Marine system solutions

Combined expertise for better performance, profitability and environmental protection



Companies of the
GEA Group

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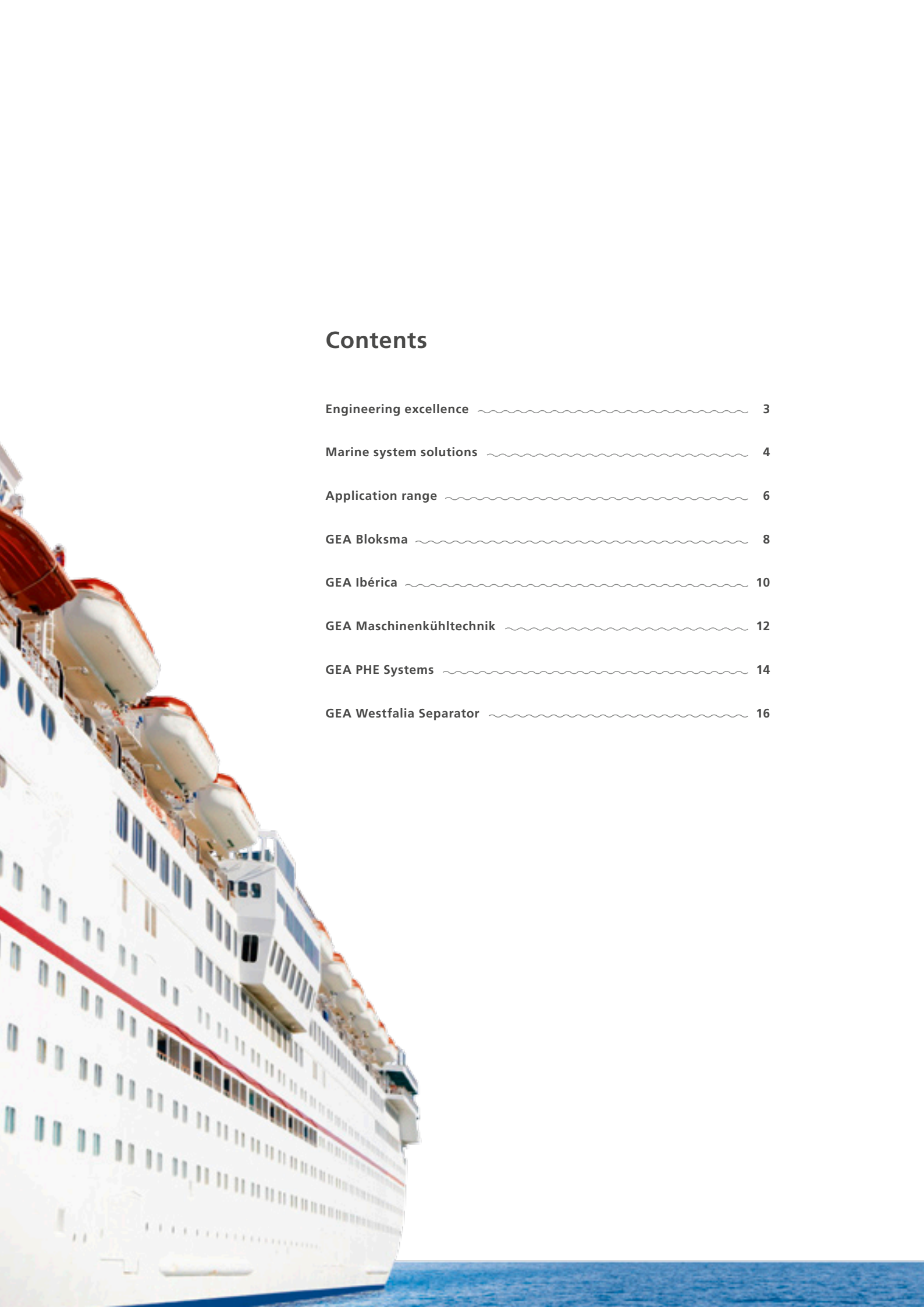
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Together on an innovative course – with companies of the GEA Group



The GEA Group is the umbrella under which global leaders in the field of marine engineering work closely together. Their combined expertise ensures that partners in the shipbuilding industry have a key edge in competing for more efficiency, profitability and environmental protection.

The shipbuilding industry is becoming increasingly important across the globe. The reasons for this are obvious: accounting for more than 95 per cent of global transport tonnage, the ship is by far the most efficient and economical means of transport and thus a central "module" within the global supply chain. At the same time, shipping companies, shipyards and suppliers are under considerable pressure to innovate: the constant growth of competition for production capacity and ever-stricter environment-protection laws call for new solutions that focus on maximum economic efficiency and sustainability with a view to improving the way resources are handled. So new technical solutions have to meet a large number of requirements. Sustainability in the economic and ecological sense is a self-evident necessity.

Being based with more than 250 companies in 50 countries, the GEA Group is able to fulfill these challenging requirements. This umbrella covers leading companies in the field of process engineering whose engineering excellence ideally supports the shipbuilding industry in the performance of its tasks: GEA Bloksma, GEA Ibérica, GEA Maschinenkühltechnik, GEA PHE Systems and GEA Westfalia Separator.

Complete system solutions for the engine room

The companies of the GEA Group and their marine specialists can be approached individually or in different combinations, depending on requirements and needs. The use of several companies within one shipbuilding project ensures the greatest value added for customers: experience with joint projects and continuous know-how transfer results in valuable synergies. The combined expertise of these companies is the best foundation for developing complete system solutions for the modern engine room – without frictional losses and without interface problems.

These technological leaders in marine process engineering pool their expertise in the GEA Group:

- GEA Bloksma
- GEA Ibérica
- GEA Maschinenkühltechnik
- GEA PHE Systems
- GEA Westfalia Separator



Marine system solutions

These marine specialists bring more efficiency and sustainability on board

Whether bilgewater treatment, fuel oil conditioning, engine cooling or seawater desalination is required, the companies of the GEA Group offer marine system solutions that make it possible to achieve strategic improvements in efficiency and cut costs while optimising product and process quality.

The GEA Group offers its customers in the shipping sector system solutions that are comprehensively and systematically designed for the special requirements on board. In an energy-efficient manner they ensure a high performance from the drive units while securing maximum availability of the systems. At the same time they support the aim of shipping companies to protect both crews and the environment as well as possible. All the rules laid down by the International Maritime Organization (IMO) to protect sensitive maritime ecosystems are more than complied with. The compact design of the systems and components fulfill the requirements of modern shipbuilding by virtue of their low weight and the extremely small space needed to accommodate them. All products from the GEA Group are designed for extreme conditions and operate reliably even in rough seas. The consistently applied plug-and-play principle simplifies installation, thereby contributing to shortening building times. In addition to this, the systems are low-maintenance and support the demand for an intelligent, supervision-free engine room.

This means that costs are reduced, efficiency increased and return on investment optimised. At the same time working conditions are significantly improved and operational safety further enhanced. As a result, the economic, social and ecological sustainability of investments in shipping is further reinforced.





Protecting investments with life-cycle benefit

GEA marine system solutions are designed for the maximum benefit over the entire lifetime of the units. This life-cycle benefit is not only ensured by first-class product quality. A further bonus takes the form of customised service solutions that can be perfectly adapted to customers' needs. Here partners benefit not only from conventional services such as inspection, maintenance, original spare parts and repairs, but also from proactive risk-avoiding solutions, such as the on-line or off-line monitoring of systems.

By modernising units during operation, performing retrofit activities and upgrading in line with the latest state of the art, performance can also be continuously improved. Overall, this means maximum process efficiency and plant availability combined with absolute budget control. There is no better way to secure your investments and your processes.

The benefits of GEA marine system solutions at a glance

- First-class product quality
- Safe in extreme conditions
- Compact design – low weight and small space requirements
- Reduction of interfaces
- Simple installation thanks to plug and play
- Maximum process efficiency and availability
- Sparing use of natural resources
- IMO-compliant
- Reliable protection of people and the environment
- Proactive service
- Optimal investment protection



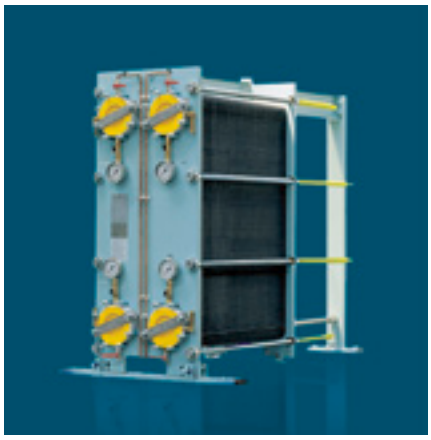


Cruise ships

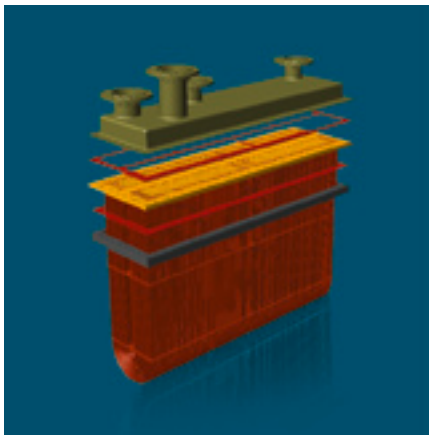
Oil and gas tankers

Application range

Successful shipping companies make use of GEA group expertise in the engine room



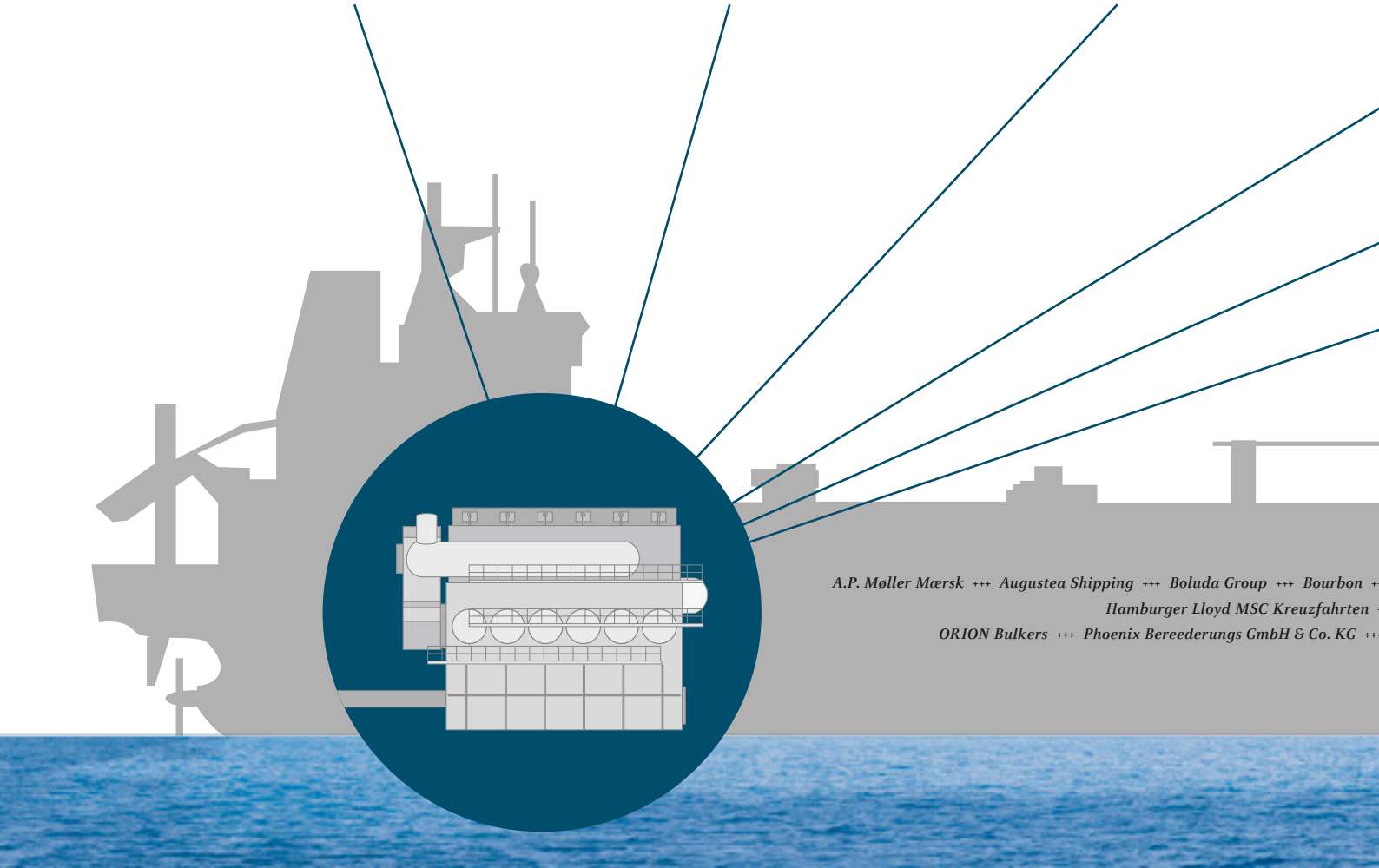
Central cooling of the main and auxiliary engines



Dedicated cooling of engines and auxiliary systems



Efficient energy conversion

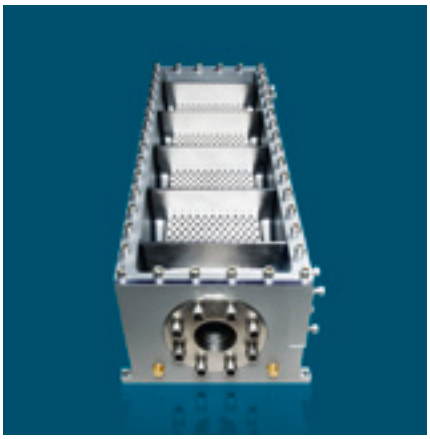


A.P. Møller Mærsk +++ Augustea Shipping +++ Boluda Group +++ Bourbon +++
Hamburger Lloyd MSC Kreuzfahrten +++
ORION Bulkers +++ Phoenix Bereederungs GmbH & Co. KG +++



Cargo ships *Ferries* *Trawlers* *Tugboats* *Yachts*

Supertankers, cruise ships, trawlers, freighters and mega-yachts: all types of ships with systems, units and components from companies of the GEA Group are ideally equipped for the challenges of today and tomorrow.



Reduction of NOx emissions



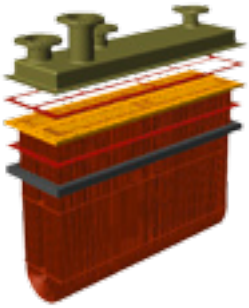
Sea water desalination



Clarification and purification of fuel and lube oil treatment plants

++ Carnival Cruise Lines +++ Deutsche Seereederei GmbH +++ District Offshore +++ Gulmar
+++ Jo Tankers +++ Norddeutsche Reederei +++ Norwegian Cruise Line +++ Norwegian Hapag Lloyd AG +++ Olympic Shipping
+ Rem Offshore +++ Sanmar Shipping +++ Rickmers Reederei +++ Royal P&O Nedlloyd +++ and many more ...

Efficient heat exchange for a wide range of applications



Boxcooler (K-type)



Plate Fin Oilcooler (PF-type)

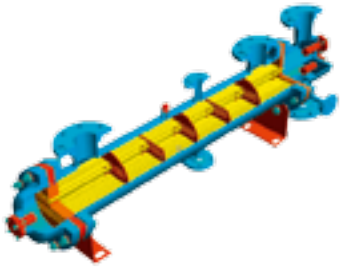
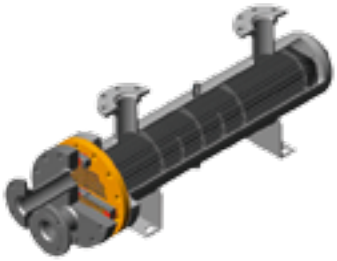


Plate Fin Oilcooler (N-type)



Oil and water heater (V-type)



Plate Fin Oilcooler bundle for lube oil applications (PF-OEM-type)

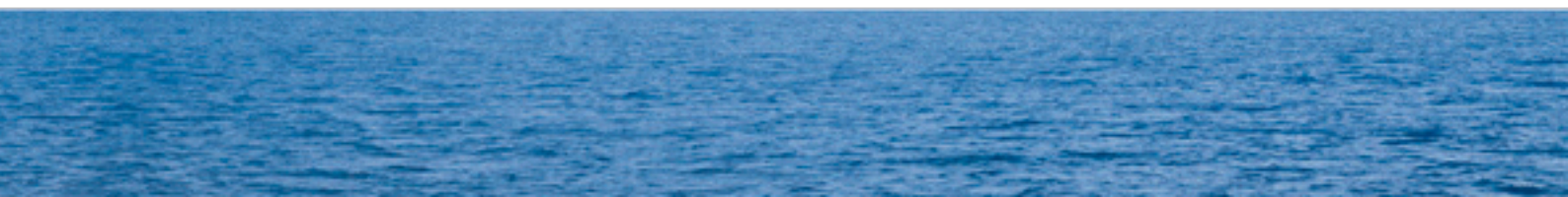
On the high seas, for example on an ocean freighter or a drilling rig, there are innumerable areas where the efficiency of heat exchangers is of paramount economic importance. Over the past 90 years, GEA Bloksma has made a name for itself around the world in the field of oil, water and air cooling and has maintained its technological leadership.

The application areas of heat transfer are manifold: diesel engines, hydraulic systems, lube oil systems, separators, propulsion systems, turbines, transformers and much more. So research and development play a major role. In order to be able to ensure a constant high quality for the entire area of heat-transfer technology, GEA Bloksma uses the latest development and design equipment. Long-standing and stable relations with customers and partners are one factor in quality assurance.

The GEA Bloksma Boxcooler is a product that combines various advantages used in vessels ranging from the fishing boat, cargo vessels to the dredger or workboats: much lower power consumption thanks to thermosyphon cooling and making use of flow characteristics when the ship is in sailing mode. For instance, the Boxcooler saves up to 15,000 litres of fuel a year. In addition, it is not susceptible to galvanic corrosion and impurities. In particular, biological impurities are prevented by copper ions.

A further specialist area is liquid-based oil and air cooling. The plate fin technology used here offers a maximum of operating safety combined with an extremely compact design – the GEA Bloksma Plate Fin (PF) Oilcooler is only 30 per cent the size of a conventional cooler and offers the reliable benefits of a cylindrical, tubular heat exchanger. The four standard series and standardised connections simplify installation.

Thermal transfer technology for heating, especially for heavy heating oil, lube oil, thermal oil, steam or water, is also one of the areas of use for GEA Bloksma developments. The latest information gained from heat-transfer research went into the design of the heaters. For instance, the V-type heaters work up to a temperature of 300 degrees Celsius and can withstand overpressure of 32 bar. This robust design means that GEA Bloksma heat exchangers are suitable for applications where strong pulsations occur.





Boxcoolers fitted in engine room



Boxcoolers for offshore workboats

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GEA Bloksma at a glance

- Boxcoolers:
  Low power consumption and minimal maintenance requirements
- Plate Fin Oilcoolers:
  Exceptionally compact and robust design
- Oil and water heaters:
  Various materials possible, from ingot steel through stainless steel down to cunifer
- Tube bundle heat exchangers:
  A practical addition to the GEA Bloksma standard series, especially for capacitors (steam turbines)
- Comprehensive service portfolio and prompt delivery of spare parts





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GEA Ibérica

Condensers and cooling systems for steam turbines

Steam turbines are used in innumerable applications both on land and at sea. The conversion of kinetic energy into rotational energy by means of such a turbine calls for the use of efficient condenser and cooling systems. For maritime applications, GEA Ibérica has been the market leader in this technology sector for a long time. Ongoing development work always makes use of the results of the latest scientific research.

The entire range of GEA products has been designed according the principles of longevity, cost efficiency and environmental compatibility. Based on these same principles the first air-cooled condenser, which was made by GEA Ibérica, has been running reliably for over seventy years.

While steam turbines are no longer used these days for propulsion – in an oil tanker, for example – they are still of great importance in energy conversion. The efficiency of the integrated condensers, and particularly the materials used, plays an important role here.

On the high seas, water is available in unlimited quantities for use as a cooling medium; however, the corrosive properties of sea water can shorten both the service life and the maintenance intervals of the various cooling systems significantly.

GEA Ibérica has special expertise in selecting the right materials. Titanium, copper-nickel alloys or other special materials: Decades of experience enable GEA Ibérica to combine the right technologies with the right materials.



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GEA Ibérica at a glance

- Vacuum steam condensers
- Air-cooled condensers
- Surface condensers
- Parallel condenser systems (dry/wet)

Wide range of replacement parts and components:

- Exhaust ducts (between steam turbine and condenser)
- Vacuum pumps
- Condenser pumps
- Interconnecting piping
- Various other accessories



Vacuum steam condenser view, showing inlet/outlet water boxes, flash box, hotwell, etc.



Vacuum steam condenser view, equipped with divided water boxes, hotwell, etc.



Reliable cooling for diesel engines and electric motors



Charge air cooler



Charge air cooler



Exhaust gas recirculation cooler



Closed circuit cooler



Acoustic capsule cooler for engine room

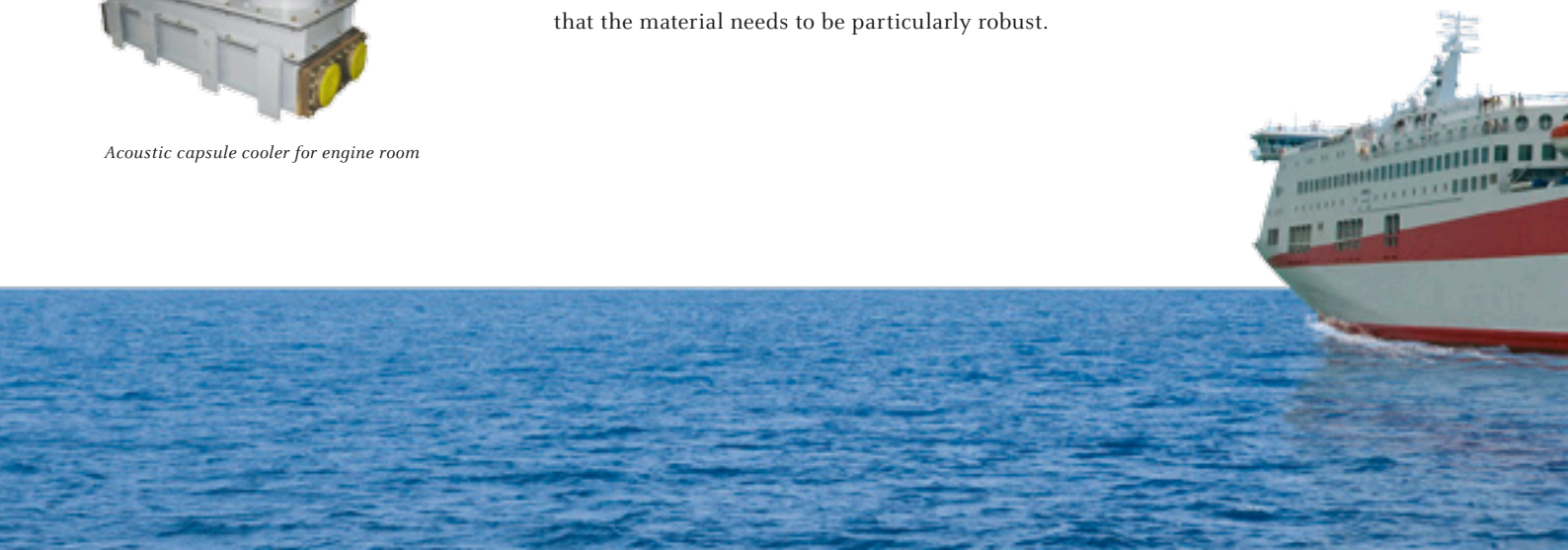
The discharge of heat from power or drive systems is an elementary factor in the operating safety and long service life of these systems. GEA Maschinenkühltechnik has been the market leader in the field of thermotechnical components for many years.

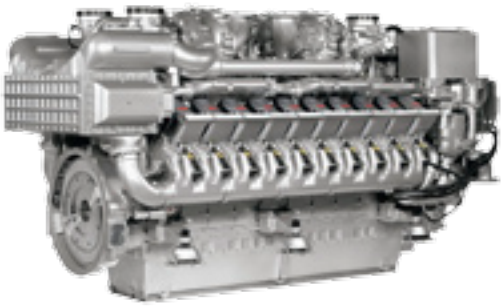
Today some 90 per cent of global goods traffic is handled by sea. The requirements to be met in terms of the cargo capacity and engine power of ocean freighters are increasing apace. Also the cruise industry is growing more and more. Dependable cooling systems are indispensable for trouble-free operation.

For several decades GEA Maschinenkühltechnik has been developing charge air coolers for diesel and gas engines and supplying the world market with key products and reliable services for cooling technology. Here research and production are closely coordinated with engine manufacturers and plant engineers. The aim is to increase efficiency with maximum operating safety and to reduce emission levels.

The exhaust gas recirculation cooler from GEA Maschinenkühltechnik represents the latest development in the field of emission reduction. It complements conventional exhaust gas recirculation and reduces NOx levels inside the engine – even at temperatures of up to 700 degrees Celsius. Recirculation upstream and downstream of the turbocharger is possible. In the near future emission guidelines will become a significant factor in mechanical engineering. At the latest as of 2016, all design engineers will have to observe new rules that further limit admissible NOx levels.

GEA Maschinenkühltechnik is also responsible for the development and manufacturing of closed-circuit coolers which are used for drive systems, mains supply of generators and charging generators as well as for air conditioning on ships and submarines. Especially for the use on ships, different requirements concerning installation size and the choice of material have to be fulfilled. Furthermore sea water is used for cooling in many cases so that the material needs to be particularly robust.





MTU engine with GEA charge air cooler

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GEA Maschinenkühltechnik at a glance

- Charge air coolers:
  For stationary and mobile onshore and offshore applications from 200 kW
- Exhaust gas recirculation coolers:
  Effectively reduce NOx levels inside the engine unit
- Closed circuit coolers:
  Cool the air in the closed circuit using seawater and circulates it via a ventilator system
- Recirculation coolers:
  For cooling large electric motors and medium-size generators
- Certified inspections
- Assembly and repair, also on site
- Emergency repairs service
- Preventive examination and damage analysis such as video endoscopy, leak tests, analysis of cooling water, etc.



AEM engine with GEA closed-circuit cooler



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GEA PHE Systems

Plate systems for cost-efficient heat exchange

Heat exchange in the onshore and offshore sector has to meet many criteria: low weight and small space requirements, to mention just two. Above all, one factor always has priority here: maximum reliability. Plate heat exchangers from GEA PHE Systems are reliable and operate safely even under the toughest conditions.



Gasketed plate heat exchanger for marine application

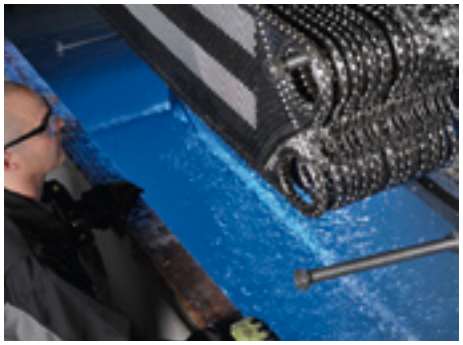
All plate heat exchangers of GEA PHE Systems have been ocean-tested and doing their work in different maritime areas of application for many years. It is not just that the development of cooling and heating technology is a decades-old tradition at GEA PHE Systems – the company also cooperates closely with leading engine builders. This resulted in complete systems that meet the highest standards in terms of cost efficiency and operational safety. Product series optimally tailored for use meet the increasingly stricter requirements at sea. Their variable lengths and profiles mean that the plate heat exchangers are adapted to conditions in the engine room and not vice versa. And all products of GEA PHE Systems easily pass the acceptance tests of international classification societies.



Brazed plate heat exchanger GP series for engine exhaust heat recovery

Higher performance, more applications and even less investment: the new versatile NT series fulfills the requirements of the industry and sets economical standards for future plate heat exchangers. The innovative OptiWave plate design transfers a maximum of heat – while taking up less space. Modern installation and sealing technology ensures that the plate package is perfectly positioned. The non-adhesive and easy-to-change EcoLoc gaskets enable short downtimes, thus reducing maintenance costs. Of course these gaskets are optionally also available as adhesive versions. The Varitherm series has been continuously further developed for 30 years. A large number of plate types and corrosion-resistant materials provide a solution for every application. Gaskets can be conventionally glued or installed without adhesives using the well proven Locln system.





Servicing a plate pack



Shipowners and shipyards all over the world rely on GEA PHE Systems

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GEA PHE Systems at a glance

- NT series:
  Maximum corrosion protection thanks to broad choice of material (e.g. Titanium) combined with a small investment volume and maximum heat transfer
- Varitherm series:
  Flexible in capacity, dimensions and material at transfer rates of 3,600 cubic metres per hour and unit
- EcoWeld plate heat exchangers:
  Fully welded and reliable operation between minus 200 degrees Celsius and plus 950 degrees Celsius at an operating pressure of up to 100 bar
- EcoBraze – brazed plate heat exchangers:
  The design of the plates creates an extremely turbulent flow, effective heat transfer at low volume flows
- Effective central cooling of the main and auxiliary engines
- Cooling of gearbox, compressor and other lube oils
- Pre-heating of heavy fuel oils and lube oils
- Pre-heating of sea water to create fresh water
- Engine exhaust heat recovery with the GP series
- Heat exchange to air-condition the passenger and freight areas



Combined lube oil – water – module with GEA PHE Systems gasketed plate heat exchanger



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High performance equipment for maritime applications



Sea water desalination



Sludge treatment



Bilgewater treatment



Fuel oil conditioning systems

The treatment of water, grease, oil and fuel on the high seas is subject to strict economic, technical and ecological rules and regulations. High-performance systems from GEA Westfalia Separator cover the entire area of maritime applications for centrifugal separation technology.

The treatment of lube oils and fuels, sludge containing oil and contaminated bilgewater at the highest level of purity and safety is one of the central requirements in the shipping sector. Other requirements are the operational safety of the ship's drive units, which has to be ensured by means of fuel treatment as well as water treatment, and obtaining fresh water from sea water. In addition the sludge treatment plant from GEA Westfalia Separator is capable of reducing the volume of sludge disposal by up to 90%. The recovered fuel oil can be reused. The recovered lube oil can be used for boiler fuel.

The systems from GEA Westfalia Separator are characterised by the highest technical standard and innovative separator design.

The new Westfalia Separator® **unitrol**plus sensor system ensures the continuous monitoring and control of water and solids, for instance during the treatment of heavy and lube oils. Thanks to their high g-forces, the systems of GEA Westfalia Separator achieve the best results in the world when it comes to meeting classifications and purity regulations. Their compact design means that they can be integrated in existing systems and do not take up much space easily.



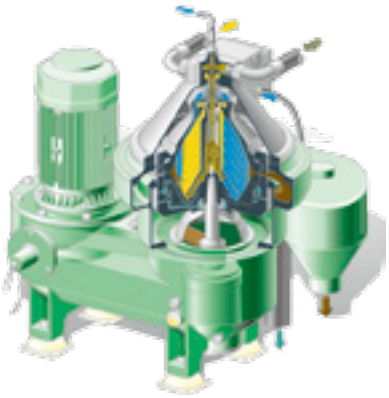
*The new separator generation – Westfalia Separator® **eagle**class*

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www.seaprotectsolutions.com

Two assembly systems are available: modular compact units can be installed by the shipyard using plug and play. Alternatively, Westfalia Separator® centri**pack** is equipped with a self-contained treatment plant package system which is preconfigured with pipes and all the control modules.

Outdated systems can be replaced by easy-to-install retrofit units in order to meet the new safety, purity and environmental standards. This makes it possible to expand capacity, automate processes and reduce service and maintenance costs.



*Westfalia Separator® **unitrol**plus – a new sensor system for automatic monitoring and control for water and solids content monitoring*

GEA Westfalia Separator products at a glance

- Westfalia Separator® **eagle**class:
  Clarification and purification in fuel and lube oil treatment plants
- Westfalia Separator® **ViscoBooster**Unit®:
  Ensuring the temperature, pressure and viscosity for continuous and safe operation of drive units (fuel oil conditioning)
- Westfalia Separator® **SeaWater**Distiller:
  Generation of fresh water on board by single-stage evaporation technology – equipped with GEA PHE Systems plate packs
- Westfalia Separator® **SeaProtect** Solutions®:
  Security in reducing oily water and clever cost reduction for sludge disposal



Original Manufacturer Service Worldwide

Westfalia Separator® capitalcare** – Original Manufacturer Service**

Best machines need the best service. Therefore our preventive services and measures have been developed to secure the highest performance and availability and to avoid unplanned stoppages. We also focus on realistic repair and maintenance budgets for our customers.

The worldwide available Westfalia Separator® capital**care** services are:

- Field service
- Original spare parts
- Repairs by authorised workshops
- Condition monitoring system – Westfalia Separator® we**watch**®
- Crew training
- Service level agreements
- Exchange and upgrading programs

We are available on site where you need us. GEA Westfalia Separator is present all over the world, with more than 50 sales and service companies and over 20 authorised workshops. Accordingly, original replacement parts from the technology leader are always available on site. Naturally, our experts are also at your service when you need them – 24/7.

Westfalia Separator® wewatch**® – Condition monitoring system**

On top of the high safety standard of GEA Westfalia Separator centrifuges, the Westfalia Separator® we**watch**® concept provides additional security with the Westfalia Separator® **Watch**Master. It monitors the operating status of your machines. Faults are identified at an early stage due to the precise observation of the operating status, minimising unscheduled downtimes. The Westfalia Separator® we**watch**® system offers different levels to suit your individual needs.





Westfalia Separator® WatchMaster

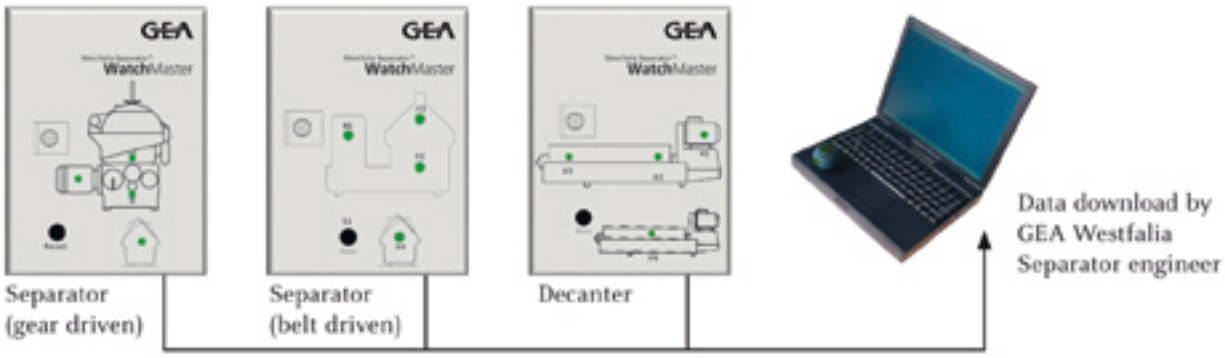
The Westfalia Separator® **Watch**Master monitors the actual condition of the machine permanently and shows it on a traffic-light-styled LED display. With the Westfalia Separator® **Watch**Master sources of error such as unbalance or bearing failure are precisely identified. Unscheduled downtimes can be minimised with this system.

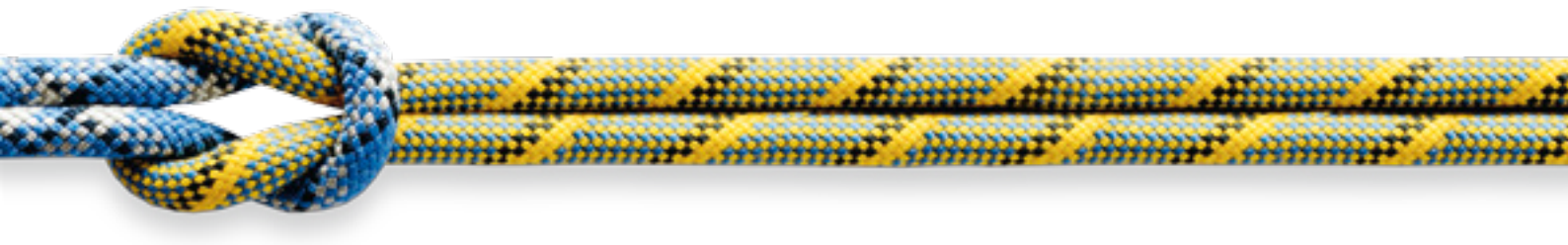
- Continuous measurements of vibration and bearing frequency
- Creation of a database for measurement, evaluation and history

Westfalia Separator® WatchMaster plus

Based on Westfalia Separator® **Watch**Master with additional features:

- Data connection of all machines and transfer to a central server
- Continuously measured data with detailed status and trend visualised on a monitor
- Machine analyses worldwide via the Internet
- Access to all machine data e.g. speed, flow rate, operating hours, outlet pressure etc.





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