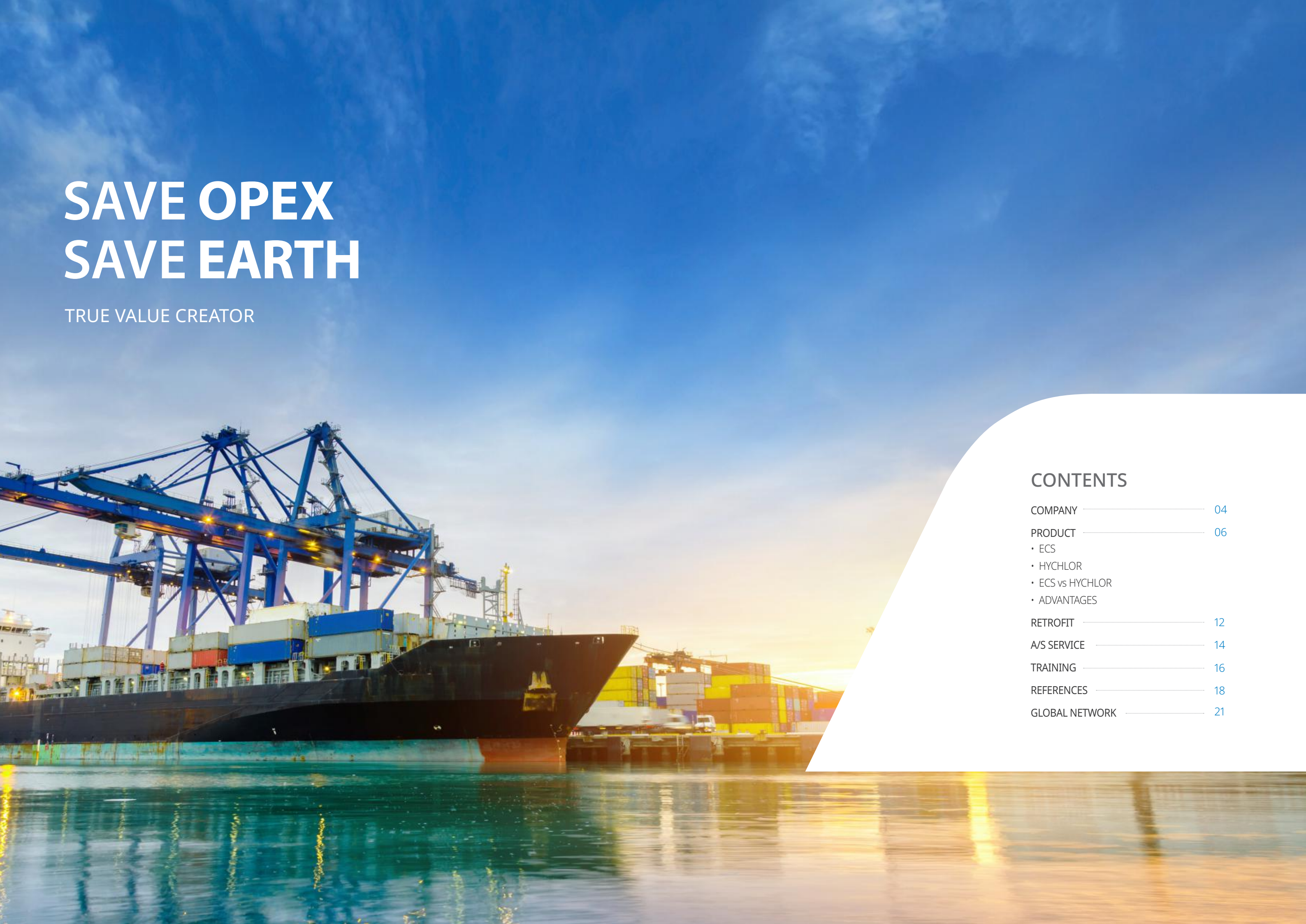


SAVE OPEX SAVE EARTH

TRUE VALUE CREATOR

BWMS TOTAL SOLUTIONS PROVIDER **TECHCROSS**





SAVE OPEX SAVE EARTH

TRUE VALUE CREATOR

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COMPANY :

Techcross, developed the world's first ballast water management system, takes pride in maintaining the Global No. 1 sales performance and leads the ballast water management system market. Since 2020, Techcross has been expanding their business to other areas of the environmental industry, including land-based water treatment, waste treatment & energy conversion, air pollution prevention, and new renewable energy, as well as marine environmental protection to expand into a global comprehensive environmental company.



Comprehensive Environmental Company, TECHCROSS

Techcross, which manufactures and sells eco-friendly shipbuilding equipment, Techcross Water & Energy, which performs environmental EPC business, and Techcross Environmental Services, which operates environmental O&M business, provides integrated solutions throughout the value chain of the environmental industry.

*EPC : Engineering, Procurement, Construction | *O&M : Operation & Management



“Global No. 1 BWMS” in the shipbuilding & marine industry

Manufacturing and sales of ballast water management system

Obtained the world's first IMO Basic Approval with self developed technology (2006)

Global No. 1 performance in ballast water management system



Environmental EPC “Creating the future of environmental industry”

- Korea's largest capacity treatment performance in the industrial water sector
- World's largest performance in water treatment in the global display area
- Conducted a number of overseas projects including North America, Latin America, Central Asia, Southeast Asia, etc.



Environmental O&M “A reliable environmental operation management partner”

- Operation and management of the largest private sewage treatment facility in Korea
- Started operation and management of domestic environment (1999)
- Entered the industry's first overseas environmental operation business in China and Vietnam (2003)

True Value Creator, TECHCROSS

Cost reduction is one of the most important factors in industrial activity. An environmental company, Techcross offers the best solution to realize cost reduction while preserving a sustainable environment of the future.

SAVE OPEX

Low Power Consumption

- Techcross' incomparable top technology based on electrodes provides reduced power consumption.

Efficient Installation Cost

- Compact footprint and its flexibility result in minimized structure change of vessels and help to save the installation cost.

Economical Maintenance Cost

- Optimal component configuration and improvement of its durability through total quality assurance program lead in decreased maintenance cost.

SAVE EARTH

Save the Ocean by Strong Disinfection Efficacy

- With no harmful effects on marine ecosystem, Techcross BWMS prevents microorganism from regrowing for over 120 days after treatment.

Pioneer for Marine Environmental Protection

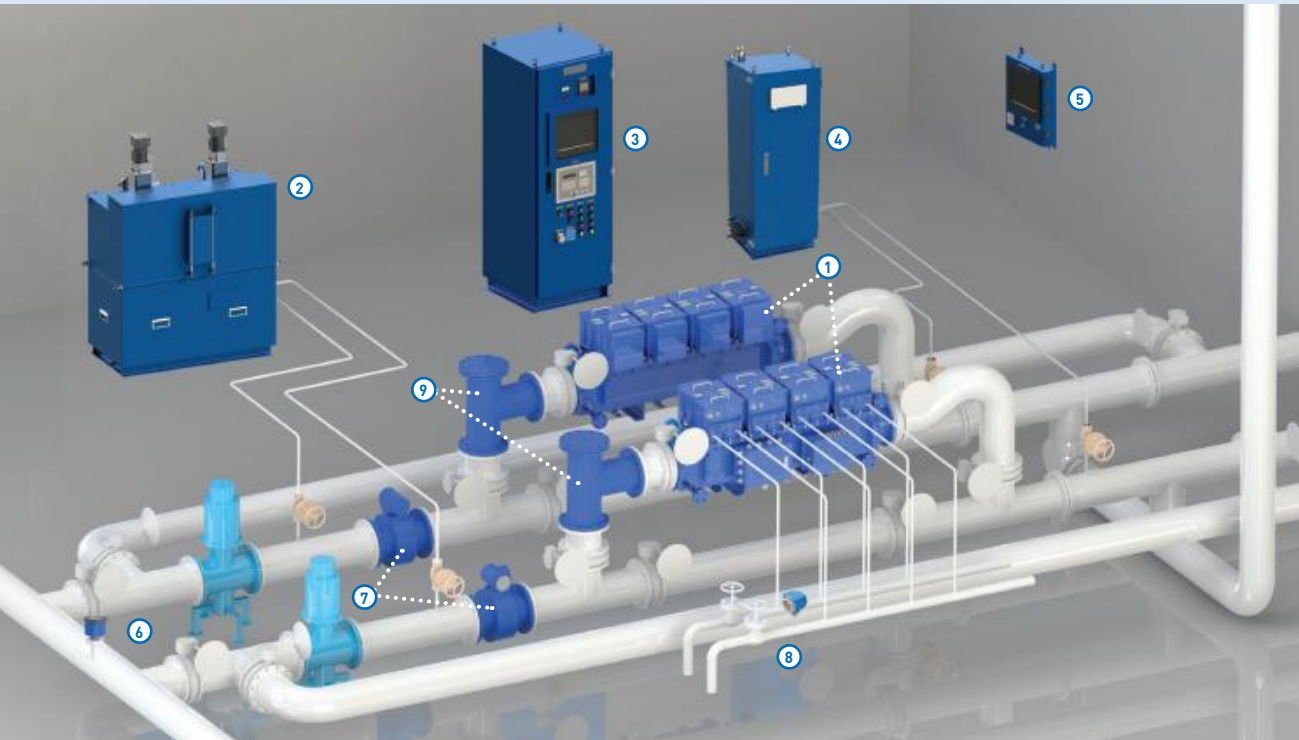
- Techcross leads the environmental industry as Global No. 1 BWMS manufacturer.

Strategic Environmental R&D

- The company strives to be a comprehensive environmental company with its top technologies.

PRODUCT : ECS

The world's first ballast water management system ECS (Electro-Cleen™ System) developed by Techcross uses a direct electrolysis method to efficiently destroy microorganisms. It is not restricted by the installation area and easy to install on existing ships where spaces are limited. The optimal solution of the system can be provided through various references that have proven by the world's No. 1 sales and installation performance.



- ① - ECU (Electro Chamber Unit)

② - ANU (Auto Neutralization Unit)

③ - PDE (Power Distributor Equipment)

④ - TSU (TRO Sensor Unit)

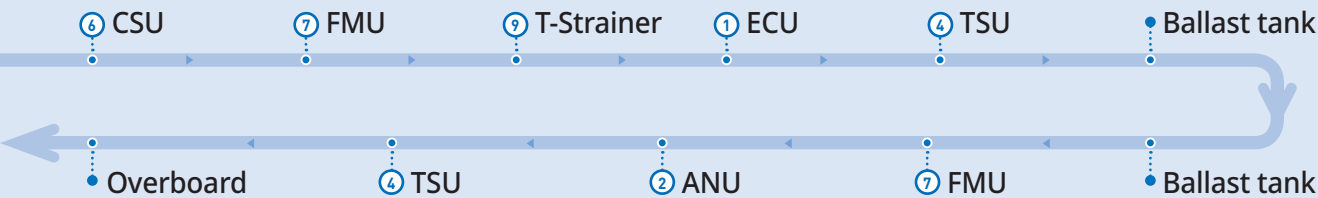
⑤ - CPC (Control PC)
- ⑥ - CSU (Conductivity Sensor Unit)

⑦ - FMU (Flow Meter Unit)

⑧ - FTS (Freshwater Temperature Sensor)

⑨ - T-Strainer

>> Ballasting



>> Deballasting

Treatment Component

ECU, the main component of ECS that treats all the incoming water with 5 models ranging from 150 ton to 1,000 ton. It can be installed both horizontal type and vertical type depending on the installation space.

Size & Weight	ECU 300B
ECU 150B : W790 X D540 X H862 (mm) / 390kg	
ECU 300B : W1,243 X D763 X H862 (mm) / 490kg	
ECU 450B : W1,490 X D763 X H862 (mm) / 660kg	
ECU 600B : W1,840 X D763 X H862 (mm) / 830kg	
ECU 1000B : W2,000 X D1,124 X H914.5 (mm) / 1,210kg	

TECHCROSS Electrode

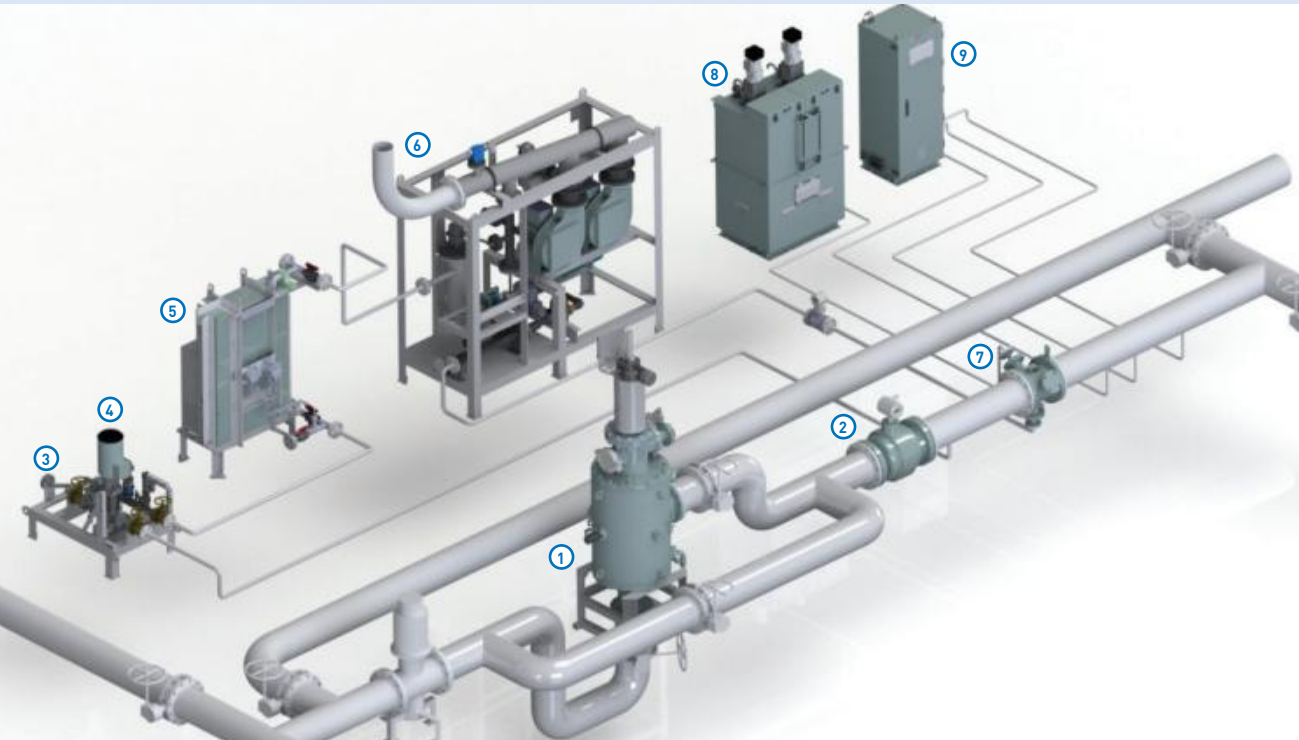
The key element that allows better results without filter is the self-developed electrode by Techcross. Techcross, the company that had been developing electrodes for efficient electrolysis since the land- based water treatment business, has improved electrode efficiency by switching to the BWMS business.

Features of electrodes
• Using highly reactive catalyst shown high-quality in blackish and fresh water
• Increasing the surface area via producing crack on the electrode
• Reducing the scale of cathode electrodes by coating special substances on the surface
• Competitive price by self-production facility



PRODUCT : HYCHLOR

HYCHLOR (ECS-Hychlor™ System) developed by Techcross effectively treats harmful microorganisms in ballast water through indirect electrolysis. As the high-quality electrodes of Techcross are used in the same way as ECS, sterilization efficiency can be guaranteed. Since only 1% of seawater entering the ship is used for electrolysis, it is a good alternative for tanker ships, which had many difficulties in installation space.



- ① - AFU (Auto Filter Unit)

② - FMU (Flow Meter Unit)

③ - CSU (Conductivity Sensor Unit)

④ - PMU (Pump Module Unit)

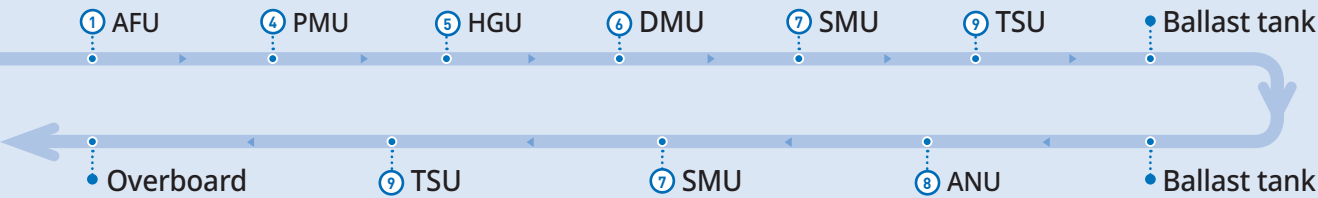
⑤ - HGU (Hypochlorite Generation Unit)
- ⑥ - DMU (Degas Module Unit)

⑦ - SMU (Static Mixer Unit)

⑧ - ANU (Auto Neutralization Unit)

⑨ - TSU (TRO Sensor Unit)

>> Ballasting



>> Deballasting

Treatment Components

The main treatment components of HYCHLOR are filter unit and hypochlorite generator. HGU uses only 1% of total ballast water flows to generate the highly concentrated TRO. Both HGU and AFU operate ballasting only and AFU can be installed horizontal type or vertical type depending on the installation space.

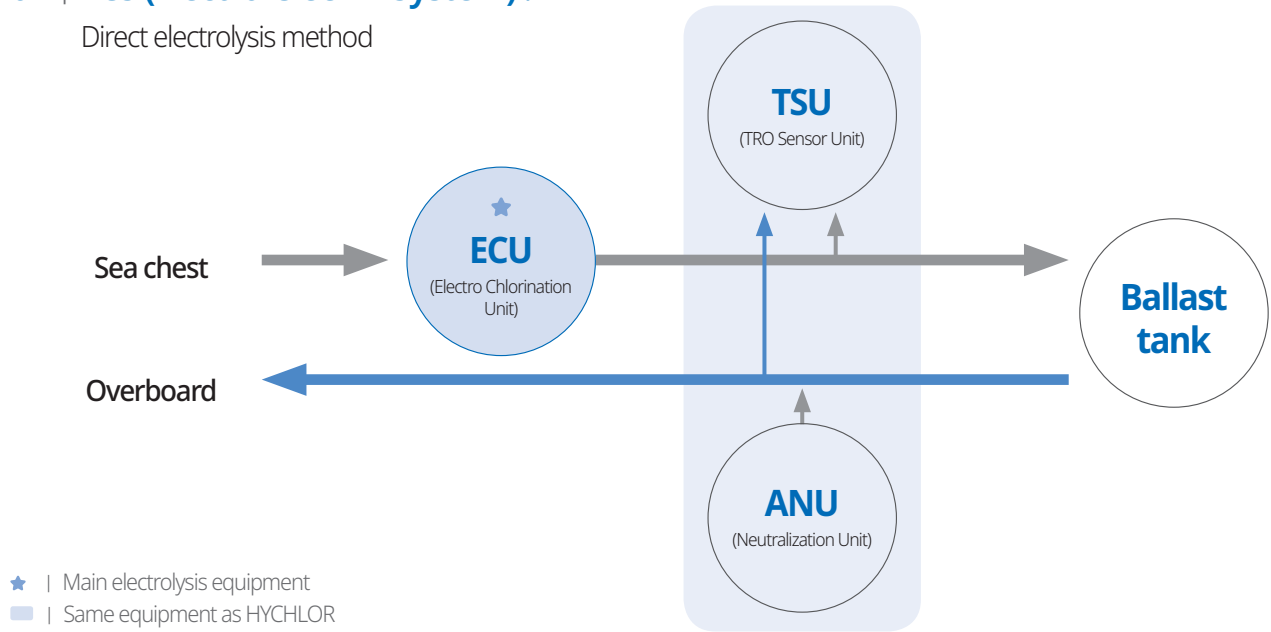
Size & Weight	HGU-050
HGU-050 : W980 X D705 X H1,445 (mm) / 412kg	
HGU-100 : W1,490 X D705 X H1,445 (mm) / 570kg	
HGU-200 : W1,490 X D1,470 X H1,445 (mm) / 1,160kg	
HGU-400 : W1,490 X D3,470 X H1,445 (mm) / 2,310kg	
HGU-800 : W4,280 X D3,540 X H1,445 (mm) / 4,600kg	

Size & Weight	AFU BS_061_TURBO
BS061E-H : W2,447 X D688 X H660 (mm) / 290kg	
BS061E-V : W687 X D745 X H2,598 (mm) / 310kg	
BS603E-H : W3,089 X D1,742 X H1,770 (mm) / 2,908kg	
BS603E-V : W1,749 X D1,814 X H3,109 (mm) / 2,858kg	
BS1406E-H : W3,534 X D2,164 X H2,410 (mm) / 5,259kg	
BS1406E-V : W2,309 X D2,431 X H3,554 (mm) / 5,169kg	

PRODUCT : ECS vs HYCHLOR

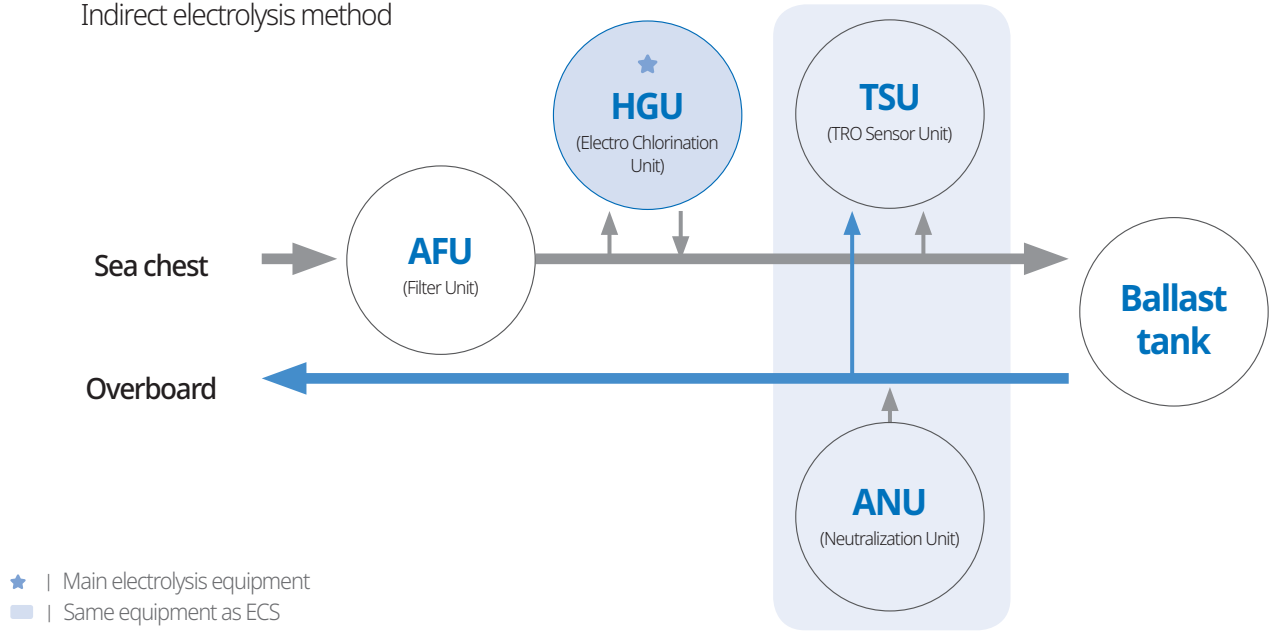
01 | ECS (Electro-Cleen™ System) :

Direct electrolysis method



02 | HYCHLOR (ECS-HYCHLOR™ System) :

Indirect electrolysis method



BWMS	Division	Treatment unit	Neutralization unit	Supporting equipment
ECS	Unit	ECU	ANU, TSU	PDE, T-strainer
	Installation area (in case of tanker ship)	P/R or Hazardous area	E/R & On-deck room	E/R & On-deck room
HYCHLOR	Unit	AFU, HGU	ANU, TSU	PDE, DMU, PMU, SMU
	Installation area (in case of tanker ship)	AFU : P/R or Hazardous area HGU : E/R or Safety area	E/R	E/R

PRODUCT : Advantages

Strong disinfection efficacy	Self-developed electrode technology	Approved system
The largest reference list	Low power consumption	Low operational cost
Easy installation & maintenance	Automatic system	Global service network

RETROFIT :

Under the BWM Convention established by IMO, all ships around the world must install ballast water management systems by 2024. Accordingly, Techcross provides an easy installation in a minimum space to facilitate the ships currently in operation, as well as a quick solution to prevent any disruptions to the ship's schedule.

Service Option

Case 1 (Standard Solution)

ECS SupplyCommissioning

Case 2 (Engineering Package)

Onboard surveyDesignECS SupplySupervisionCommissioning

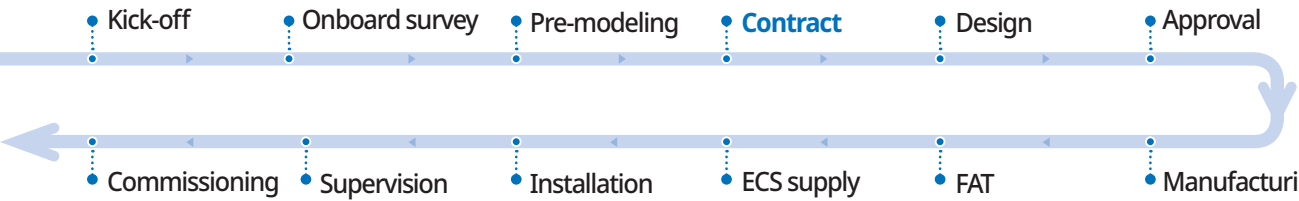
* Including basic drawing (P&ID, Wiring, M/A), detail drawing (Manufacturing, installation)

Case 3 (Turnkey Package)

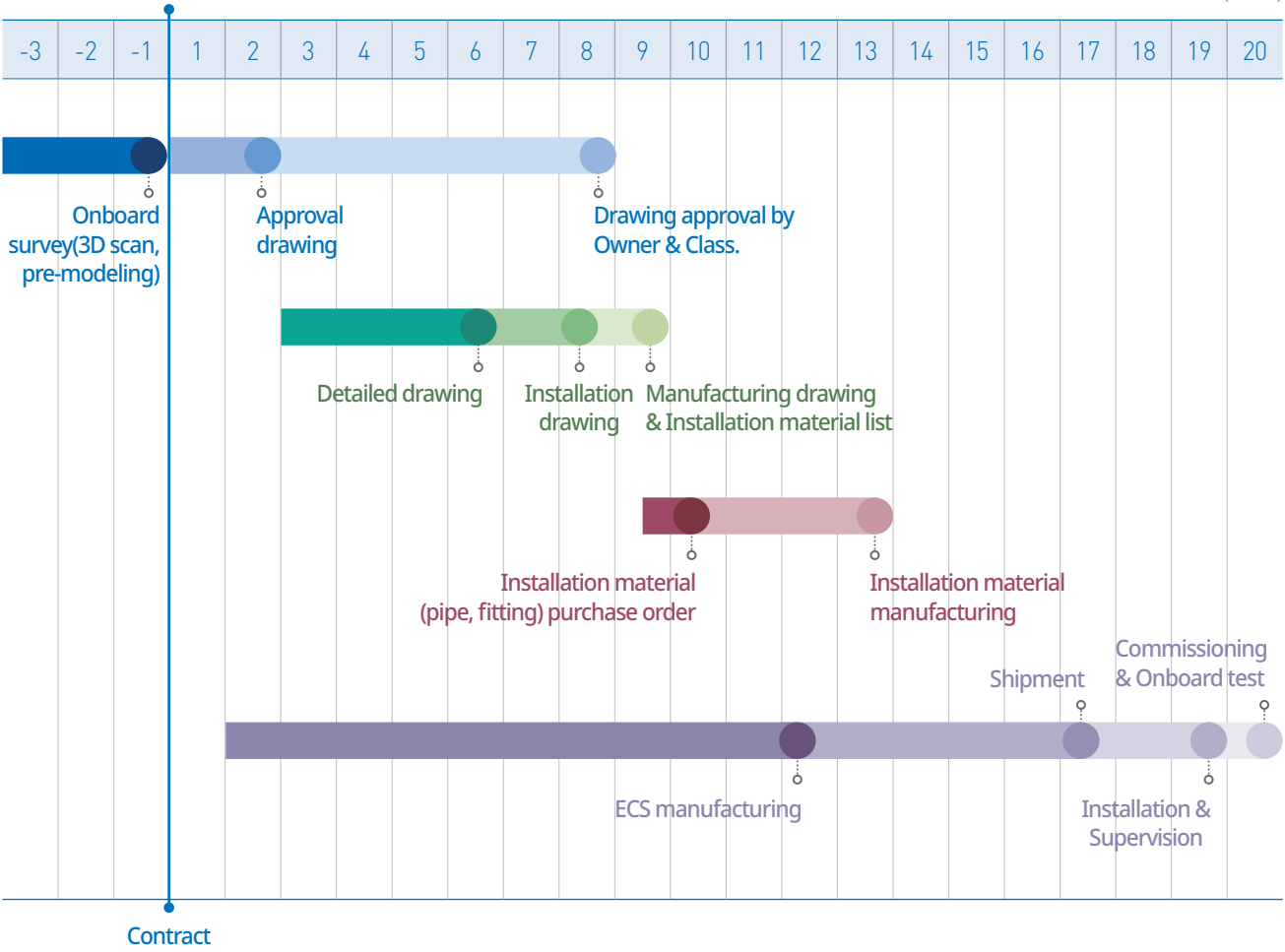
Onboard surveyDesignManufacturingECS SupplyInstallationSupervisionCommissioning

* Including manufacturing of pipe, seat, support, valve, cable tray, etc.

Service Process



Timetable (Standard schedule / 20 weeks)



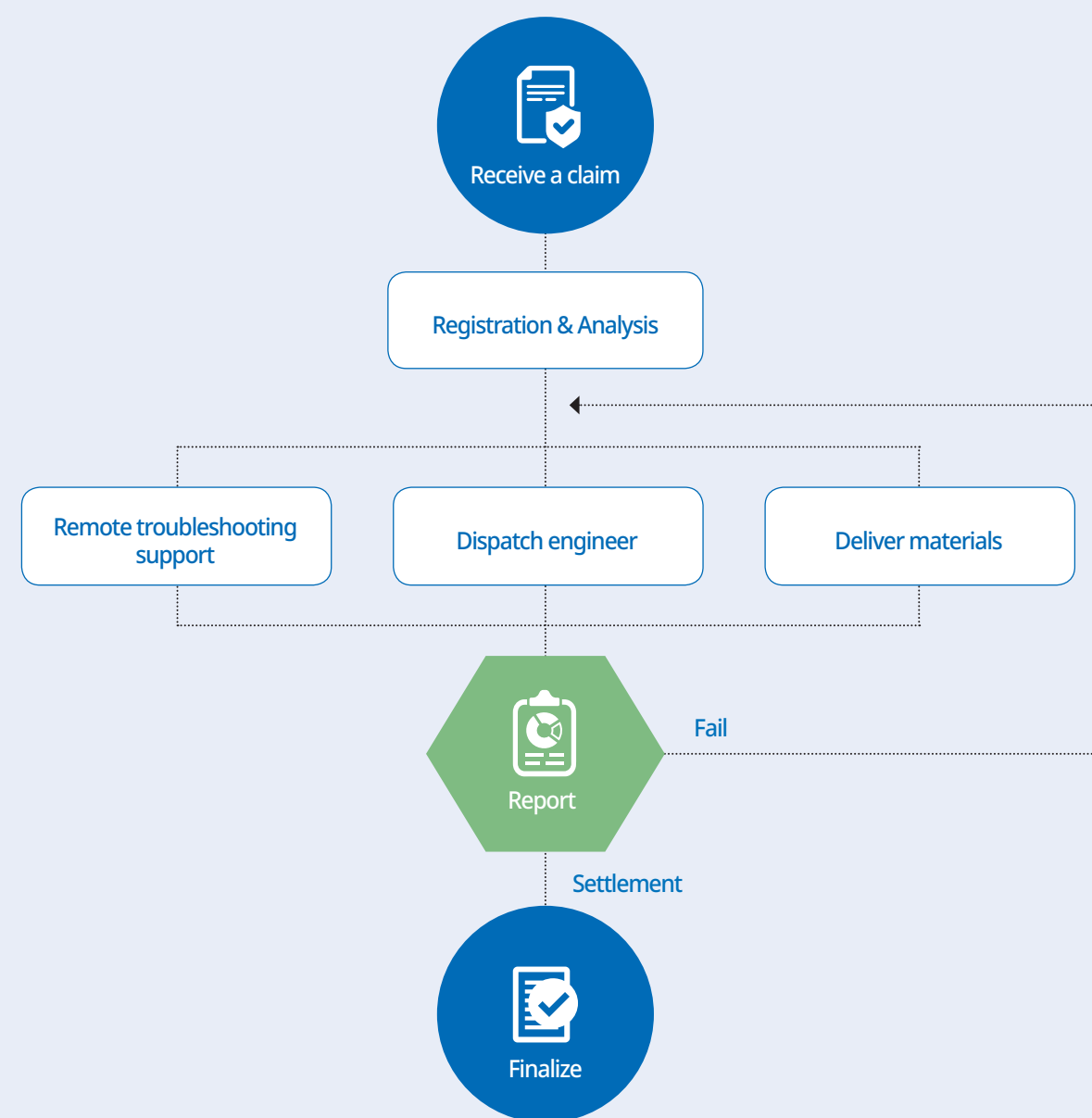
Before Contract	After Contract
- Preliminary onboard survey - Onboard survey 3D scanning & visual check - Merging for 3D scanning data 3D modeling for equipment & new pipes - Onboard survey report (Feasibility study)	- Preparation of approval drawing for the Class and owner approval - Preparation 3D modeling for equipment & new pipes - Material list (B.O.M) - Manufacturing & installation drawing - Supervision for installation - Commissioning

A/S SERVICE

In order to promptly respond to various issues that may arise after installing BWMS on a ship, Techcross has established and is operating an organized management system with dedicated BWMS personnel. In addition, Techcross is making every effort to provide prompt service by cooperating with more than 100 engineers including partners in worldwide.

A/S Service Work Process

Techcross has sufficient troubleshooting experiences especially in the field of BWMS. It makes it possible to organize the best work process which has the most efficient and proper method to save the time.



Support Materials for A/S Service

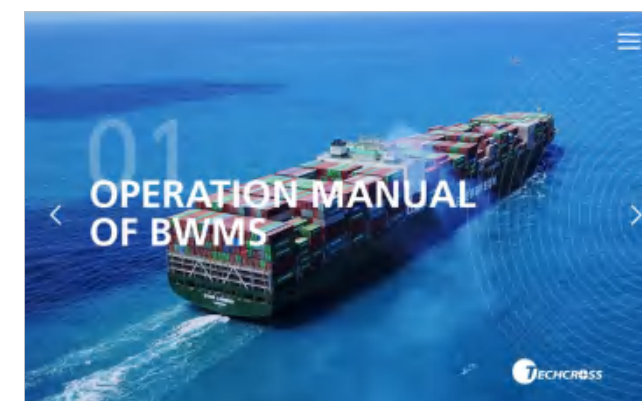
Techcross has developed various training materials to provide easy understanding on the system and opportunities to solve the trouble on their own in case of emergency. Each material is provided when the system is delivered to the vessel. CBT (Computer-based Training) and E-manual is installed in CPC so that everyone can easily find it when they need. IBT (Internet-based Training) program contains system operation and maintenance issues as well as troubleshooting. After finishing the education through IBT, trainee can receive the certification After passing the exam.



▲ Troubleshooting book (Hard copy / Soft copy)



▲ E-manual

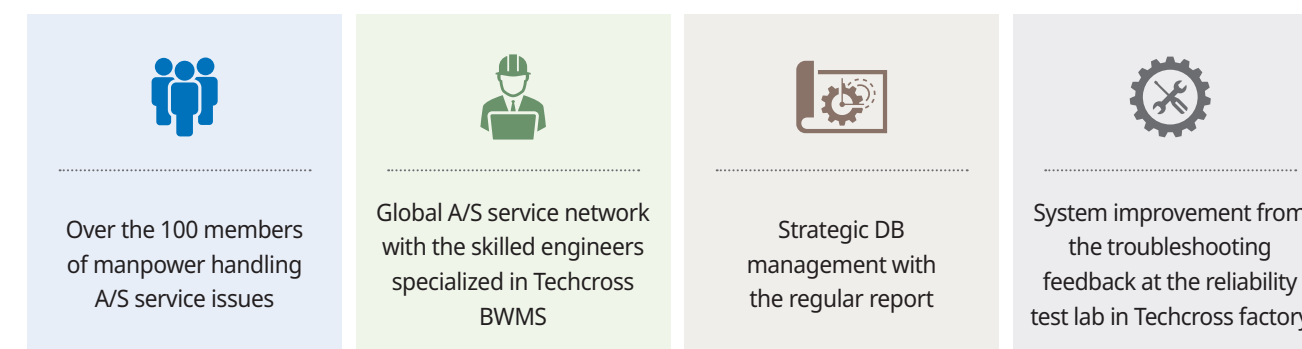


▲ CBT (Computer-based Training)



▲ IBT (Internet-based Training)

Advantages of Techcross A/S Service



TRAINING :

As BWMS is an equipment used during cargo operation / navigation, it is important to have a sufficient understanding of the equipment and to respond promptly in the field when the problem arises. Since early on, Techcross has been working hard on developing equipment manuals and training crews, and currently operates an education center where various educational materials and actual equipment are installed in major hubs around the world.



TECHCROSS Training Center

Name TECHCROSS Training Center
Location Busan, Korea
Open Date November 2019
Model ECS 150B X 1 set
HYCHLOR 500 X 1 set
Facility Seminar room, Cafeteria, Practice area



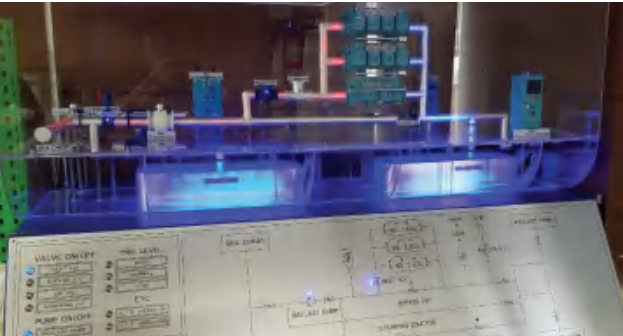
AEM Training Center

Name Anglo Eastern Maritime Training Center
Location Mumbai, India
Open Date August 2015
Model ECS 150B X 1 set



HOS Training Center

Name HMM Ocean Service Training Center
Location Busan, Korea
Open Date September 2018
Model ECS simulation miniature



Winkong Training Center

Name Winkong Marine Engineering Co., Ltd Training Center
Location Qingdao, China
Open Date July 2019
Model ECS 150B X 1 set



KMOU Training Center

Name Korea Maritime & Ocean University Training Center
Location Busan, Korea
Open Date July 2020
Model ECS 300B X 1 set



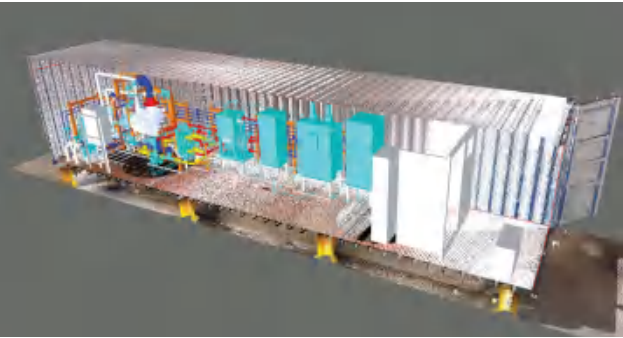
UM Training Center

Name United Marine Training Center
Location Manila, Philippine
Open Date 2021
Model ECS 150B X 1 set



IMECC

Name International Maritime Education Center Corporation
Location Piraeus, Greece
Open Date 2022
Model ECS 150B X 1 set



Advantages of Techcross Training System

- Real simulation in the same conditions as ship
- Using 2 types of electrolysis system
- Customized curriculum to trainee
- Various troubleshooting examples
- The latest updates and revision issues
- Interactive learning with the actual operation

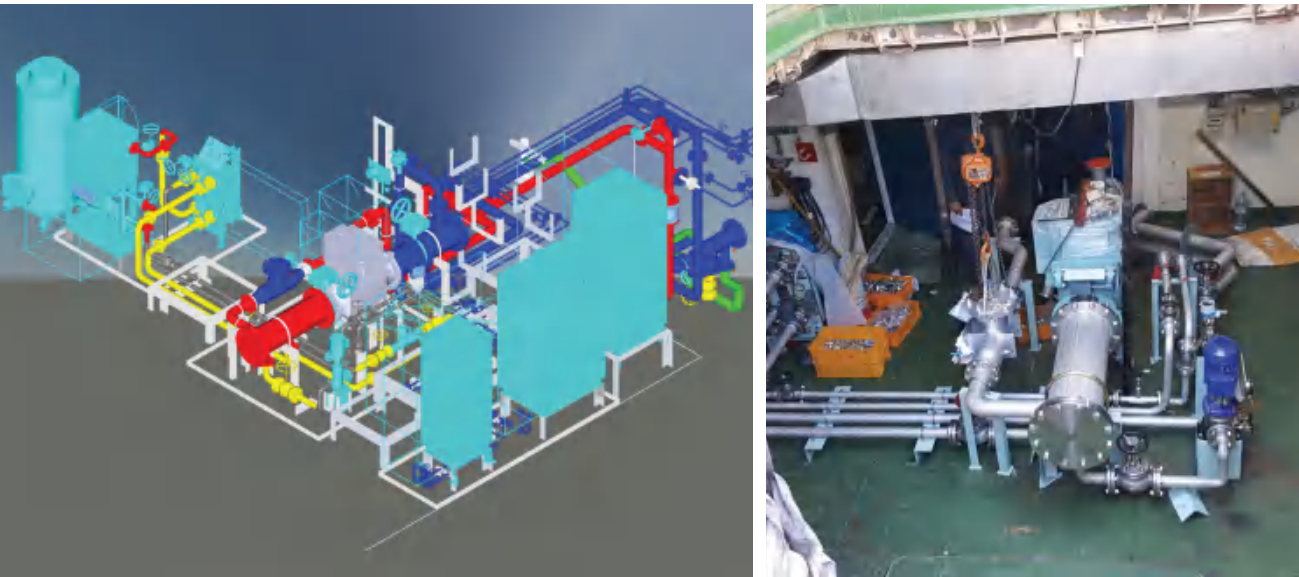
REFERENCES :

Retrofit (2021)



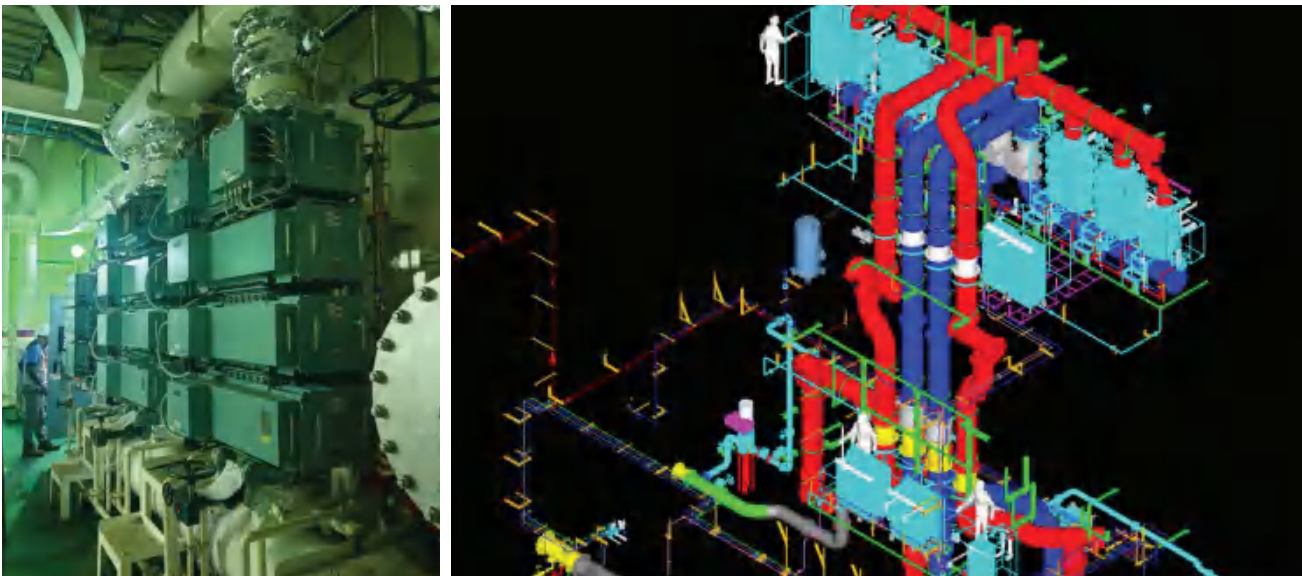
Ship type	Installation area	Repair S/Y	Ship owner	BWMS model
18K Heavy Lift Vessel	Pump Room (Port & STB'D)	Korea	Korea	ECS 3000B X 4 sets

Retrofit (2020)



Ship type	Installation area	Repair S/Y	Ship owner	BWMS model
1.4K Public Vessel	Engine Room (Tank top ~ Main deck)	Korea	Korea	ECS 150B X 1 set

Retrofit (2019)



Ship type	Installation area	Repair S/Y	Ship owner	BWMS model
157K LNG Carrier	Engine Room (Floor ~ 2nd deck)	Malaysia	Malaysia	ECS 2450B X 2 sets

Retrofit (2021)



Ship type	Installation area	Repair S/Y	Ship owner	BWMS model
12K Oil Tanker	Engine Room, On-deck Store	Korea	Korea	Ex-ECS 450B X 1 set

Newbuilding (2014)



Ship type	Installation area	Shipyard	Ship owner	BWMS model
37K PC Tanker	On-deck Room	Korea	Singapore	Ex-ECS 750B X 2 sets

Retrofit (2020)



Ship type	Installation area	Repair S/Y	Ship owner	BWMS model
56K Bulk Carrier	Engine Room	China	Korea	HYCHLOR 1500 X 1 set

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