



Marine System Solutions

Expertise for maximum performance,
profitability and environmental protection



gea.com



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HEAT RECOVERY PROVISION COOLING
REFRIGERANT RETROFIT
BOG RECOVERY SYSTEM PROCESS GAS
FLASH GAS **CLEAR WATERS** CO₂ TRANSCRITICAL
BILGEWATER TREATMENT ICE MACHINES
SLUDGE CONTAINING OIL AND WATER
CAT FINE REMOVAL REFRIGERATION & FREEZING SOLUTIONS
GEA MARINE SYSTEM SOLUTIONS
VENT GAS RECOVERY SYSTEM BALLAST WATER TREATMENT
FUEL CONDITIONING REPAIRS & MAINTENANCE
HOT SEPARATION FUEL GAS BOOSTER
CHILLERS NITROGEN SEA WATER DESALINATION
GAS INJECTION 24/7 SERVICE
FUEL PROCESSING AND CONDITIONING

engineering for a better world

The shipping industry is rapidly changing to meet the increasingly complex demands of global supply chains and there is a growing trend towards energy efficiency, risk management, automation and smart maintenance. As a long-term, reliable partner to the marine sector, GEA is supporting customers in achieving these goals through a strong, global network of service, spare parts and know-how.

The shipbuilding industry is becoming increasingly important across the globe. The reasons for this are obvious: accounting for more than 95 percent 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 environmental 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. Based in more than 50 countries, GEA is able to fulfill these challenging requirements.

*A.P. Møller Mærsk
Augustea Shipping
Bourbon · Carnival Cruise Lines
Deutsche Seereederei
District Offshore · Gulmar
Hamburg Süd · Hapag Lloyd
MSC Kreuzfahrten
Jo Tankers · Norddeutsche Reederei
Norwegian Cruise Line
Olympic Shipping
ORION Bulkers · Phoenix Reederei
Rem Offshore · Sanmar Shipping
Rickmers Group · E.R. Schifffahrt
Royal P&O Nedlloyd · Hurtigruten
Navigator Gas · Maran Tankers · Danaos
and many more ...*



Air-conditioning

GEA compressors are ideal for air-conditioning on large vessels such as cruise ships, cargo ships, fishing and supply vessels, reefers, tankers, navy and drill ships.

Cooling & refrigeration

GEA specializes in refrigeration processes and technologies, in particular the temperature control of cargo and provisions cooling. Both for merchant and leisure operations and for the fishing industry.

Fresh water generation

Storing large quantities of fresh water on board ship is costly and takes up valuable space. GEA offers an alternative solution, in the form of a process and technology for sea water desalination, which can be used to generate up to 30 tons of fresh water a day.

Oil treatment and sludge reduction

GEA centrifugal separators specialize in the purification of fuel and lube oil as well as sludge treatment and effective cat fines removal. With their high g-force, the separators reliably guarantee high performance and economic operation of ship engines, and boost their service life even under extreme conditions.

Protecting seas & oceans

With a wide-ranging portfolio of cutting-edge technology, GEA continues to demonstrate its long-term commitment both to safeguarding the investments of our clients and partners, and protecting the marine ecosystem. We work closely together with ship owners and operators to deliver customized solutions for the treatment of bilgewater, ballast water, scrubber water and grey and black water.



Marine System Solutions

GEA brings more efficiency and sustainability on board

Whether fuel, lube oil, bilgewater or ballast water treatment, fuel oil conditioning, engine cooling, sea water desalination or cooling and refrigeration is required, GEA offers marine system solutions that make it possible to achieve strategic improvements in efficiency and cut costs while optimising product and process quality.

GEA 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 GEA products 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 customized 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

GEA Omni™ Control



GEA IO Control Touch Panel



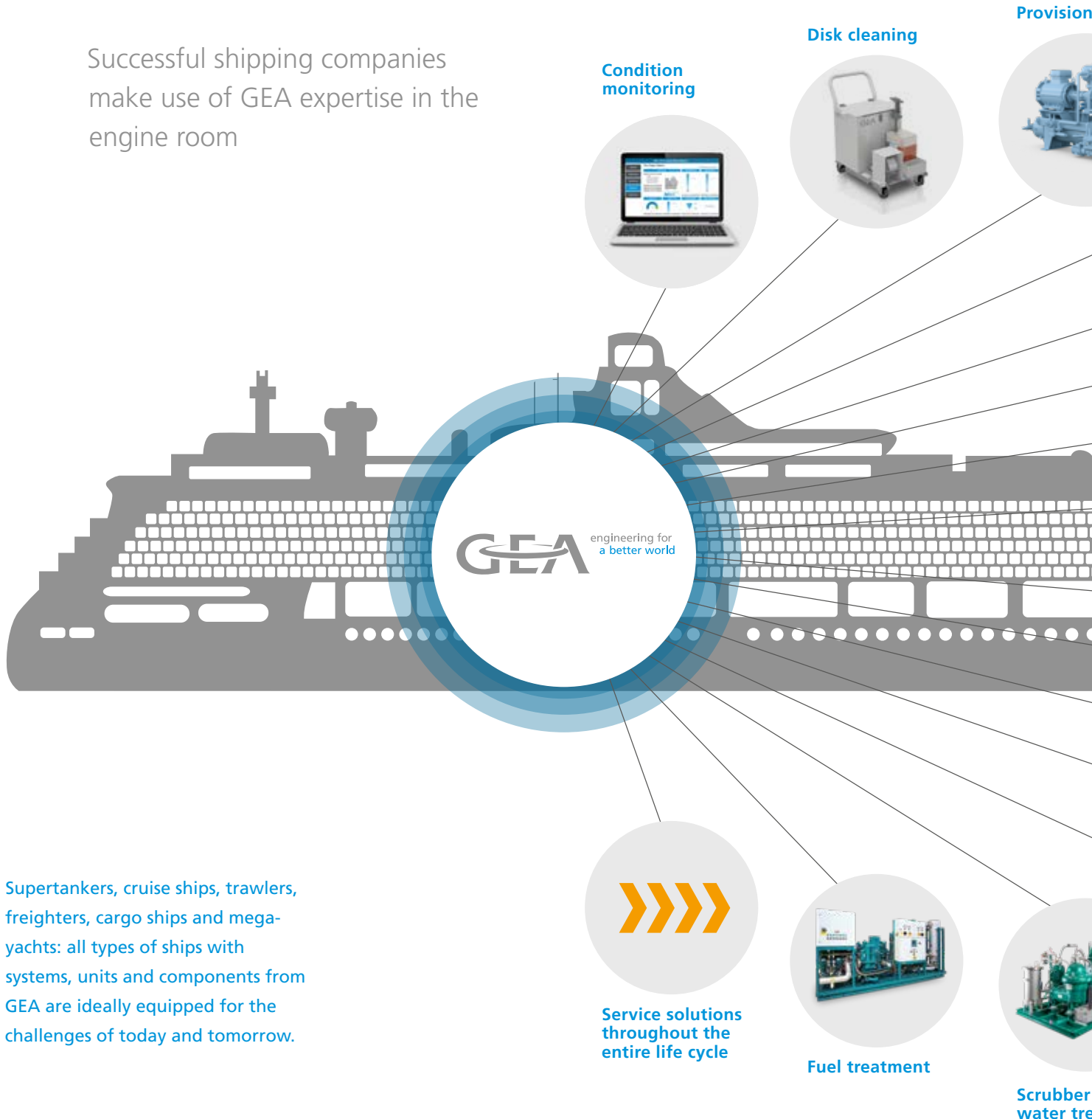


TAILORED SOLUTIONS FOR
MAXIMUM PERFORMANCE

GEA's equipment and cooling technology are precisely tailored to the requirements of a wide variety of vessels, including container ships, tankers, fishing trawlers, cruise ships, orange juice carriers and tug boats.

Application Range

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



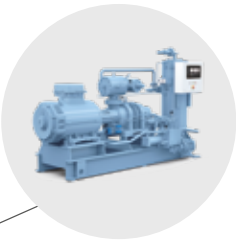
Supertankers, cruise ships, trawlers, freighters, cargo ships and mega-yachts: all types of ships with systems, units and components from GEA are ideally equipped for the challenges of today and tomorrow.



...s cooling unit



Refrigeration, cooling & freezing solutions



Compressors for refrigeration and air conditioning & provision cooling



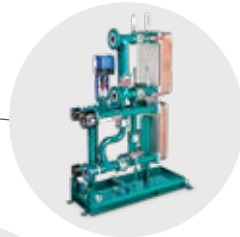
CO₂ transcritical cooling & freezing solutions



Sea water desalination



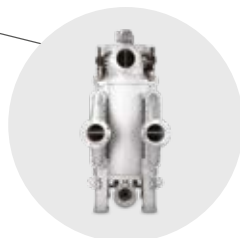
Clarification and purification of fuel and lube oil



Heat recovery



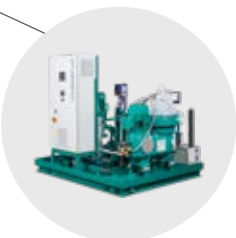
Bilgewater treatment



Ballast water treatment



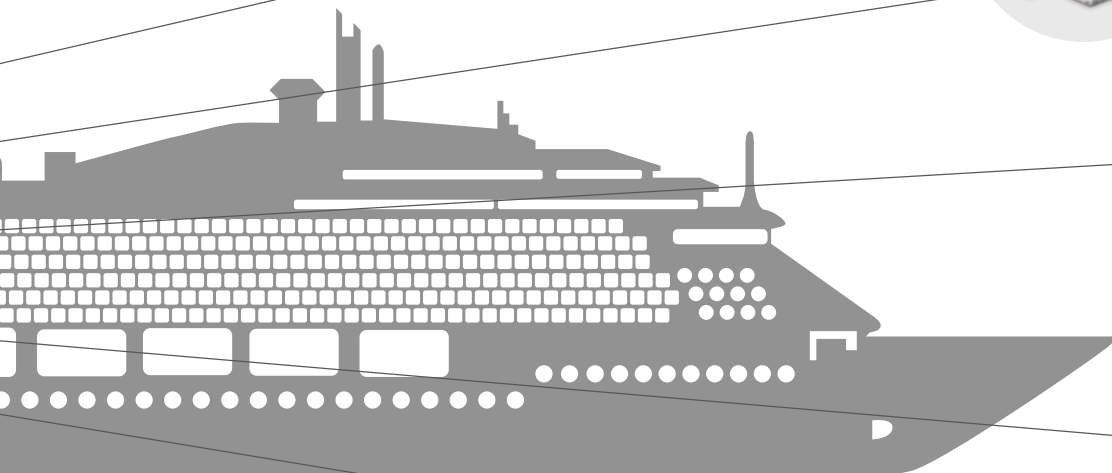
Sludge treatment



Cat fine removal



...treatment



GEA SERVICE – FOR YOUR CONTINUED SUCCESS

We build, maintain and improve our customers' equipment throughout the full life cycle so they could focus on their business and market challenges.



Air-Conditioning

Keeping cool on the high seas

The use of modern air-conditioning systems is a must on the high seas to keep the climate pleasant, to provide an optimum working temperature for the crew, and to keep provisions in excellent condition on cruise ships.

In order to stay concentrated during their stay on the high seas, ship captains and their crew need to have a pleasant climate in their working environment. A lot of ships are underway on their journeys in very hot tropical realms: Container ships for example transport thousands of tons of goods between continents under extreme climatic conditions. To make the crews' lives on board nevertheless bearable, air-conditioning systems are essential in all kinds of maritime applications.

Keeping cool heads on the high seas

GEA Compressors are ideal for crew cabin air-conditioning on all ship types. GEA ensures a comfortable air-conditioning even under the extreme conditions of equatorial regions. What counts is the greatest possible benefit under cost-efficient conditions, with a maximum of environmental and climate protection.



APPROVED FOR MARINE APPLICATIONS

With their uncompromising quality
and resistant construction,
GEA HG and F compressors are
predestinated for maritime
applications at sea.

*GEA HG44e
semi-hermetic compressor*



*GEA F76
open type compressor*





CO₂ Transcritical



Vertical plate freezers



Cooling & Refrigeration

Energy efficient freshness on board

At GEA we love to work on revolutionary refrigeration and cooling solutions every day. Our projects vary from industrial refrigeration plants to provision cooling on board of cruise vessels.

GEA specializes in marine cooling processes and technology

No task is too big for us. Whether we have to assure that thousands of cruise ship passengers can enjoy a fresh meal or that cargo needs to arrive in excellent condition, GEA is always ready to demonstrate its expertise. The aim of our mission is threefold.

- Analyze and improve the energy consumption of each refrigeration solution by looking at the current process.
- Guarantee the product quality of any content (fish, food, beverage, livestock)
- Challenge the customers carbon footprint by working on sustainable solutions

GEA provides high tech provisions cooling solutions for the marine industry. Our technology is easy to control and completely in line with the Safe Return to Port philosophy for cruise ships. Our main focus is on the following marine segments:

- Fishing vessels
- Reefers
- Cruise ships
- Orange juice carriers
- Livestock carriers
- Conversion and retrofit projects

GEA refrigeration units and cooling systems are widely used on board of large fish factory trawlers and small fishing ships. Compact, advanced and energy-efficient systems are the key to freezing fish. GEA provides refrigeration systems for pre-cooling of fish by RSW-plants and storing frozen fish in fish holds just after freezing.

With the rise of the cruise ship industry, the demand for high quality food and cooling of provision is growing rapidly. We are specialized in engineering, contracting and deliver tailor-made solutions for new and existing vessels – from planning to implementation.

Products at a glance

- Engineering & contracting placed on the supply of refrigeration
- Piston and screw compressors: covering all normally encountered requirements regarding refrigeration
- Tailor-made solutions
- Control systems: for individual units or complete systems to assure maximum benefits
- Valves and fittings: particular applications with regard to maximum permissible pressures
- Freezers: for fish that has been unprocessed, headed & gutted and filleted
- Plate freezers: for fish whole round, headed & gutted, fillet and roe

Industrial screw compressors



Commercial piston compressors



Omni control panel



Fresh Water Generation

Sea water desalination by evaporation

Storing large quantities of fresh water on board ship is costly and takes up valuable space. GEA offers an alternative solution, in the form of a process and technology for sea water desalination, which can be used to generate up to 30 tons of fresh water a day.

The principle of sea water desalination by evaporation

Desalination is based on the principle of evaporation: sea water that has been filtered through a coarse mesh is evaporated in a heat exchanger plate stack that is made of titanium to precipitate out salt and impurities. A further plate stack then condenses the steam into drinking water. A salt measuring cell checks for residual salt content, which should be below four parts per million (ppm). If a value below four ppm can be reliably maintained, then the desalinated water can be passed to a storage tank before further treatment by UV sterilization.



An output of 5 – 30 tons a day

A re-hardening filter finally returns enough hardness to the fully demineralized water to make it suitable for human use. Whether for the shower room, for the galley or for scrubbing – our systems enable output of between five tons and 30 tons a day, which should easily cover the everyday requirements of container ships, LNG tankers, bulk carriers or freighters.

GEA SeaWaterDistiller





Oil Treatment and Sludge Reduction

Concepts and high performance equipment for the engine room

GEA supplies separation systems specifically designed for continuous operation under the roughest conditions.

Plant concepts for efficient operation

GEA centrifugal separators specialize in the purification of fuel and lube oil as well as sludge treatment and effective cat fines removal. With their high g-force, the separators reliably guarantee high performance and economic operation of ship engines, and boost their service life even under extreme conditions.

Product range overview

- Fuel and lube oil treatment
- Fuel conditioning
- Sludge treatment
- Effective cat fines removal

GEA CatFineMaster



GEA ViscoBoosterUnit



GEA SludgeMaster



GEA marine Separator



GEA EffiClean



SYSTEM CONCEPTS FOR THE FUTURE

Modern lube and fuel oil treatment systems from GEA provide easy handling and optimum separating efficiency in difficult situations.

Protecting Seas & Oceans

Economically and ecologically sound solutions

Water covers some 70 percent of the surface of the earth, and all life on our planet needs water to survive. Today, over 90 percent of world trade is carried out using international shipping lanes, and some 50,000 vessels traverse these routes.

Whilst they may be vital for trade and transportation, the earth's seas, oceans and other waterways are also highly sensitive ecosystems that need protection.

Clear waters to the horizon and beyond

With a wide-ranging portfolio of cutting-edge technology, GEA continues to demonstrate its long-term commitment both to safeguarding the investments of our clients and partners, and protecting the marine ecosystem. We work closely together with ship owners and operators to deliver customized solutions for the treatment of bilgewater, ballast water and scrubber water.

The combination of GEA's innovative technologies, such as the **BallastMaster** and **BilgeMaster** systems, together with its extensive service network, are geared towards providing efficient, future-proof systems, in line with IMO standards.

Product range overview

- Ballast water treatment
- Scubber water treatment
- Bilgewater treatment
- Energy recovery



*GEA BallastMaster marineX –
powered by Trojan Marinex*



GEA BallastMaster ultraV



GEA ScrubberMaster



GEA BilgeMaster



GEA EnergyMaster



GEA **SEAPROTECT**SOLUTIONS

Cutting-edge, future-proof solutions that protect the aquatic ecosystem and your investment.

Seven seas – one single
point of contact.



In addition to traditional services such as maintenance or repair, GEA Service also provides solutions which avoid risk and with which the installation availability can be proactively assured.

Proactive Service for Optimum Reliability on Board

The proactive, risk-free services from GEA optimize operating reliability

Safety first: this is precisely what the service concept from GEA stands for.

Ship owners not only benefit from traditional services such as inspection, maintenance, original spare parts and repair work provided by the original manufacturer; they also benefit from proactive solutions which avoid risk, e. g. online and offline monitoring. These preventive services are the best pre-condition for a smooth operation.

Enhanced process efficiency also follows from maximum operating reliability and machine availability. Accompanying modernization or upgrading to state-of-the-art technology also offer the option of boosting performance as required.

Training provided on site or in the modern training centre of GEA ensures that the plant operator's employees receive training in the proper handling of the high-tech installations. This provides additional safety.

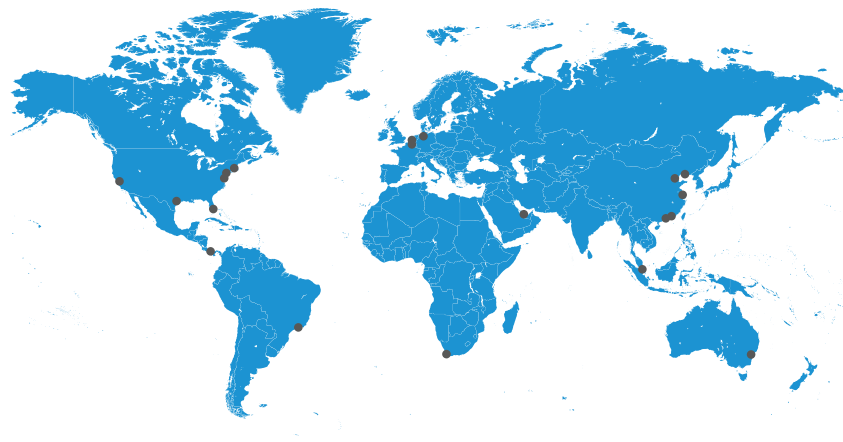
GEA Service worldwide

And if problems occasionally occur or if a spare part is required at short notice, the specialists are able to attend to the ships quickly. This is ensured by a global network which is able to service every location in the world at short notice.

GEA Service accordingly makes for maximum operating reliability, machine availability, process efficiency and budget security. And these benefits are provided throughout the entire life cycle of the entire installation.

Service from the original manufacturer:

- Service engineers quickly on site
- Extensive service network
- Risk avoidance through service provided by the original manufacturer
- Proactive solutions
- Upgrading to boost performance
- Crew training



We live our values.

Excellence • Passion • Integrity • Responsibility • GEA-versity

GEA is a global technology company with multi-billion euro sales operations in more than 50 countries. Founded in 1881 the company is one of the largest providers of innovative equipment and process technology. GEA is listed in the STOXX® Europe 600 Index. In addition, the company is included in selected MSCI Global Sustainability Indexes.

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