

TECO Technology Group



Company presentation



TECO'S CORPORATE SOCIAL RESPONSIBILITY

Green Marine Technology

Agenda



Technology Group

- **About us**
- **Business Activity and Location**
- **Strong Strategic Partnership and our Regular Clients**
 - AVL, technology development leader, innovation
- **Green Marine Technology**
 - smart scrubber
 - ballast water treatment system
- **Digital Solutions, Naval Architects**
 - digitalization, digital twin
 - 3D scanning and reverse engineering
- **Green Marine Chemicals**
 - sox, nox and awp
 - tank and general cleaning
- **Advanced Onboard Turn-Key System Installations**
 - mechanical
 - surface treatment services
 - electronics & automation
 - ship repair and maintenance
- **Our Commercial Team**



We are a Clean Technology Provider, focusing on the environment over and under the waterline.

Our core objective is to identify and develop high quality, cutting edge and cost-effective solutions to significantly reduce maritime pollution.

We develop, we engineer, we install, we maintain and we care. We are a global company with focus on a greener and cleaner environment.

We are approximately 125 land-based staff worldwide, working from 12 geographical locations, approx. 300 workers out on projects daily. Serving the industry with approx. 1,200,000 manhours on a yearly basis

Our solutions are driven to meet international rules and regulations which protect the environment for generations to come.



Group Business Activity and Worldwide Locations



Technology Group

- green marine technology provider
- digitalization, 3D scanning, design and engineering
- green marine chemicals
- procurement and material administration
- system delivery to yards and shipowners
- onboard installations, during voyage or during docking
- site management and turn-key retrofits
- operational assistance, service and maintenance
- global after-sales service and technical support



Houston - Miami - Algeciras - Gibraltar - Athens - Oslo - Skien - Rumia - Krakow - Pula - Dubai - Singapore

Our regular clients



Technology Group



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Strong Strategic Partnership with AVL



Technology Group

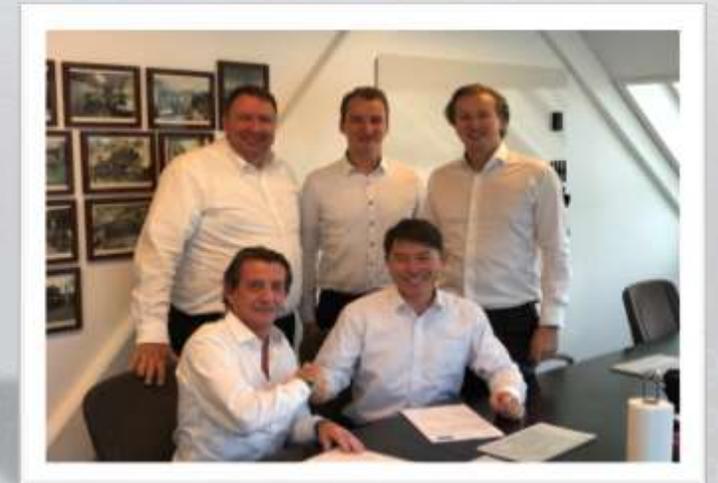
AVL is the world's largest independent company for the development, simulation and testing of powertrain systems for passenger cars, commercial vehicles, construction vehicles, as well as large engine applications for power plants, marine, trains, mining and other heavy machinery.

The company has decades of experience in the development and optimization of powertrain systems for all industries. As a global technology leader, AVL has extensive experience in design, development, simulation and testing of ship engines on behalf of engine OEM (original equipment manufacturer) operating in our sector.

Through the Strategic Partnership, TECO and AVL aims to provide ground-breaking turnkey concepts to the marine industry solving the challenges of tomorrow – today.



www.avl.com



Strong Strategic Partnership with AVL



Technology Group



Vehicles, Bikes



Racing

Exhaust gas cleaning



Marine

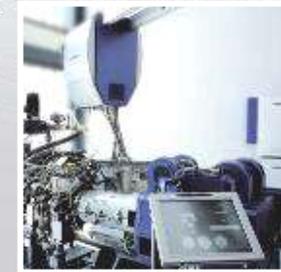
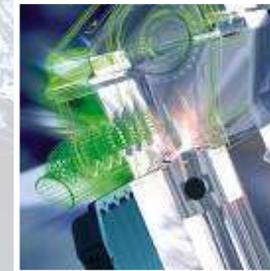


Power Plants

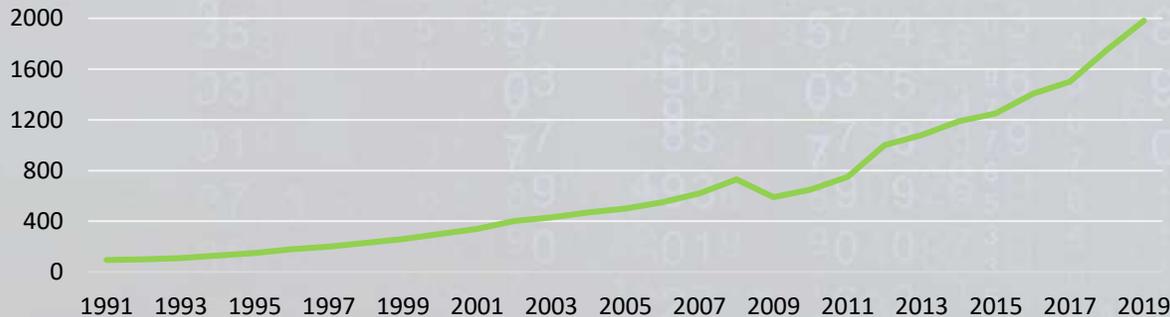
Powertrain Engineering



Development Platform



Simulation & Testing



1995 0.15 billion €

2018 1.75 billion €

2019 2.05 billion €

Innovation: 1,500 granted patents
 Staff: 11 500 employees
 Global footprint, 45 affiliates and 40 Tech & Engineering's Centers
 70 years of experience
 R & D inhouse turnover, 10% - MEUR 200,-
 HQ: Graz, Austria, 4 500 employees

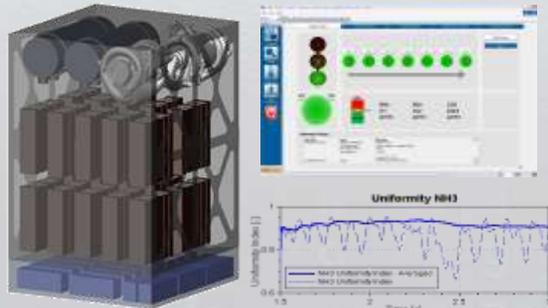
Strong Strategic Partnership with AVL



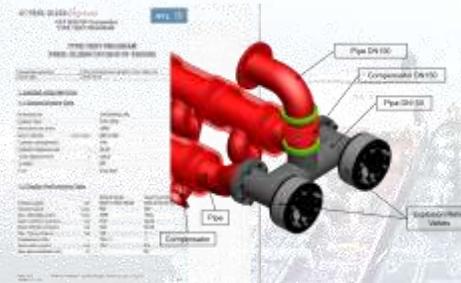
Technology Group

Emission reduction initiatives

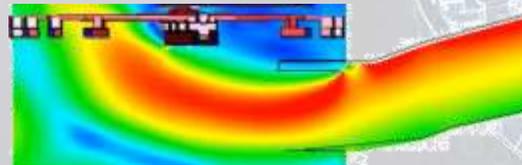
- Fuel Cells
- Alternative fuels
- Hybrid conversion
- Engine management optimization
- Engine room redesign/refit
- Engine monitoring and tuning



Dual fuel conversion



Flow design and optimization

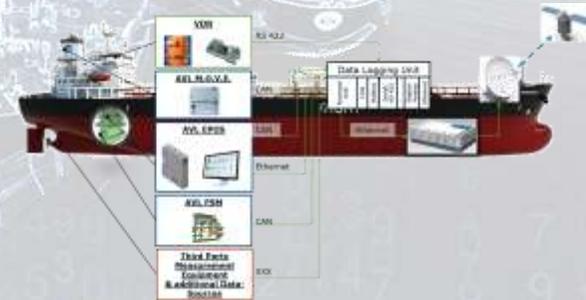


Digitalization

- Data Analytics incl. Validation
- Vessel Performance Reporting
- Predictive Maintenance



- Custom Analytics / Services



TECO turnkey offering just expanded exponentially, sky is now the limit

Focus areas

SO2

Global fuel limit of 0,5% in 2020

Particulate Matter

Under heavy discussion at IMO

Greenhouse Gases

50% reduction in 2050

CO2

40% reduction in 2030

70% reduction in 2050



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TECO Smart Scrubber



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IN
FOCUS



From 1 January 2020, the limit for sulphur in fuel oil used on board ships operating outside designated emission control areas is reduced to 0.50% m/m (mass by mass). This will significantly reduce the amount of sulphur oxides emanating from ships and should have major health and environmental benefits for the world, particularly for populations living close to ports and coasts.



TECO Smart Scrubber



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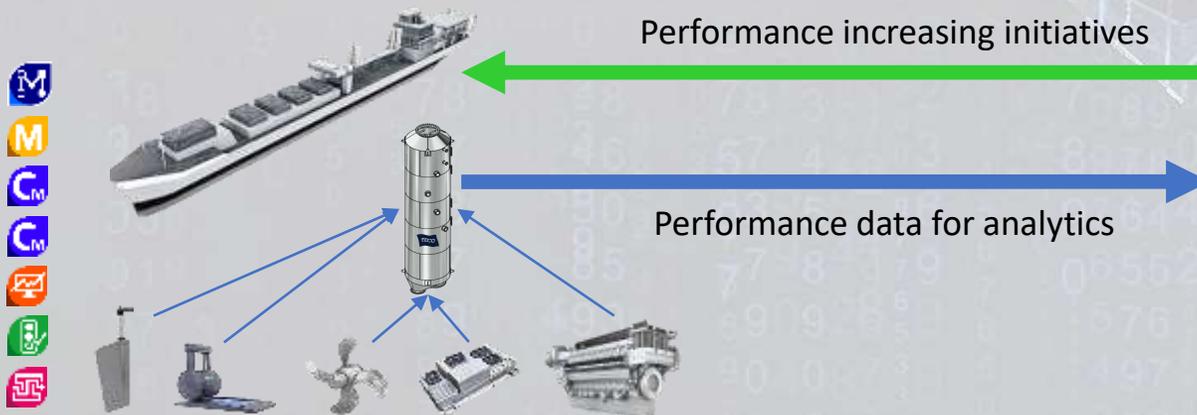
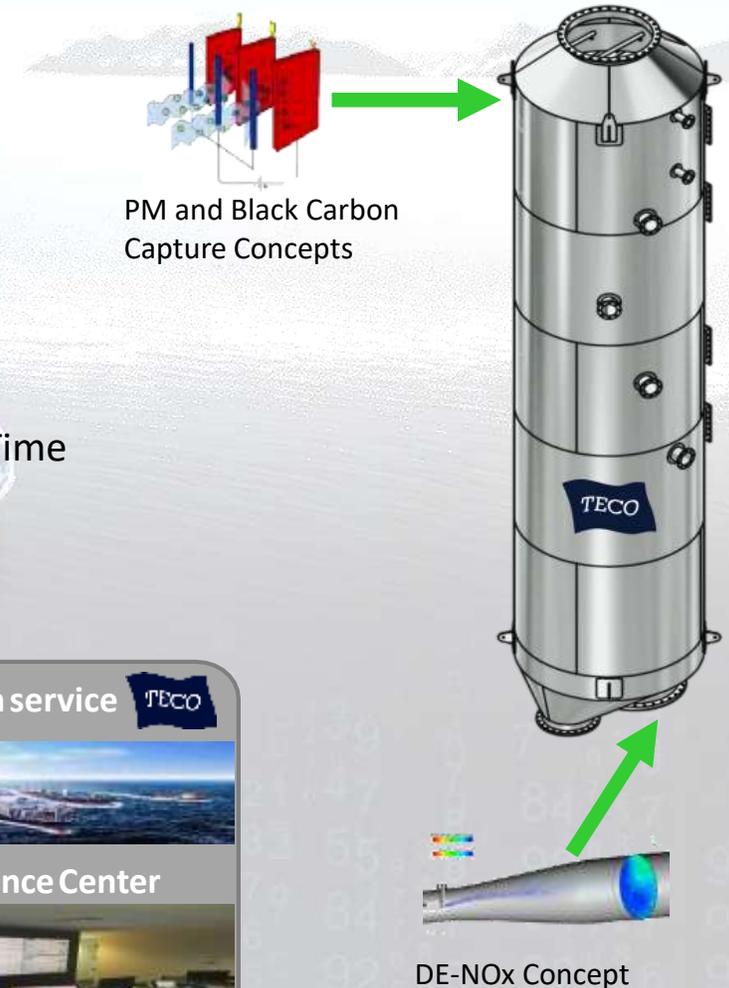
New simple design developed with reputable European OEM partner

Our vision

- To create a high-quality scrubber platform enabling conformity to the current regulatory
- Enabling upgrading capabilities for future legislations on the same platform
- Enable vessel specific optimization options within the scrubber upgrade

Our initiative

- Each TECO Smart Scrubber is equipped with the capabilities of Data-Analytic Driven Real Time Simulation and Diagnosis tools enabling vessel specific performance improvements.
- Each installation can be upgraded to offer full vessel analytics



AVL Follow the Sun service TECO

24/7 Fleet Performance Center

This block contains two images. The top image shows a digital interface for 'AVL Follow the Sun service' with the TECO logo. The bottom image shows a control room or data center with multiple computer monitors displaying data, labeled '24/7 Fleet Performance Center'.

TECO Smart Scrubber

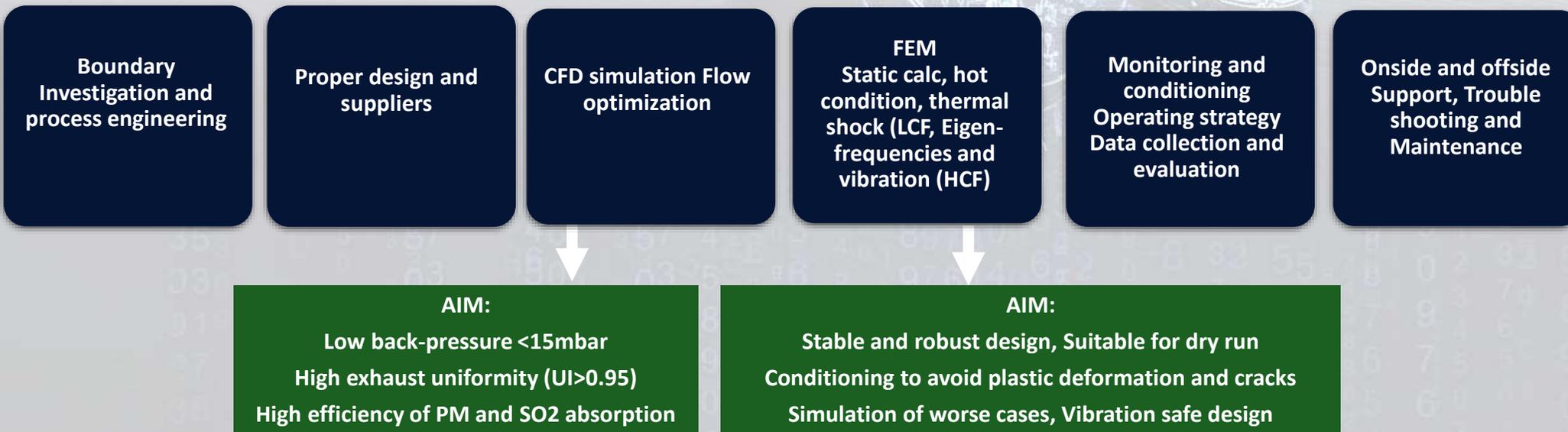


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TECO Smart Scrubber is designed for:

- Flexible installation scenarios without the need for dry-dock
- Worst case operating conditions
- Lessons learned from 120 + scrubber installations incorporated in the design
- Competitive package CAPEX and predictable OPEX, range 5-60MW
- Total design effort equal to 20 years of realistic operation

The design process:



TECO Smart Scrubber



Technology Group

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Simulation strategies

- Thermal shock (LCF)
- Eigen-frequencies & Vibration (HCF)
- Finite Element Modeling (FEM)



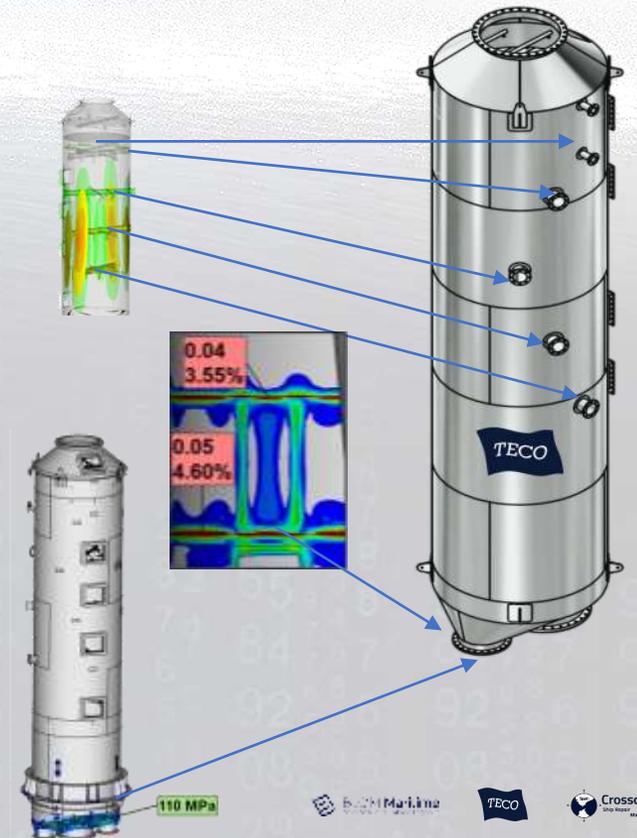
The ideal exhaust gas flow

200 different designs evaluated



Result

- Stable and robust design
- Suitable for dry run
- Tested to avoid deformation and cracks
- Simulation of worse cases
- Vibration safe design
- Low back-pressure <15mbar
- High exhaust uniformity (UI>0.95)
- High efficiency of PM and SO2 absorption



TECO Ballast Water Treatment System, in compliance



Technology Group

IN
FOCUS



TECO Ballast Water Treatment System, powered by BIO-SEA is a water treatment system designed for inactivation and elimination of organisms in the ballast water, in order to comply with the IMO D-2 standard and USCG regulations for discharge of such water by vessels during their ballasting operations. Our systems will also comply with the new G8 rules which will be enforced on October 28th 2020, TECO Ballast Water Treatment System comply with IMO and USCG



INTERNATIONAL
MARITIME
ORGANIZATION

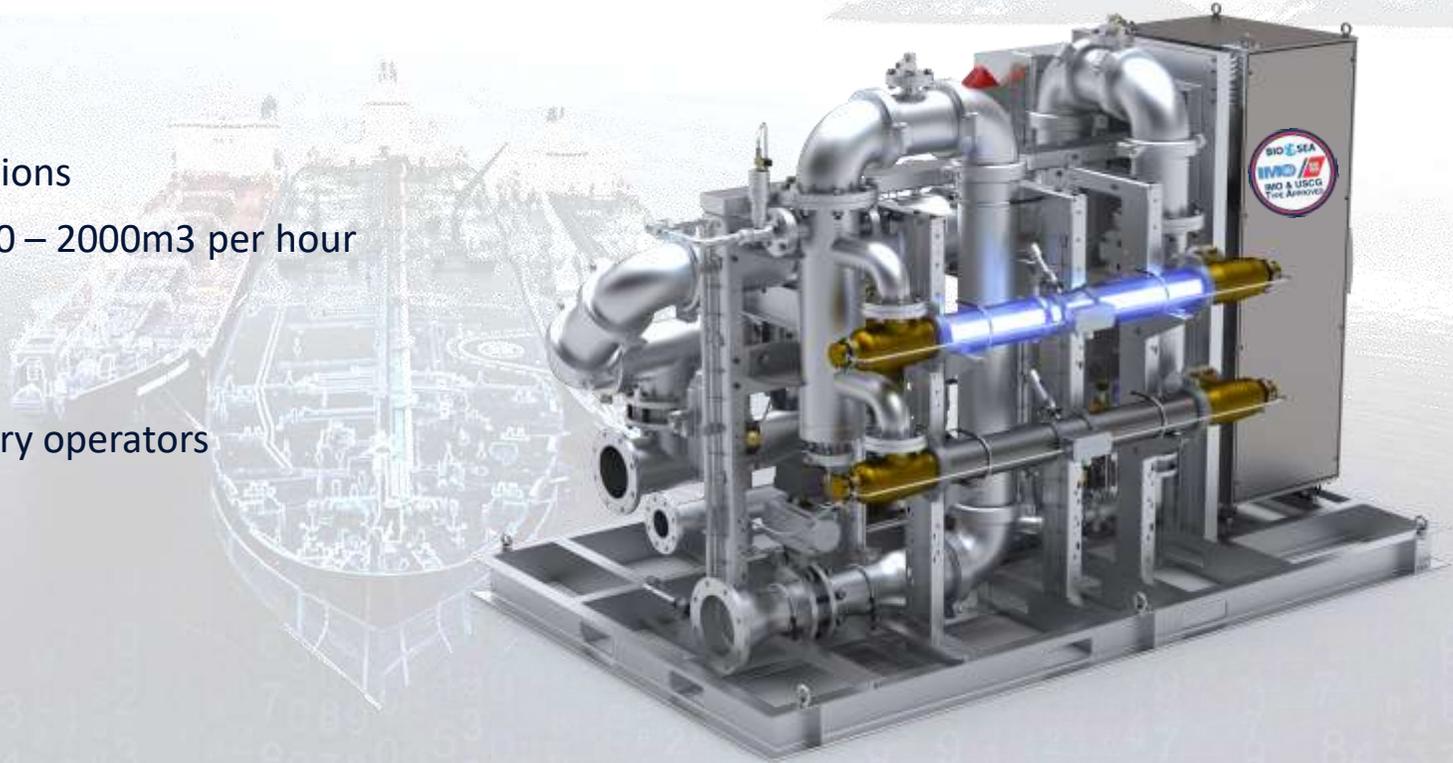


TECO Ballast Water Treatment System, in compliance



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- TECO offers complete in-house turnkey solutions
- Around 250 vessels installed, ranging from 10 – 2000m3 per hour
- Type approved by USCG & IMO
- Class approved by BV, LR and DNV GL
- Proven reference list with well known industry operators



TECO Smart Ballast Water Treatment System



Technology Group

TECO Technologies has designed the TECO Smart BWTC, a new flexible container solution for Ballast Water Treatment capacities ranging from 10-3000m³/h.

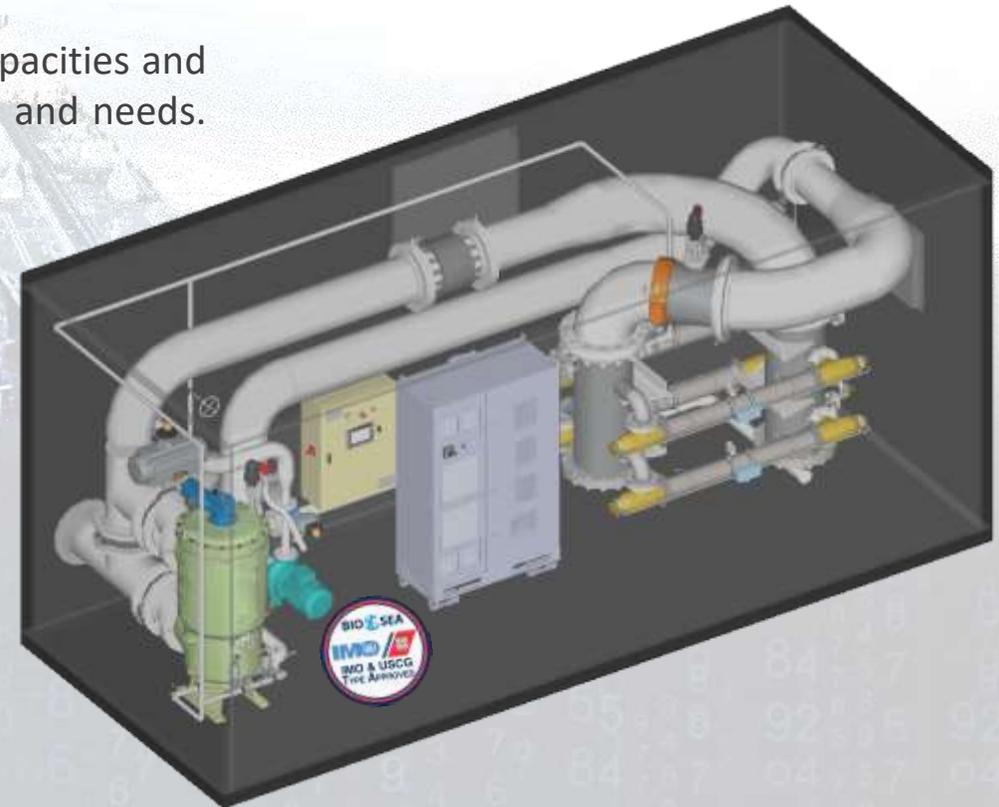
The containers are based on ISO standard and can be delivered with different capacities and with different treatment technologies depending on the shipowner's preference and needs.

TECO Smart BWTC is available with different treatment technologies:

- BIO-SEA: UV (IMO/USCG)
- Kurita: Filter free solution with Sodium Hypochlorite (IMO/USCG/ATEX)
- Oceansaver: Electro Chlorination (IMO/USCG/ATEX)

Container size 10 feet:	Container size 20 feet:	Container size 40 feet:
Length: 3.0 m	Length: 6.1 m	Length: 12.2 m
Width: 2.44 m	Width: 2.44 m	Width: 2.4 m
Height: 2.6 m	Height: 2.9 m	Height: 2.7 m

Suitable for Oil/Chemical vessels and barges.



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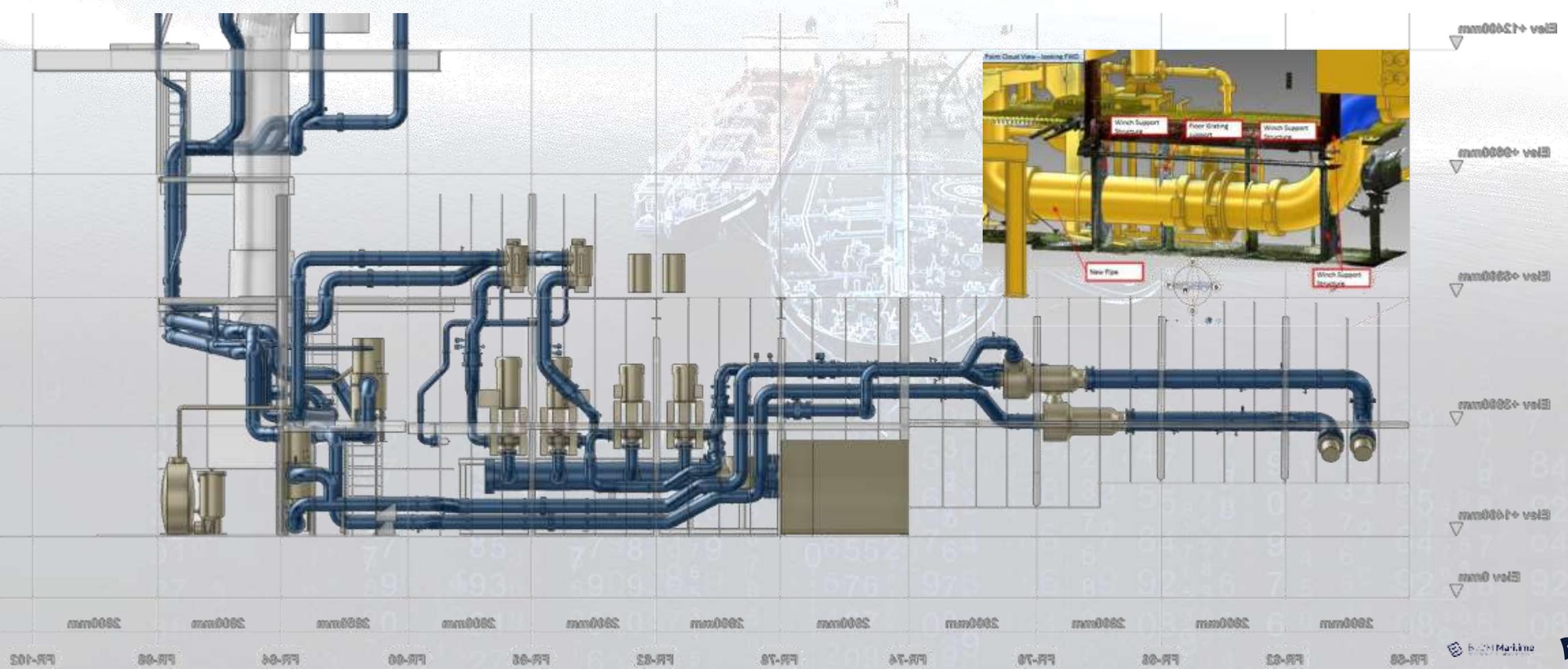


3D SCANNING powered by



- 3D Laser Scanning
- Reverse Engineering
- Multi level detailed engineering
- Data at your fingertips
- Advanced 3D Technology for a greener environment
- Quality made to fit

ENGINEERING powered by **AVEVA**



NUBES

THE CLOUD IN YOUR OFFICE

Objects

- Point Clouds
 - 194311-0349
- Measurements
 - Area
 - Distance
 - Height
 - Volume
 - Volume
- Annotations
- Scans
- Other
- Camera

Properties

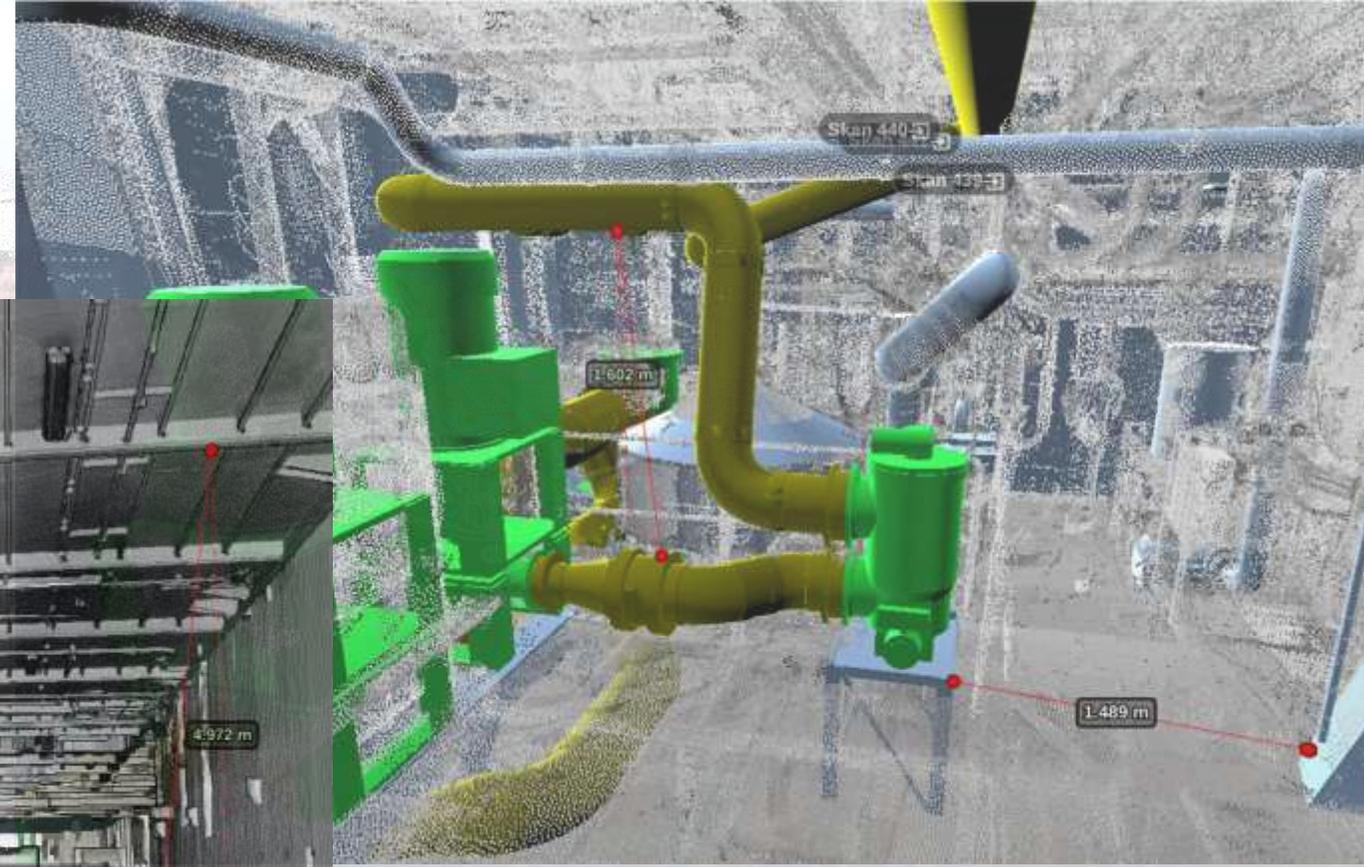
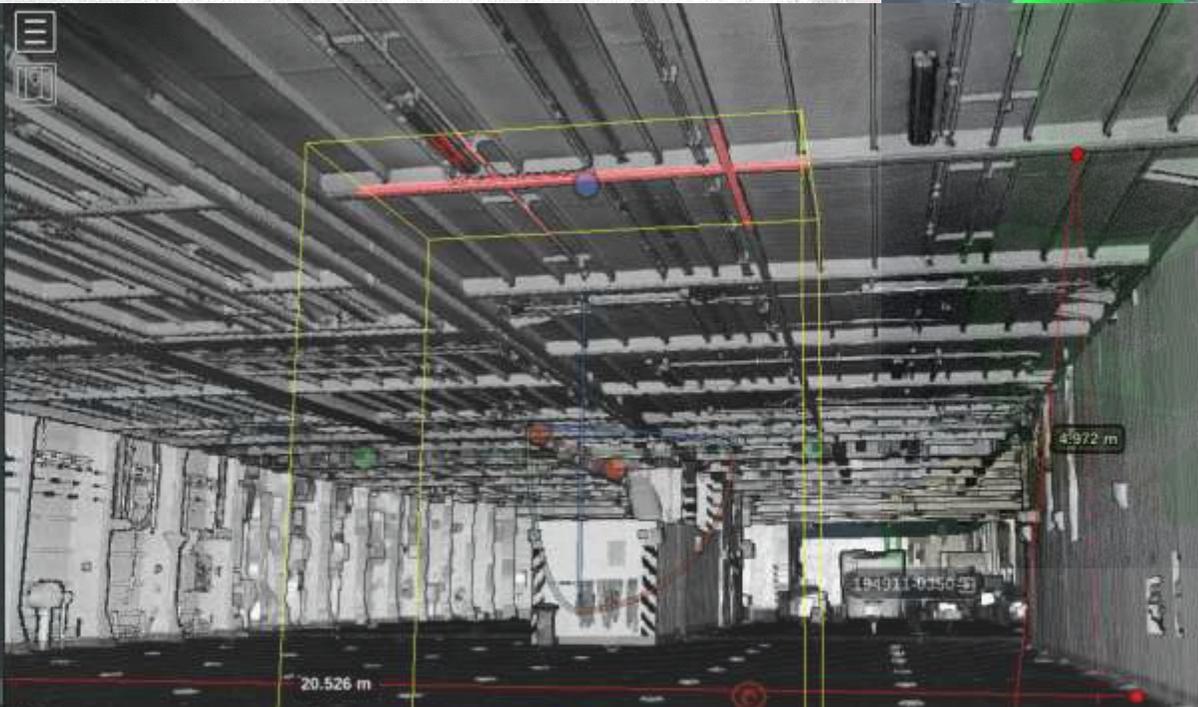
x	y	z
76.263	-2.549	17.282
α	β	γ
0.0°	0.0°	0.0°
length	width	height
2.24	4.06	4.80

Volume: 43.62

make clip volume

reset orientation

About



Inhouse made tool to access your data from anywhere in the world

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TECO High Quality Marine Cleaning Chemicals



Technology Group

For a Cleaner Global Ocean

- ✓ TECO Chemicals is a specialised provider of cleaning chemicals, equipment and consultancy serving the maritime industry since 1994.
- ✓ Today the TECO Chemicals MarClean[®] range of cleaning products consists of cost effective, highly concentrated, environmentally friendly products, designed to clean a variety of dirty areas, surfaces, tanks, ships deck, hull, inside and outside
- ✓ MarClean[®] cleaning products are coating manufacturer approved, IMO approved, and in compliance with MARPOL regulations.
- ✓ TECO Chemicals support the new IMO 2020 regulations for emissions reduction and focus on green technology, by offering raw materials for Scrubbers (SOx), SCR Systems (NOx) and Ballast Water Treatment Systems.
- ✓ TECO Chemicals – serving our clients worldwide from Singapore, Houston and TECO Group HQ in Norway



TECO High Quality Marine Cleaning Chemicals

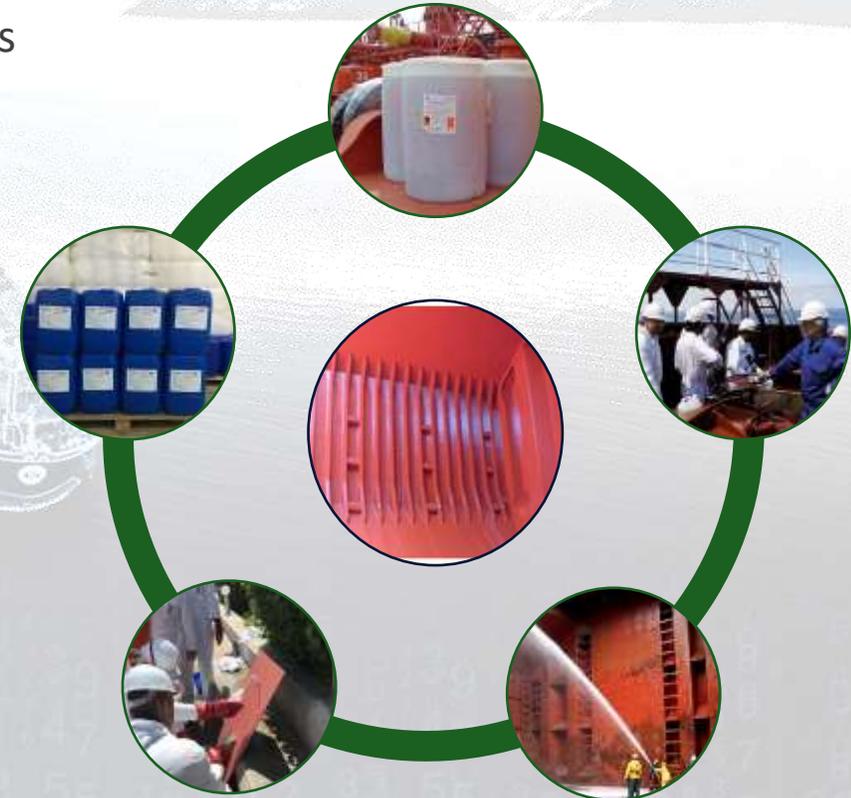


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Marine Cleaning Chemicals and raw materials supporting IMO 2020 regulations

- ✓ Advanced cleaning chemicals for Chemical Tankers to highest standards
- ✓ Complete chemical range for hold cleaning of Dry Bulk vessels to grain clean
- ✓ Supercargo services, consultancy, and remote cleaning advice
- ✓ Cleaning related equipment, safety and protection equipment

- ✓ Sodium Hydroxide 50% solution supply for EGCS (SOX reduction)
- ✓ Magnesium supply for EGCS (SOX reduction)
- ✓ Urea (NOX reduction)
- ✓ Sodium Sulphate for Ballast Water Treatment System



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TECO Advanced Onboard Installations



Technology Group

1

Mechanical Installations, Scrubbers, BWTS, Chillers, AWP etc

We are specialists in turnkey marine system integration on vessels in service, alongside or in dry dock.

Since the late 1990's, with a crew of approx. 300 technicians we have amassed wide variety of experience installing systems in the Cruise, Commercial and Offshore sectors.

We are installing system components along with all associated, foundations, piping and electrical materials.

Installations include AWP, Scrubbers, BWTS, AC compressors, heat exchangers, chillers. We are specialists in GRE/GRVE piping installation and prefabrication.

We can provide an all-inclusive package including planning, project management, materials, logistics, installation, problem solving, and assistance with commissioning.



2

Surface treatment services

By using the correct surface treatment techniques we can develop a maintenance program for any vessel, preventing corrosion, reducing cost and placing safety and quality in the forefront.

Surface preparations and applications including scaffolding: Ballast Water Tanks, Deck and Superstructure Surface Treatment, Helideck Surface Compliance to CAP 437, IRATA certified Rope Access Solutions, Cargo, Fuel Tank Cleaning and Exhaust Gas Stack Cleaning.

As an integrated part of our projects, we provide a range of specialized access solutions, including rope access and below methodology of surface preparation: High and Ultra-High Pressure Water Blasting, Slurry Blasting, Vacuum blasting, Conventional Dry-grit blasting, High Quality Coating system applications.



3

Electronics & Automation

With more than 25 years of experience and a unique knowledge of a wide range of products, we have highly skilled service engineers in the field of maritime electronics and automation.

We are specialized in repairing printed circuit boards (PCB's), TE repair and recondition equipment from most international manufacturers.

We are a supplier of calibration and test equipment according to E0 regulations within SOLAS. Complete kits available as suitcases ranging from Basic E0 to customized kits.

We are specialized in retrofitting Marine Automation Systems from complete IAMCS to Valve Control, Gas Detection, Level Gauging Systems etc.



4

Ship Repair and Maintenance

Crosscomar is an international ship repair afloat company, who has been operating since 1991. Our workforce is ready for immediate mobilization whenever and wherever needed. Our aim is to assist shipowners and technical managers to resolve/repair whatever issue might arise; therefore saving on off-hire costs, by keeping vessels trading. Our areas of action cover all Spanish Med Ports and Gibraltar, besides most Spanish Atlantic Ports.

Our expertise comprises the following fields: all kind of steel repairs, piping, Installations, mechanical work, including ME, AE, Turbocharges and hydraulics. Electrical/automation, refrigeration/AC UW, including hull cleaning, pp, inspections and repairs.

Riding squads, tank cleaning, laser alignment, load tests, NDT's, calibration and Chris Marine equipment.



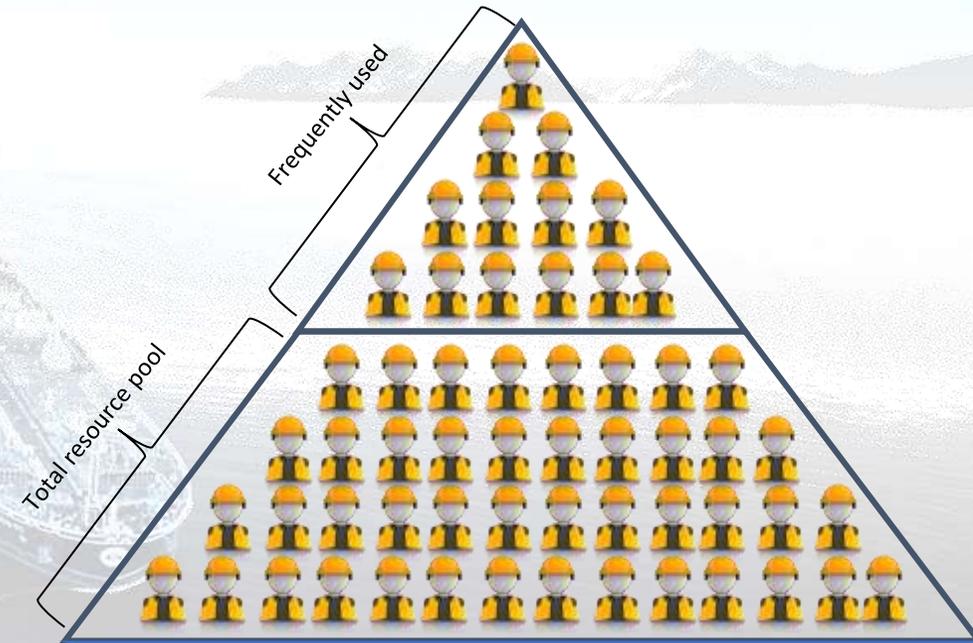
TECO Advanced Onboard Installations



Technology Group

Our main competitive advantage is our pool of qualified resources

- Our operational model is based on the use of externally hired project personnel
- The personnel is drawn from a large resource pool containing ~1500 people
 - A subset of 300 are frequently used
 - These technicians work almost exclusively for our group
- We have developed our own software tool to keep track of available personnel
 - The database contains personalia, CV and certifications
- Advantages
 - We can scale operations according to activity level, reducing unnecessary personnel cost
 - Fast deployment across all geographic locations, as the people within the pool are located all over the world
 - The company is still able to retain competence and experience without fixed hires



Proprietary software

Mechanical Installation

We offer a wide range of mechanical trades for construction, installation, and maintenance related activities.

All tradesmen provided are fully qualified and verified competent in their given area of expertise, and all projects are managed by our team of experienced and customer focused project managers.

Main services offered:

- Project planning and management
- Procurement and logistics
- Welding & Fabrication
- Pipefitting & Plating
- Electrical installations
- Installation & Retrofit works

Present focus areas:

- SOX Scrubbers, installation and service
- SOX Scrubber repairs
- Ballast Water Treatment systems
- Fuel Flow meter installations
- AWP installations
- Chiller and AC compressor installations



TECO Mechanical Installation Services



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TECO Surface Treatment Services



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We are serving the Marine Industry worldwide. We propose different methodologies and treatments to our clients to ensure the best quality and long life of the proposed services. Based on an agreed Scope of Work, we will mobilize qualified and experienced crew, including Supervisors and all necessary equipment, materials, spare parts, consumables and carry out qualified and class approved repairs onboard, while in operation.

We have upgraded more than 10,000,000 m2 of surfaces including, ballast water tanks, fresh water tanks, decks and superstructures, since 1994



✓ Surface preparation and application including scaffolding

- Ultra-High-Pressure Water blasting
- High Pressure Water blasting
- Slurry blasting
- Vacuum blasting
- Conventional Dry-grit blasting
- Coating
- ✓ Helideck surface compliance to CAP 437 Standards
- ✓ IRATA certified Rope Access Solutions
- ✓ Inspections, NDT & Consultancy
- ✓ Cargo/Fuel Tank cleaning
- ✓ Exhaust stack cleaning



TECO Surface Treatment Services



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Our Crew

Our crew is certified, fully cross-trained and qualified to ensure that the same team can perform to de-muck, clean, erect scaffolding, use rope access, hydro-blast and spray-painting. Our team is also helping regular ship's crew with provision handling, engine room cleaning and other jobs which can be agreed on upon request.



Rope Access



Main Deck Upgrade



Ballast Water Tanks, Cap Survey



Helideck, Cap 437 Standards

Our Equipment

Turnkey project solutions include range of TECO equipment for different Methodology of Surface Preparation:

- Ultrahigh-Pressure Water Jetting – Up to 2500bar
- High-Pressure Water Jetting – Up to 800bar
- High-Pressure Water Blasting (Slurry)
- Vacuum blasting
- Dry & Wet Abrasive Blasting
- Power Tooling



Refurbishment of Main deck on vessels during Ship voyage or at the Shipyard

TECO Electronics and Automation, Repairs



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We are a company based on highly skilled service engineers in the field of maritime electronics and automation. With more than 25 years of experience allows us to offer our unique knowledge of a wide range of products and services to the Marine & Offshore market.



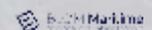
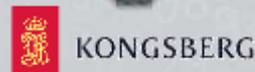
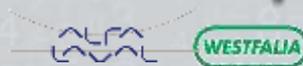
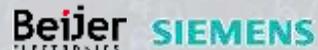
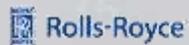
In-house services

We are specialized in repairing printed circuit boards (PCB). We repair and recondition equipment from most international manufacturers. Old existing automation systems often suffer from lack of spare parts and knowhow from the manufacturer. Our workshop contains a stock of obsolete components, ready to serve your electronics.

On-site services

We are in a unique position of providing highly skilled service engineers working on-site. They are all trained for offshore operations and equipped with a selection of electronics spares to tackle the basic on-site repairs. For specific services we aim to bring along targeted spares based on our 25 years experience in the field of electronics. With highly advanced diagnostic tools we can pinpoint the problem in a larger system, even for obsolete and poorly documented automation systems.

Selected repair services:



TECO Electronics and Automation, Refit



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We are specialists in retrofitting marine automation systems, typically integrated alarm monitoring & control systems (IAMCS). We implement existing functions to a new platform enabling enhanced functionality, increased maintainability at reduced costs. We have extensive experience in replacing older generations of IAMCS systems from makers like Norcontrol/Kongsberg, Autronica, Lyngsö, ABB, Siemens amongst others.

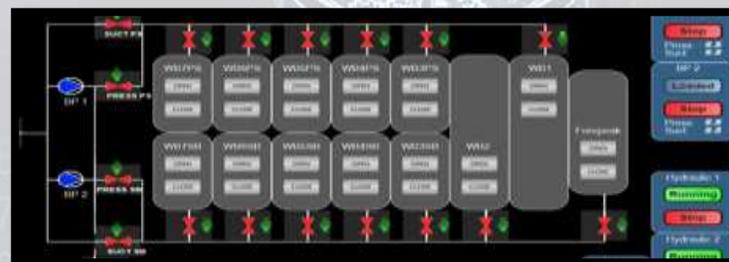
IAMCS by NORIS N4

TECO is the representative of well-known German manufacturer NORIS in the Nordic countries. We offer complete IAMCS systems with integration or supply of Level Gauging Systems, Power Management, Valve Control etc. Site Survey, Installation and commissioning by TECO.



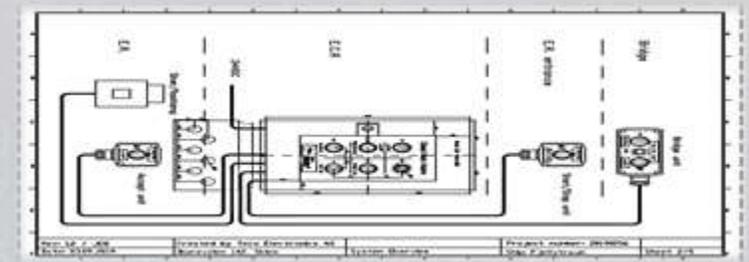
VRC by TECO TVRC

TECO specializes in custom Valve Control and Monitoring systems, highly flexible solutions for cost efficient, safe and user-friendly applications. We can offer turn-key solutions from basic Monitoring to full scale Remote Control, from retrofits to new projects, transition from manual to automated operation.



Dead-Man by TECO DMA-03

TECO Dead-Man Alarm System is a stand-alone system ready for easy and simple integration to any IAMCS by Binary Inputs & outputs. System is delivered pre-built in a small Rittal cabinet. Start/Stop, Accept and Bridge units to be scaled according to application. Easy installation allows customer to organize locally.



Gaining in depth knowledge of customer needs is crucial for a successful refit.
Site survey, communication with crew and superintendent forms the basis of our system layout for optimal performance.

TECO Electronics and Automation, Calibration



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We have supplied calibration and test equipment to the marine industry for more than **25 years**. Serving our customers to comply with E0 regulations within *SOLAS*, we offer complete kits of certified test equipment. We have several standardized suitcases, ranging from small basic E0 kits to large and fully customizable kits.

- **TECO TBS1**
- **Basic E0 Calibration suitcase with 1-year calibration interval**
- TK600 temperature calibrator 0 to 650 °C ($\pm 1.5^{\circ}\text{C}$)
- Digital pressure gauge(s), Ranges from -1 to 700 bar
- Pressure hand-pump, vacuum/pneumatic/hydraulic



- **TECO TBS2**
- **Basic E0 Calibration suitcase with 2-year calibration interval**
- TK600_2Y temperature calibrator 0 to 600 °C ($\pm 3.0^{\circ}\text{C}$)
- Digital pressure gauge(s), Ranges from -1 to 700 bar
- Pressure hand-pump, vacuum/pneumatic/hydraulic
- Extended calibration interval (24 months) according to regulations by DNV



- **TECO TCS3**
- **Customizable E0 Calibration suitcase**
- TK600 temperature calibrator
- Digital pressure gauge(s), Ranges from -1 to 700 bar
- Pressure hand-pump, vacuum/pneumatic/hydraulic
- Electrical test instruments: Multimeter, Process Calibrator etc.
- Several options available



- **TECO TMS1**
- **E0 and Cargo Calibration suitcase**
- TK600 temperature calibrator
- Digital pressure gauge(s), Ranges from -1 to 700 bar
- Pressure hand-pump, vacuum/pneumatic/hydraulic
- Selectable optional instruments
- for electrical testing/calibration, cargo calibration, fault finding etc.



- **TECO TGAS1**
- **Gas- & Alco test suitcase**
- Personal Single- or Multigas detectors
- Breath Alcohol Monitor
- Tank sampling system with hand-pump



- **TECO TGAS2**
- **Tank scope suitcase**
- Portable Multigas detector with up to 5 sensors incl. IR
- Suitable for measurement in Inert Gas Systems (IGS)
- Built in pump and user friendly operation
- Tank sampling kit with selectable hose length
- Various sensors available for many types of applications



Ship Repair and Marine Services



Technology Group

TECO Group Company, Crosscomar, is operating out of Algeciras, Spain and Gibraltar. We have excellent connections with local workshops, shipyards and suppliers for immediate specialized assistance.



We carry out ship repair at anchorage, in dry dock or during voyage. Our aim is to complete all projects in a time and cost-effective manner by collaborating with our customers.

During our nearly 30 years of experience, we have developed a full equipped workshop and warehouse of more than 1,500 m², located in Algeciras.

Our experienced workforce is ready for immediate mobilization and will complete the work when your ships are at anchorage, alongside or on voyage, reducing off-hire costs and other expenses incurred at shipyards.



Ship Repair and Marine Services



Technology Group

We provide the following the services

With our workboat we can dismantle old or damaged chains and mount new ones, vessel anchored or alongside in Algeciras bay. With her spacious deck we have a load capacity up to 100T and she is equipped with its own crane and winch, the MV WILTON is ideal to carry out specific maneuvers at anchorage such as anchor & chains replacements.

With preform alignment on diesel engines, gears, pumps, rudders, generators, etc

We have our own line of TurboChargers allowing us to service, micro-blast, balance and repair T/C within our expertise.

We have our own water bags to perform Dynamic load tests up to 50T on gantry cranes. Also, gangway and lifeboat appliances can be tested, as well as provision cranes and more.



Ship Repair and Marine Services



Technology Group

- Hydraulics
- Turbo Charger
- Calibrations
- General electric repairs.
- NDT's (dye penetrant, MPI's, UT and gamma rays)
- O.D.M. Sales, service & maintenance and chemical sewage treatment plant.
- Chris Marine equipment, for honing
- Riding squads - Voyage repairs
- All kind of steel and pipe repairs
- Installation and commissioning of new equipment/machinery
- Mechanical Work (ME & AE)
- Electrical – Automation, Refrigeration and AC
- Tank cleaning
- UW, including hull cleaning, pp, inspections and repairs
- Laser alignment



Agenda



Technology Group

- **About us**
- **Business Activity and Location**
- **Strong Strategic Partnership and our Regular Clients**
 - AVL, technology development leader, innovation
- **Green Marine Technology**
 - smart scrubber
 - ballast water treatment system
- **Digital Solutions, Naval Architects**
 - digitalization, digital twin
 - 3D scanning and reverse engineering
- **Green Marine Chemicals**
 - sox, nox and awp
 - tank and general cleaning
- **Advanced Onboard Turn-Key System Installations**
 - mechanical
 - surface treatment services
 - electronics & automation
 - ship repair and maintenance
- **Our Commercial Team**



Group Commercial Team



Technology Group

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References



Technology Group



Multiple projects



Multiple projects



Multiple projects



Multiple projects



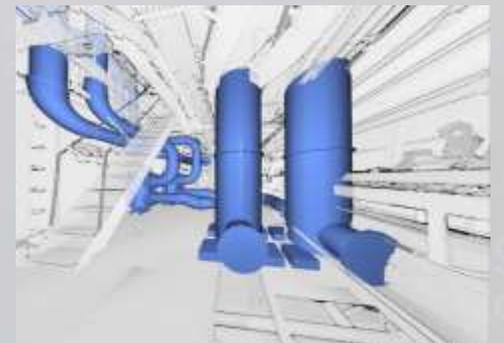
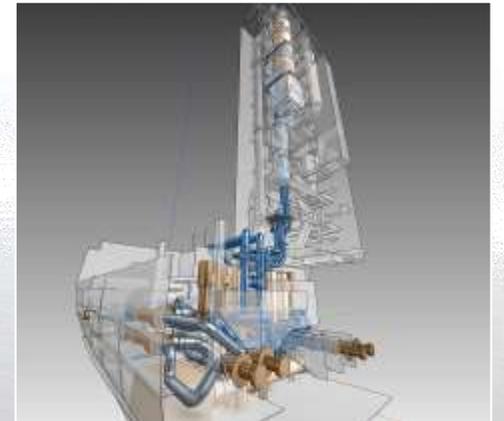
Multiple projects



Multiple projects



Multiple projects





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*- the end
thank you!*

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