

# SAVE OPEX SAVE EARTH

TRUE VALUE CREATOR

BWMS TOTAL SOLUTIONS PROVIDER **TEHCROSS**



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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
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**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

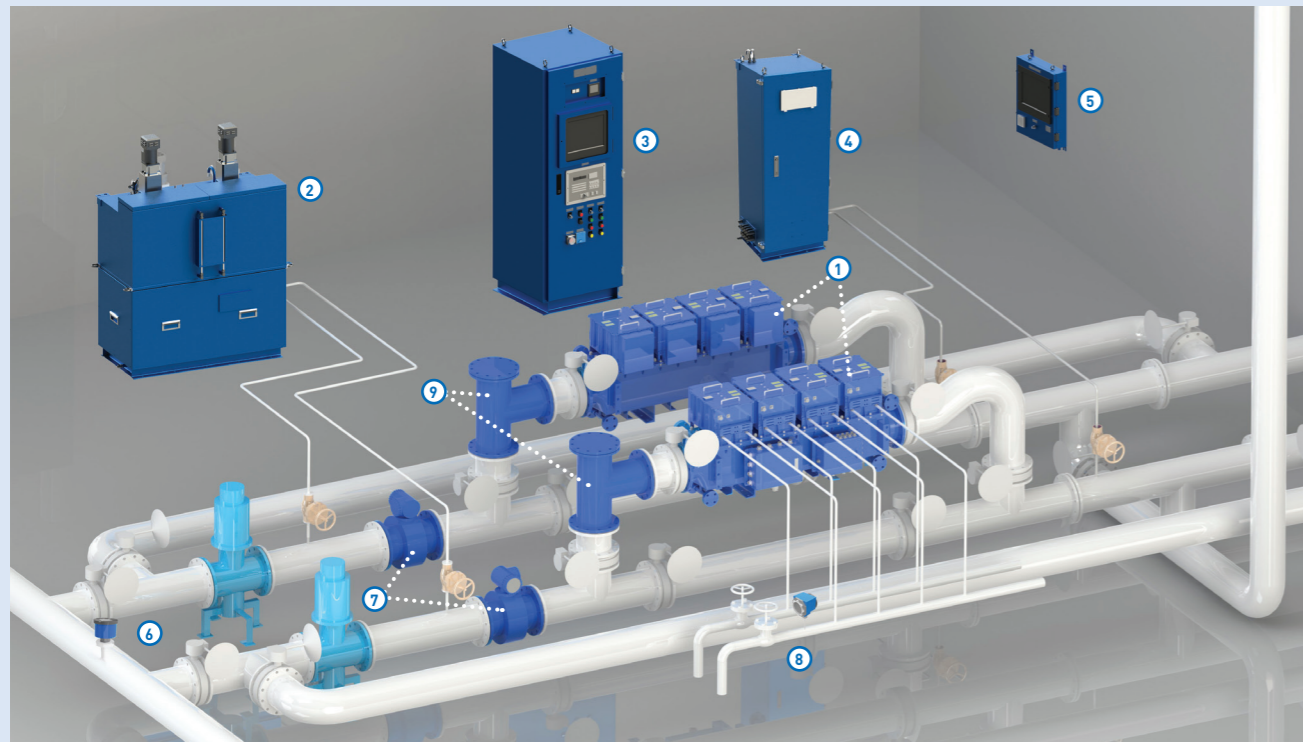
- Techcross leads the environmental industry as Global No. 1 BWMS manufacturer.

#### Strategic Environmental R&D

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

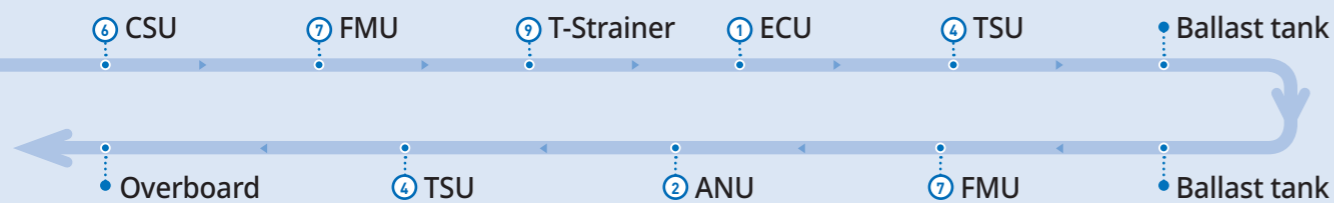
# PRODUCT : ECS

The world's first ballast water management system ECS (Electro-Clean™ 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

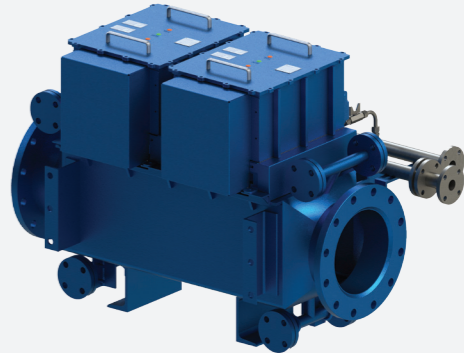
## »» Ballasting



## »» 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	

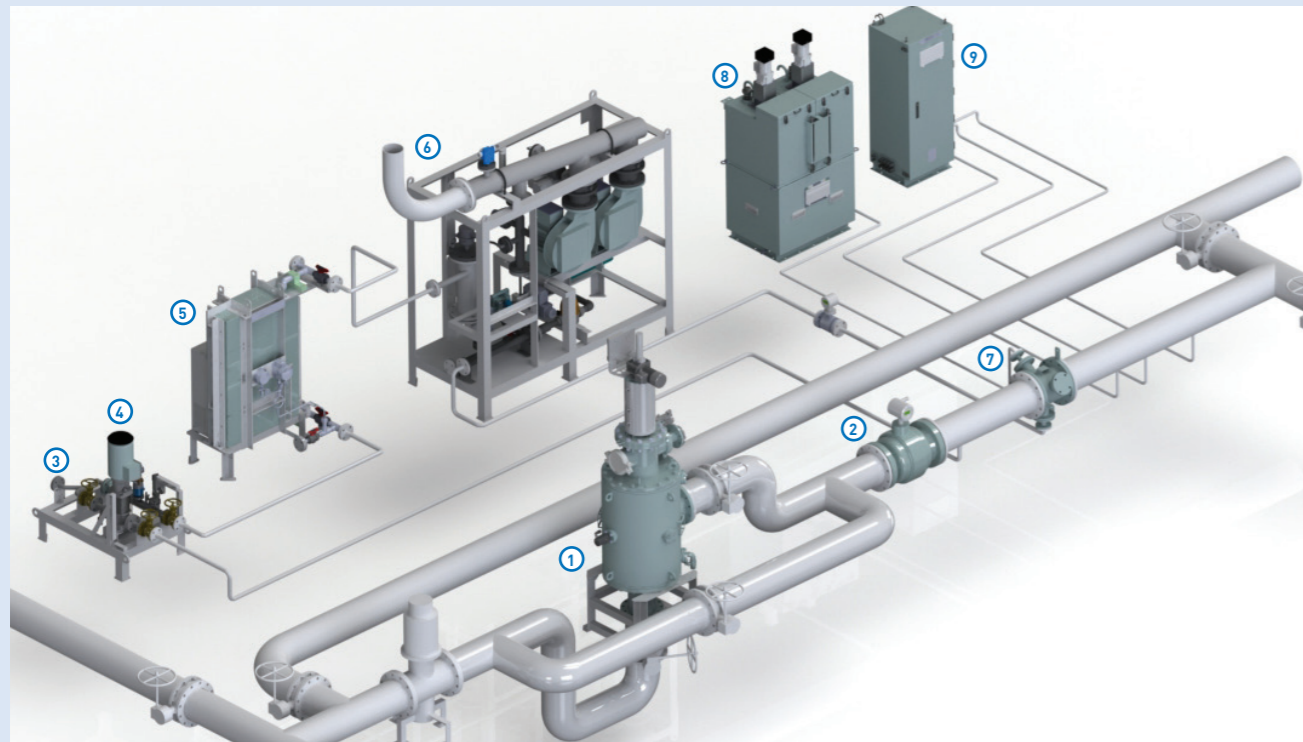
## TEHCROSS Electrode

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	
<ul style="list-style-type: none"> <li>• Using highly reactive catalyst shown high-quality in blackish and fresh water</li> </ul>	
<ul style="list-style-type: none"> <li>• Increasing the surface area via producing crack on the electrode</li> </ul>	
<ul style="list-style-type: none"> <li>• Reducing the scale of cathode electrodes by coating special substances on the surface</li> </ul>	
<ul style="list-style-type: none"> <li>• Competitive price by self-production facility</li> </ul>	

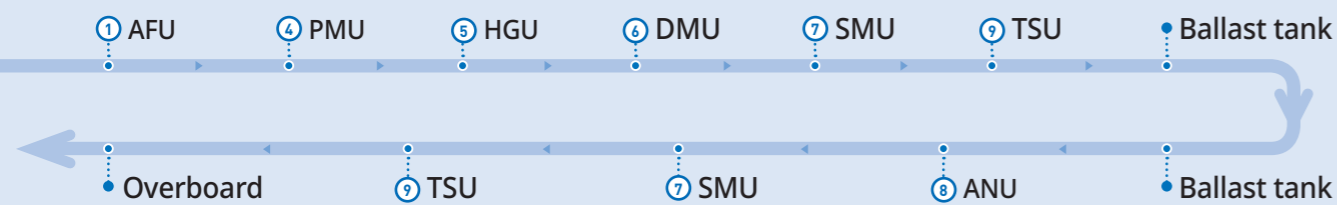
# PRODUCT : HYCHLOR

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 : 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



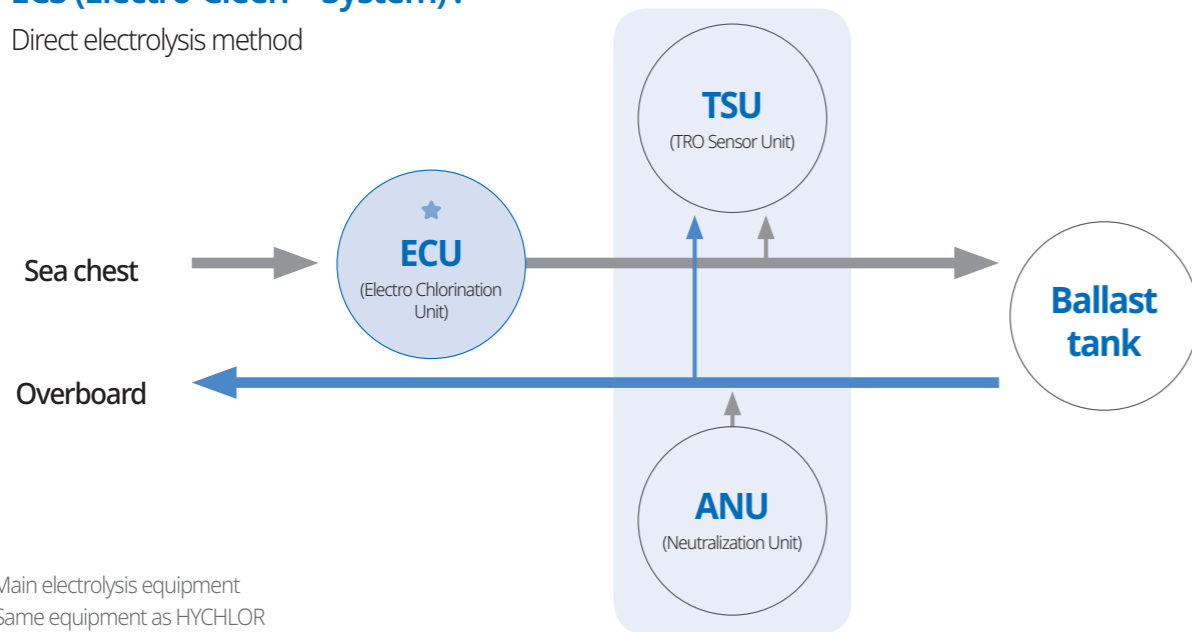
Size & Weight
BS061E-H : W2,447 X D688 X H660 (mm) / 290kg
BS061E-V : W687 X D745 X H2,598 (mm) / 310kg
BS603E-H : W3,089 X D1,742 X H1,770 (mm) / 2,908kg
BS603E-V : W1,749 X D1,814 X H3,109 (mm) / 2,858kg
BS1406E-H : W3,534 X D2,164 X H2,410 (mm) / 5,259kg
BS1406E-V : W2,309 X D2,431 X H3,554 (mm) /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



# PRODUCT : ECS vs HYCHLOR

## 01 | ECS (Electro-Clean™ System) :

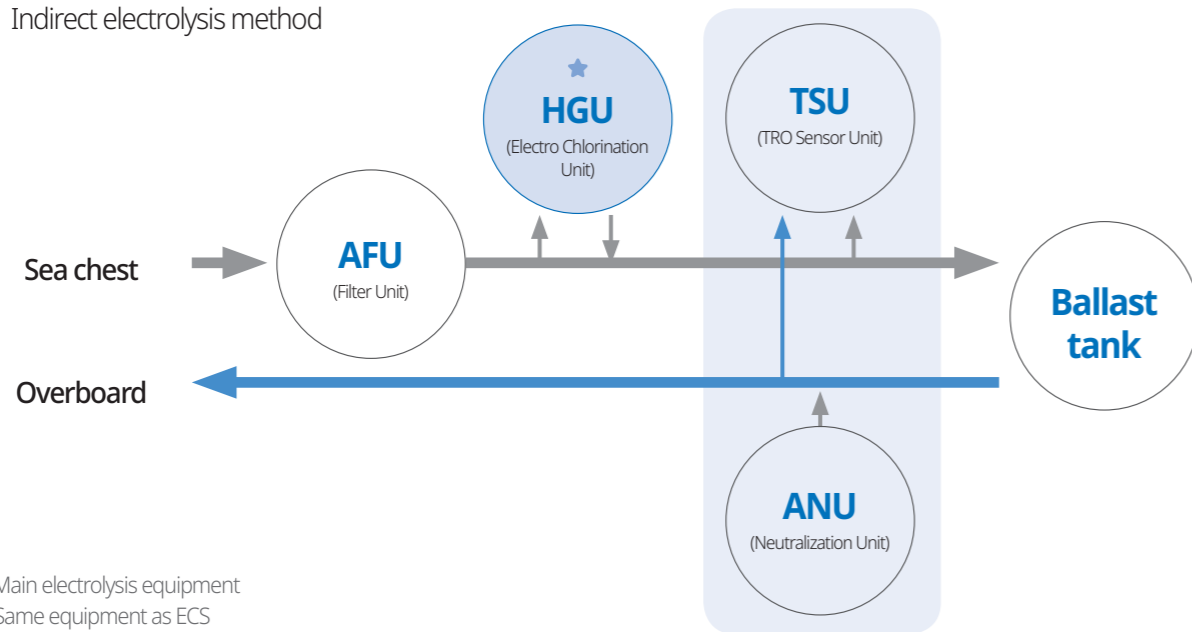
Direct electrolysis method



★ | Main electrolysis equipment  
 ■ | Same equipment as HYCHLOR

## 02 | HYCHLOR (ECS-HYCHLOR™ System) :

Indirect electrolysis method



★ | Main electrolysis equipment  
 ■ | Same equipment as ECS

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)



### Case 2 (Engineering Package)



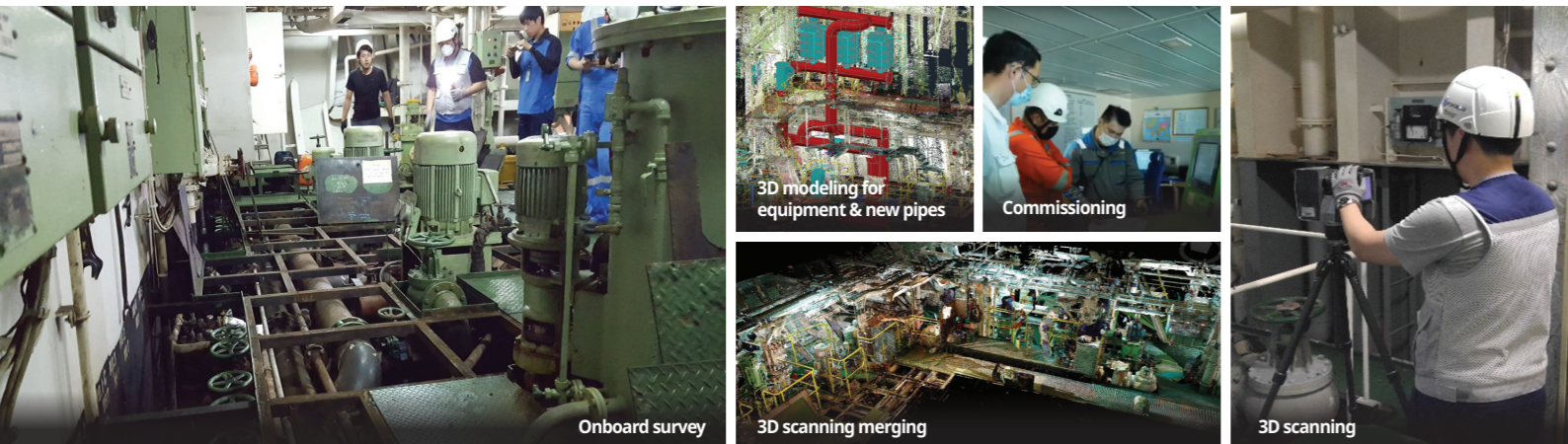
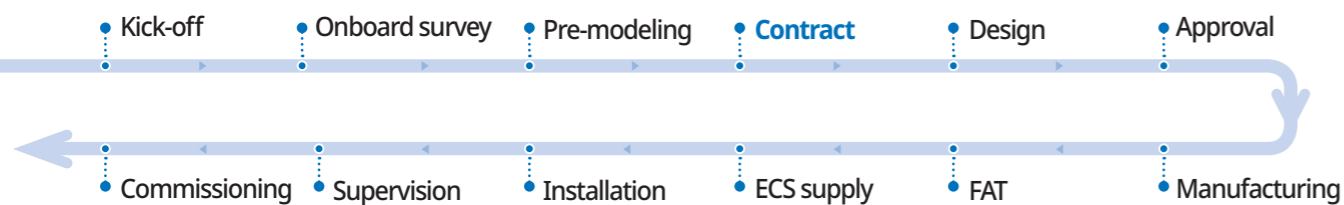
\* Including basic drawing (P&ID, Wiring, M/A), detail drawing (Manufacturing, installation)

### Case 3 (Turnkey Package)

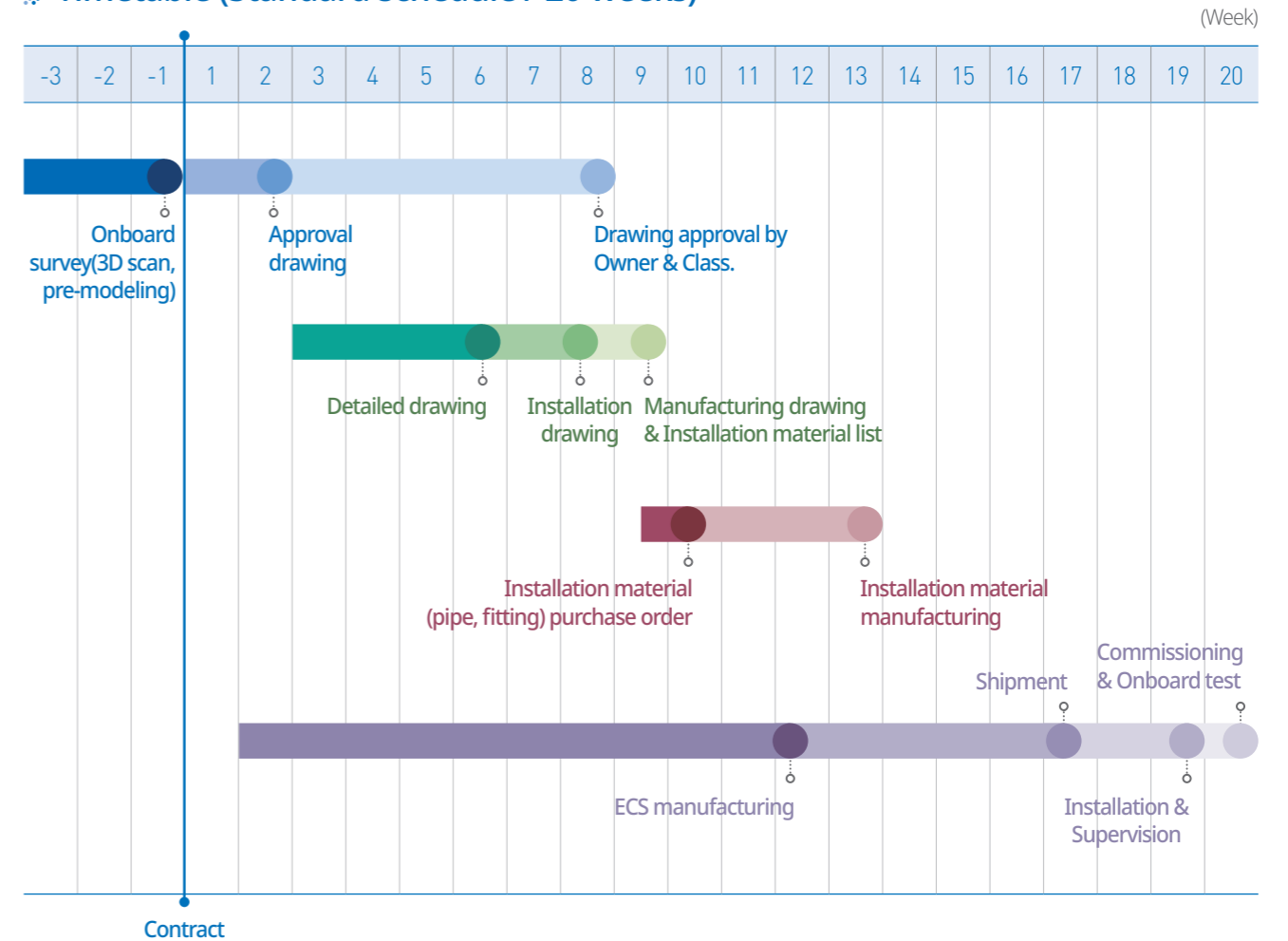


\* Including manufacturing of pipe, seat, support, valve, cable tray, etc.

## Service Process



## Timetable (Standard schedule / 20 weeks)



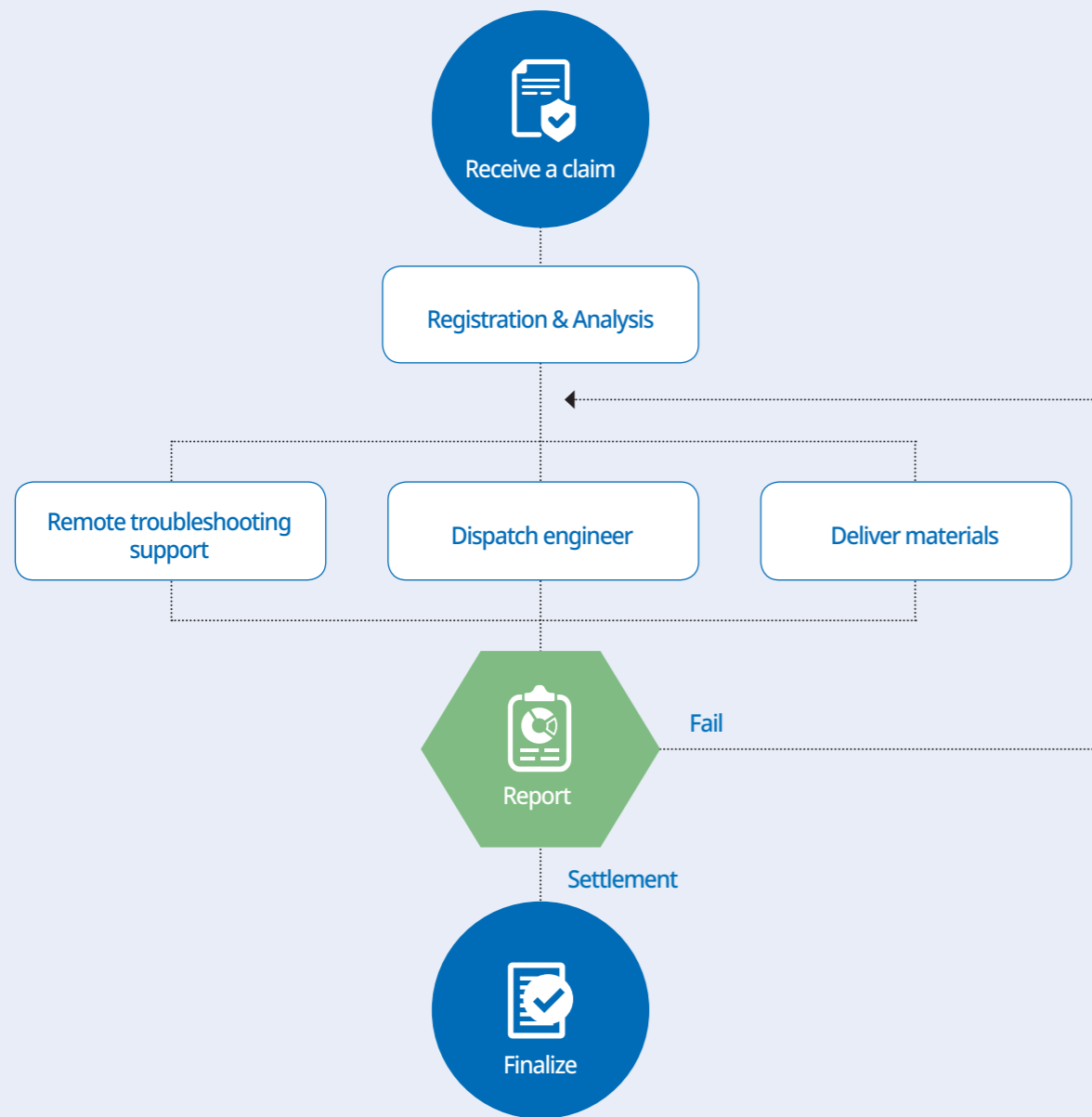
Before Contract	After Contract
■ Preliminary onboard survey	■ Preparation of approval drawing for the Class and owner approval
■ Onboard survey	■ Preparation 3D modeling for equipment & new pipes
■ 3D scanning & visual check	■ Material list (B.O.M)
■ Merging for 3D scanning data	■ Manufacturing & installation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

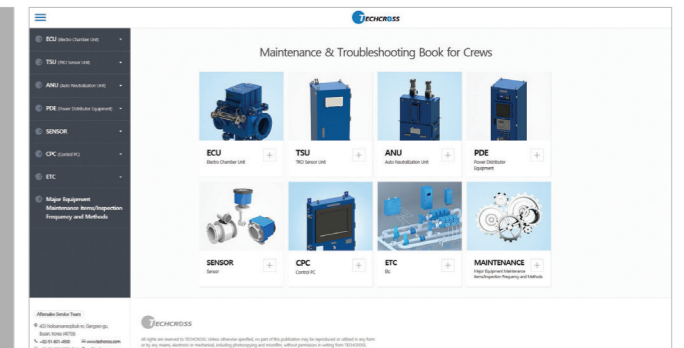


## Support Materials for A/S Service

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

<p>Over the 100 members of manpower handling A/S service issues</p>	<p>Global A/S service network with the skilled engineers specialized in Techcross BWMS</p>	<p>Strategic DB management with the regular report</p>	<p>System improvement from the troubleshooting feedback at the reliability test lab in Techcross factory</p>
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# 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.



## TEHCROSS 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



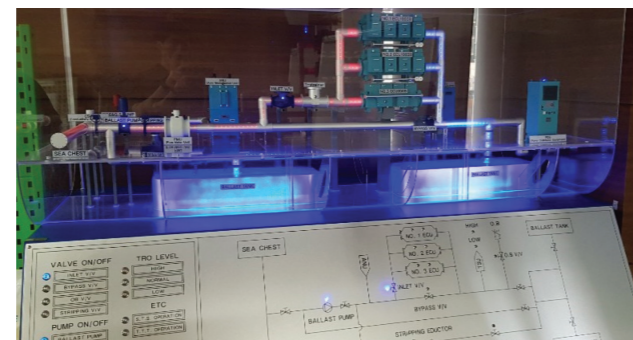
## AEM Training Center

**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



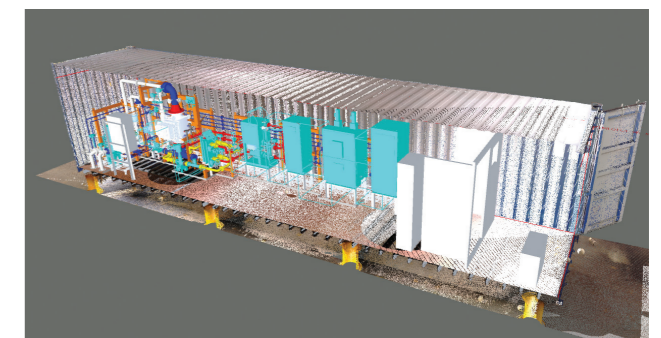
## UM Training Center

**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

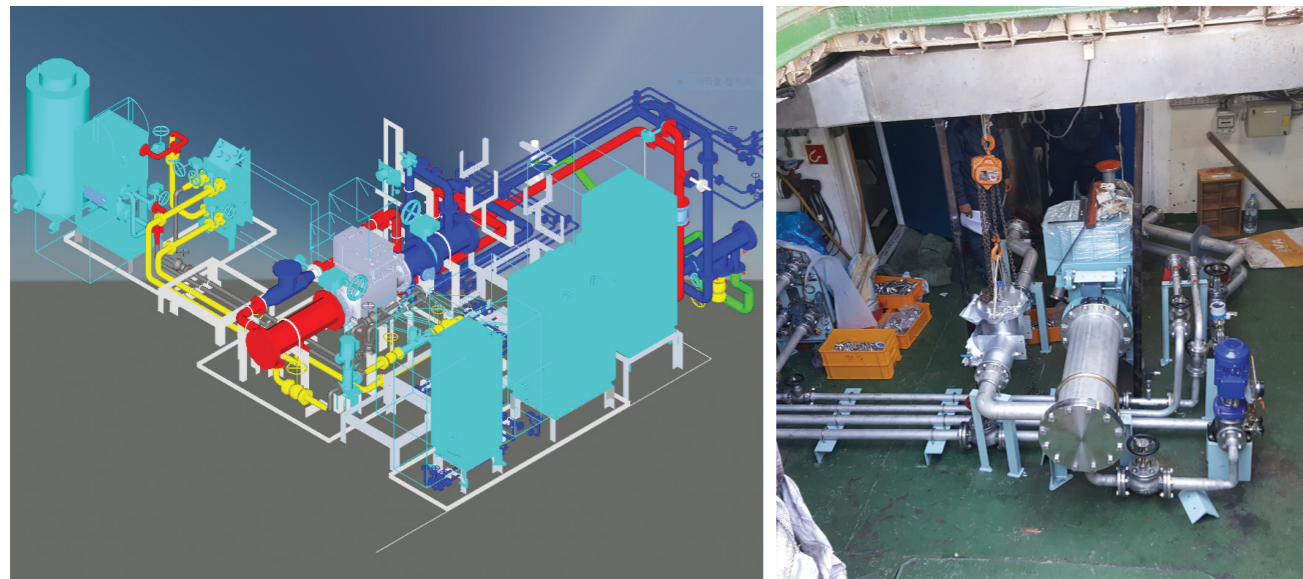
# REFERENCES :

## Retrofit (2021)



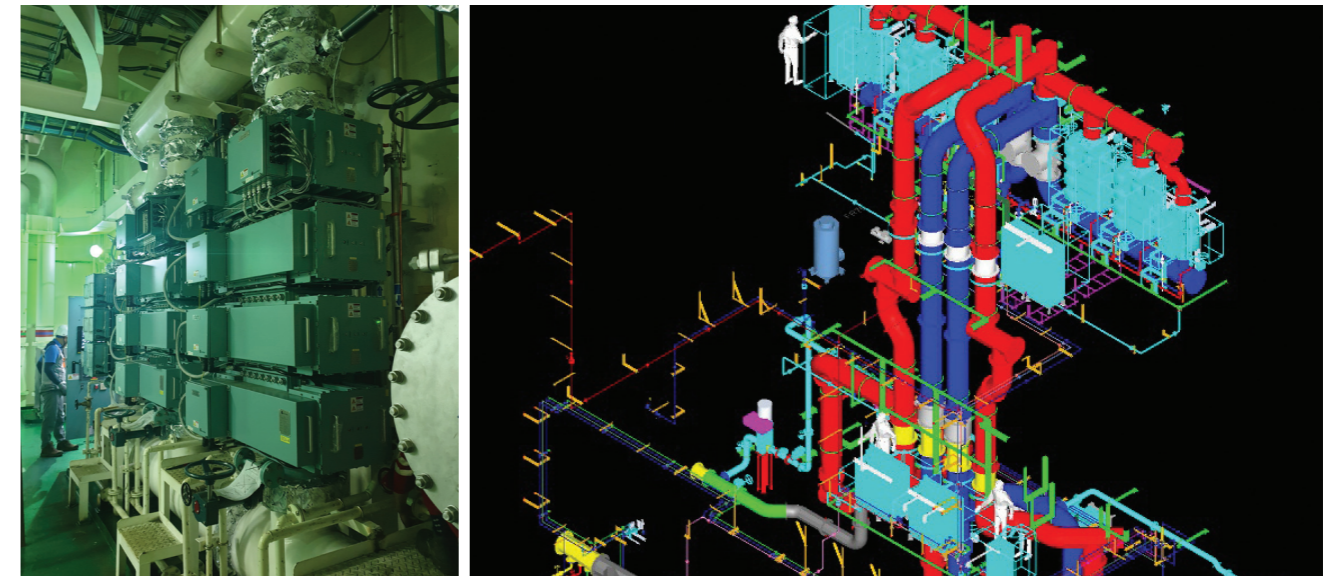
Ship type	Installation area	Repair S/Y	Ship owner	BWMS model
18K Heavy Lift Vessel	Pump Room (Port & STB'D)	Korea	Korea	ECS 3000B X 4 sets

## 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

## GLOBAL NETWORK :

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