021, the company states. In addition to the 2040 net-zero target, the company has submitted interim science-based targets across all relevant scopes. Compared to the baseline year 2019, GEA aims to reduce both GHG emissions from its own operations (Scopes 1 and 2) by 60% and GHG emissions from the customer use phase of its products (Scope 3) by 18% by 2030.

The climate strategy is described as the first building block of a comprehensive Environment, Social and Governance (ESG) strategy. Beyond climate protection, this strategy is supposed to also take social and corporate governance aspects into account. It shall reinforce the company's commitment to United Nations Sustainable Development Goals and become a foundational element of »Mission 26«, GEA's new corporate strategy that is currently under development. »Mission 26« will be presented at GEA's next Capital Markets Day in September 2021.

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VDMA WORKING GROUP »MTP IN SHIPBUILDING«

»Module Type Package« – long-awaited digital standard developed

VDMA is presenting the new MTP standard after four years of development, opening the way to link together machine and system components seamlessly and quickly, avoiding time-consuming discussions over interfaces in the ship automation system. MTP (Module Type Package) describes the standardization of communication between systems and control level: This reduces complexity for all participants along the shipbuilding value chain. If the mechanical modularisation can also be transferred to the automation system, users in the shipbuilding supply chain can achieve speed advantages in engineering and quality improvements in the integration of subsystems. The MTP is a description format with which automation can be realized as a »service-oriented software architecture«.

Due to both cost pressures and environmental requirements, modern ships must rely on increasingly complex technologies.

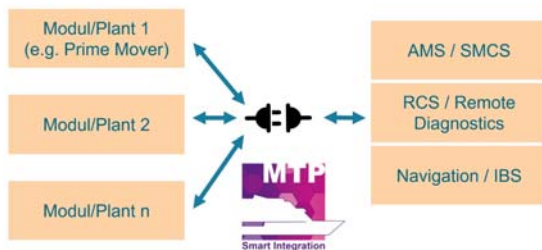


But on-board digitalization itself won't make everything better automatically – a standard is needed to link different systems with rapidly increasing number of signals efficiently and securely.

In the MTP working group, the leading manufacturers of ship automation technology work together with mechanical engineers, system integrators and experts from shipyards and universities. With this approach, maximum acceptance of the developed standards is achieved, as the concrete advantages for all stages of the value chain are part of the project right from the start. Within the framework of a VDMA standard sheet, the standard currently being developed for process engineering is adapted to the shipbuilding industry. This means that the tried and tested from a technically related sector can be used, which makes implementation in the shipping and shipbuilding industry even easier. More information on this topic:

mes.vdma.org or contact Hauke Schlegel, VDMA Marine Equipment and Systems, e-mail: hauke.schlegel@vdma.org

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MAN ENERGY SOLUTIONS

Takeover of electrolyzer manufacturer H-Tec Systems

MAN Energy Solutions is acquiring the majority of shares in the Augsburg-based electrolyzer manufacturer H-Tec Systems. The company is thereby increasing the share in H-Tec to almost 99 %. The acquisition of the shares, which will remain held in free float, has been agreed, MAN announced.

The company already gained a 40 % stake in H-Tec in 2019. The now-completed acquisition of the shares from the previous majority shareholder, GP Joule, was already agreed in the past year, but still subject to approval by competition authorities until now. The financial volume of the transaction was not disclosed. Schleswig-Holstein-based GP Joule operates in the renewable energies sector and acquired H-Tec in 2010.

With the acquisition, MAN Energy Solutions is completing their range across the hydrogen value chain and is further aligning their business towards a range of solutions for decarbonization: »Starting with extraction and transport, right through to the use of climate-neutral energy, we offer our customers solutions for using green hydrogen, and are therefore strongly positioned in one of the most important future markets,« says Chief Executive Officer Uwe Lauber.



Uwe Lauber

Electrolysis and Power-to-X

Together with the management team at H-Tec, MAN Energy Solutions wants to drive forward the large-scale industrial scaling of electrolysis. »Today, H-Tec Systems offers electrolyzers in the megawatt range,« says Lauber. »The objective now is to prepare the company for serial production because green hydrogen is going to become a mass market.«

H-Tec Systems was founded in 1997 and has over 20 years of experience in hydrogen development. The specialists produce stacks and megawatt electrolyzers based on the polymer-electrolyte membrane process (PEM) to cover the hydrogen demand for industry as well as for energy refiners.

MAN Energy Solutions sees itself also as a forerunner in Power-to-X technology, which enables green hydrogen to be converted into climate-neutral fuels. In 2013, the company commissioned the methanation reactor for Europe's first Power-to-Gas plant on a 6 MW scale for Audi AG. »Since then, MAN has consistently developed PtX technology and offers turnkey plants with a capacity of 50 MW and more today«, it is said.

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Fuel cell systems for mega yachts



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Weinheim-based company Freudenberg enters into a strategic partnership with German shipbuilding group Lürssen – a leading yard in the yacht sector – to develop fuel cell systems for mega yachts. The first system under development is said to allow a ship to spend more than 15 days at anchor or cruise for more than 1,000 miles with zero emissions.

The system uses Freudenberg's methanol-operated, maritime fuel cell system with integrated fuel reforming, which received »Approval in Principle« from DNV GL at the end of 2020: Steam reforming of methane is used to produce hydrogen directly in the system, which then reacts with oxygen from the air in the fuel cell, generating the electric energy required for the propulsion as well as the ship's electrical system.

Another part of the collaboration is the commissioning of an innovation laboratory at Lürssen, where the integration and operation of Freudenberg's systems are simulated on board a yacht operated with methanol. The optimal hybridization between fuel cells and batteries will also be analyzed here.



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