TECHCROSS
Company Profile

June 2021

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The Values of TECHCROSS

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The Values of TECHCROSS

MISSION

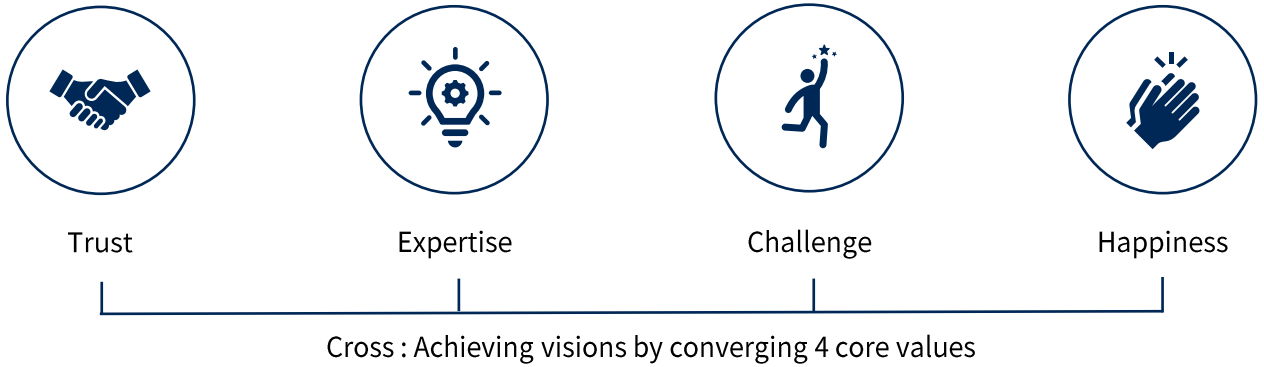
Contribute to humanity and environment through convergence of technology and human.

VISION 2025

A great company leading the world with premier technology by happy pioneers.

CORE VALUES

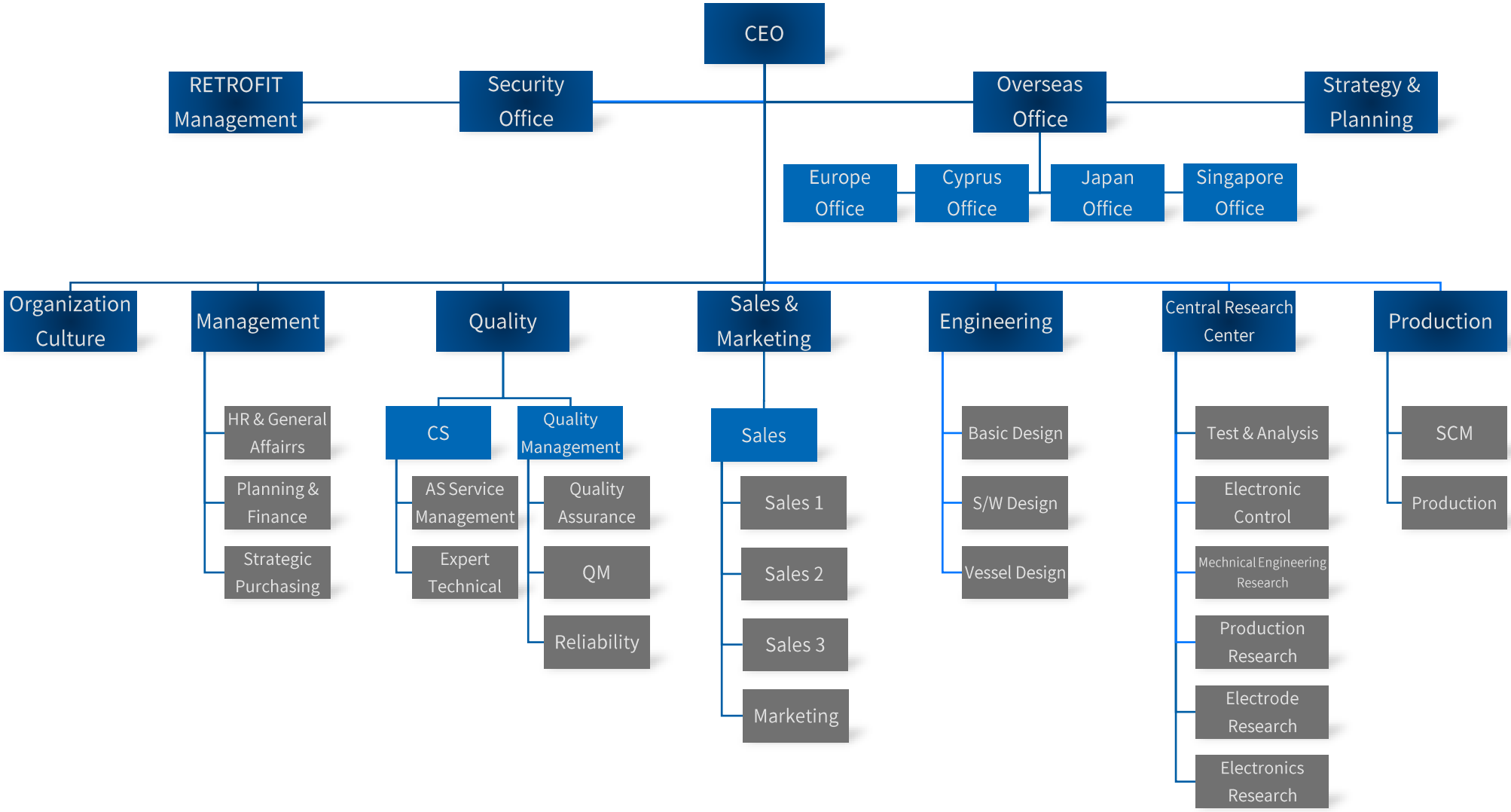
Make it happen by TECHCROSS!



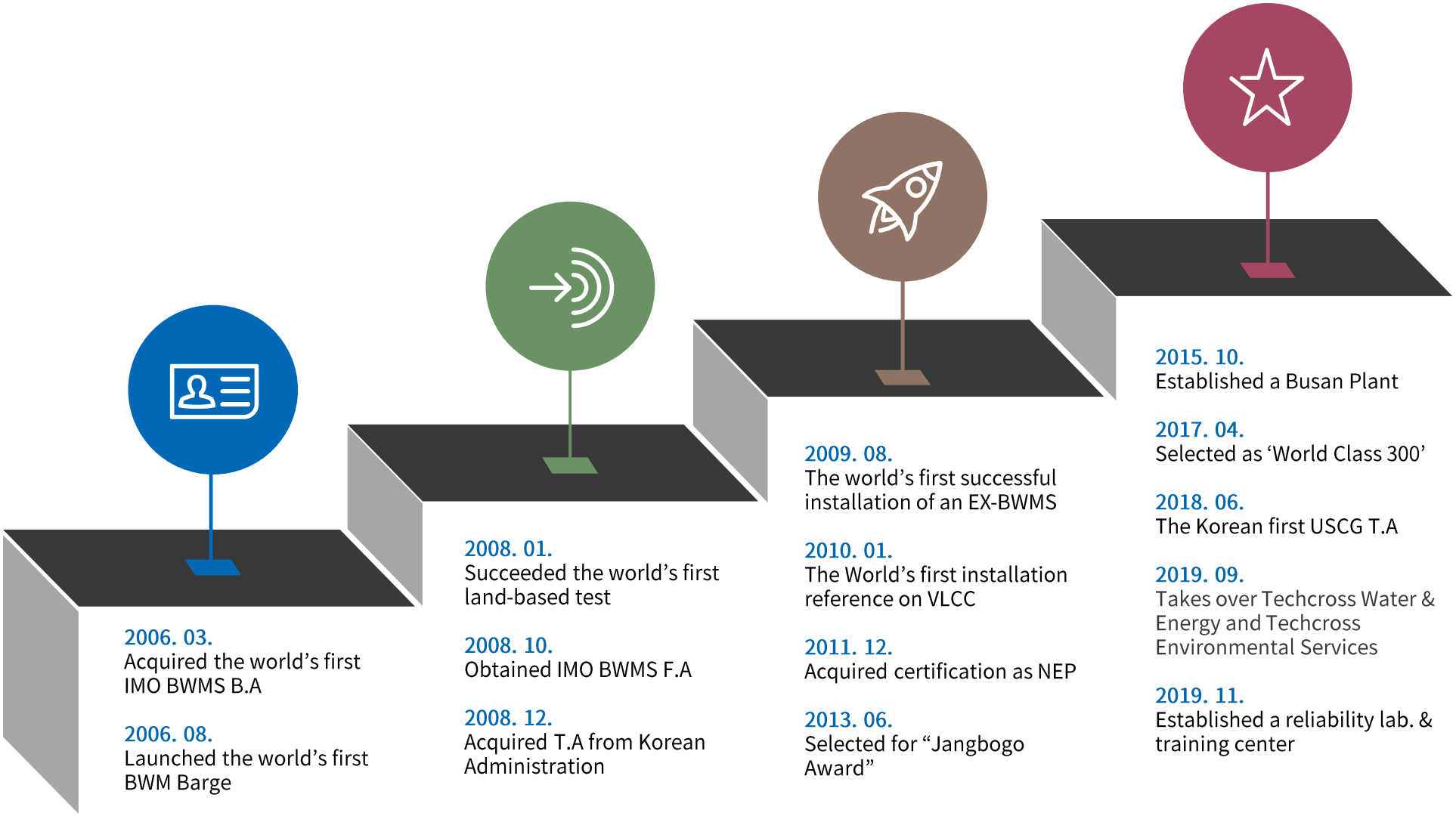
Company Profile

Address	**Headquarter** 1F Bubang B/D, 528 Samsoeng-ro, Gangnam-gu, Seoul, Korea **Busan Factory** 433 Noksansaneopbuk-ro, Gangseo-gu, Busan, Korea
Established	May 9th, 2000
CEO	Dong-Kurn Lee, Seog-Won Park, Joong-Hee Lee
Employee	206 staffs Business Partners : 20 companies with 500 employees
Capital	US$ 12.5 mil.
Business Scope	•Ballast Water Management System Electrolysis Disinfection system for Ballast water

Organization Chart



History



2006. 03.
Acquired the world's first IMO BWMS B.A

2006. 08.
Launched the world's first BWM Barge

2008. 01.
Succeeded the world's first land-based test

2008. 10.
Obtained IMO BWMS F.A

2008. 12.
Acquired T.A from Korean Administration

2009. 08.
The world's first successful installation of an EX-BWMS

2010. 01.
The World's first installation reference on VLCC

2011. 12.
Acquired certification as NEP

2013. 06.
Selected for "Jangbogo Award"

2015. 10.
Established a Busan Plant

2017. 04.
Selected as 'World Class 300'

2018. 06.
The Korean first USCG T.A

2019. 09.
Takes over Techcross Water & Energy and Techcross Environmental Services

2019. 11.
Established a reliability lab. & training center

Certification & Award

Certification

Venture Business

INNO-BIZ

New Excellent Product

ISO Excellence

Korean World Class

Award

Jangyoungsil Award

Green Technology Award

New Technology Commercialization

Jangbogo Award

Korea Environmental Award

02. Facility

Plant Arrangement

Reliability Laboratory

Training Center

Floating Test Lab

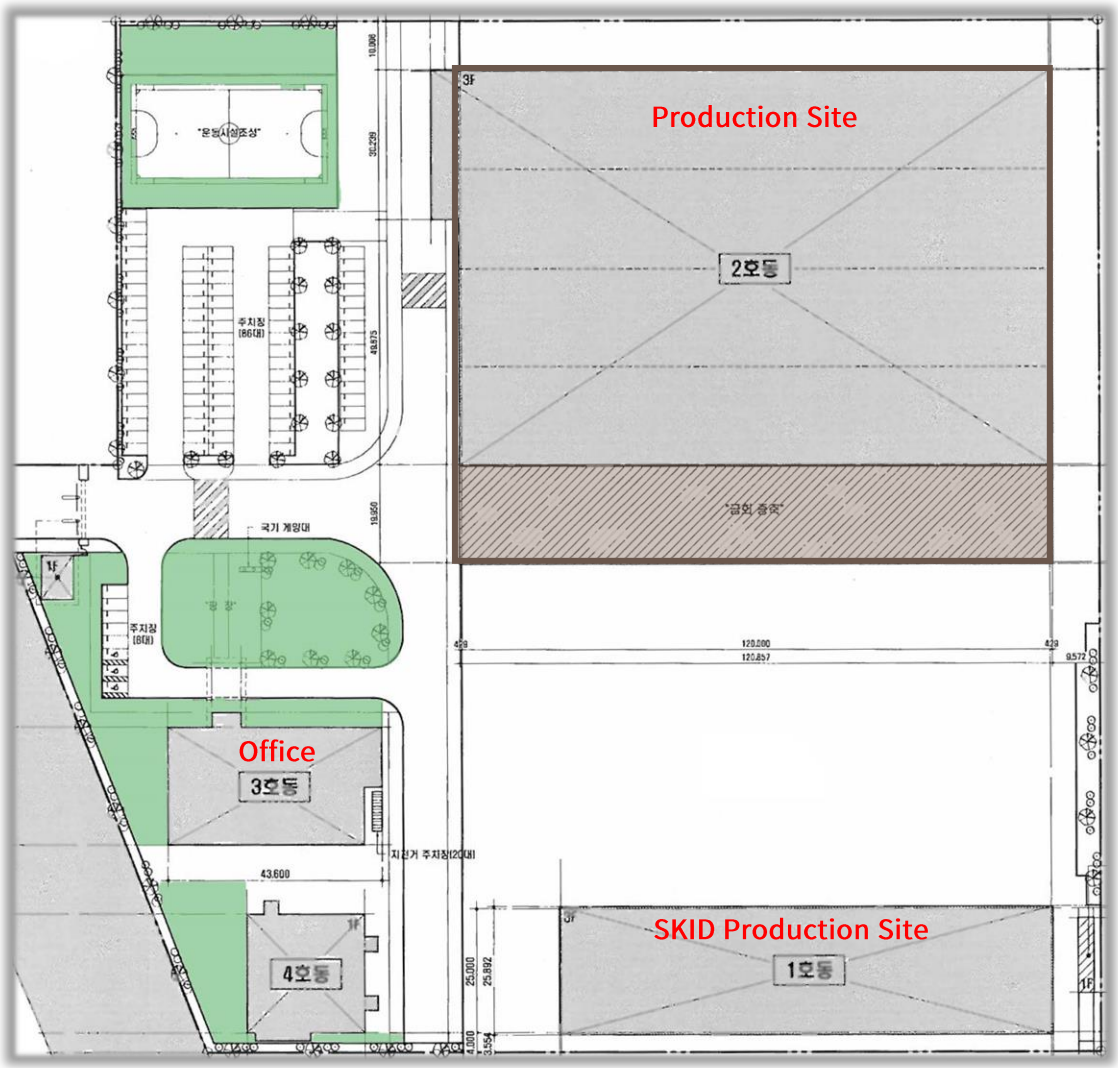
Land-based Facility

H.Q	1F Bubang B/D, 528, Samseong-ro, Gangnam-gu, Seoul, Korea (06167)
Busan Plant	433, Noksansaneopbuk-ro, Gangseo-gu, Busan, Korea (46758)

Site Area	42,479㎡
Manufacturing Capa.	ECS 600B X 3,300 sets
Staff	206


The World’s Largest
BWMS Factory

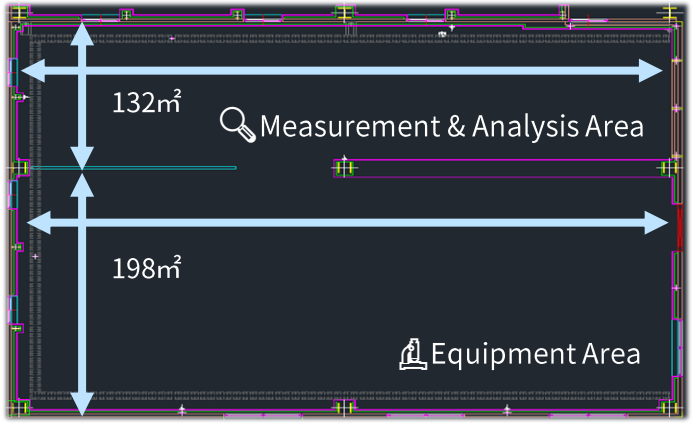
Plant Arrangement



Category	Busan New Plant		
	Building Area	Floor Area (~2018)	Floor Area (2019~)
Production	12,475㎡	15,277㎡	**18,451㎡**
SKID Production	2,662㎡	3,047㎡	3,047㎡
Office	1,089㎡	3,051㎡	3,051㎡
Total	16,226㎡	21,375㎡	24,549㎡

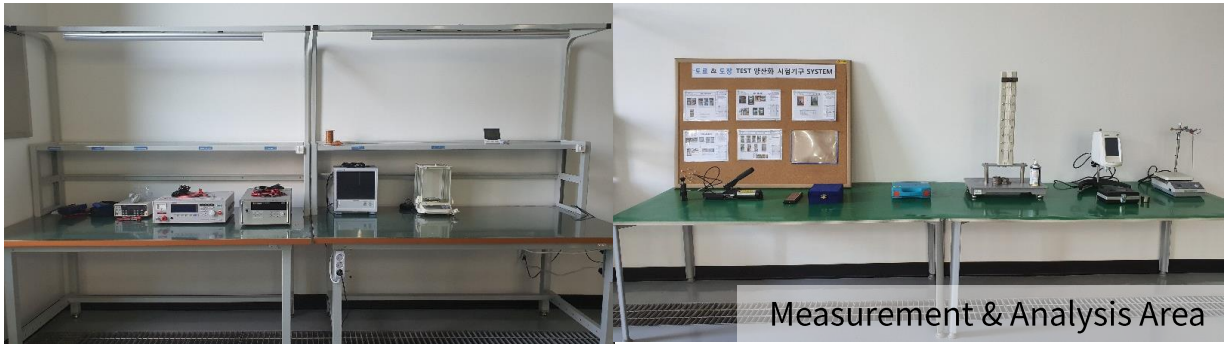
Production Site in Busan Plant

Reliability Laboratory



23±5°C
65% RH.↓
24hrs

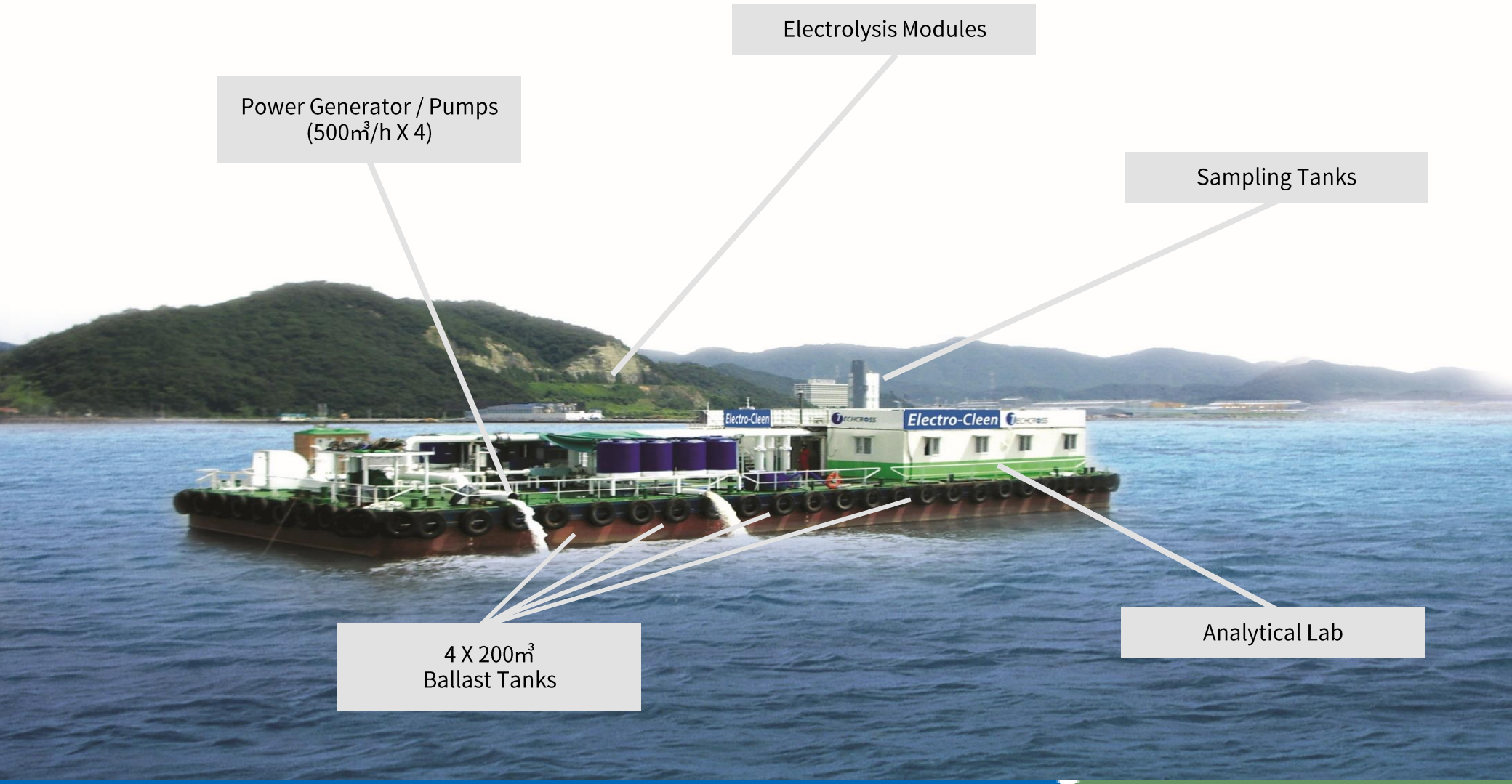
Large-scale equipment 7EA
(Durability test, thermo-hygrostat)



Training Center

System	SPEC
ECS	150㎥/h X 1 set (40㎥/h)
ECS-HYCHLOR	500㎥/h X 1 set (40㎥/h)
Seminar Room	**Size**
Large	Max. 28 persons
Small	Max. 12 persons
Cafeteria	-

Floating Test Lab (Masan)



Land-based Facility (Masan)

03. Business Scope

Business Units

What is Ballast Water?

BWM Convention

Ratification of BWM Convention

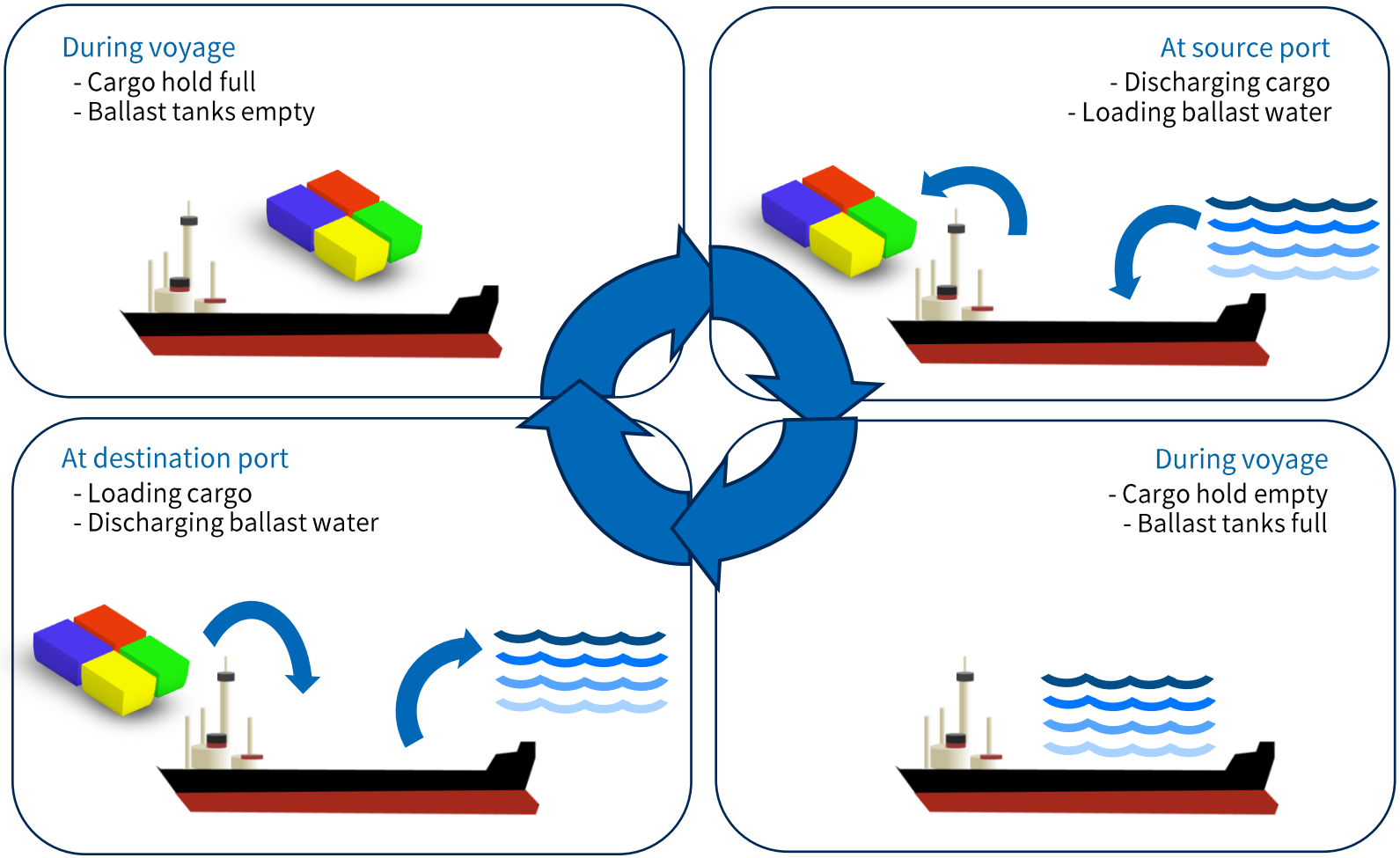
Ballast Water Management System

Electro-Cleen™ System (ECS) is a Ballast Water Management System using the principle of electrolysis to effectively disinfect ballast water.

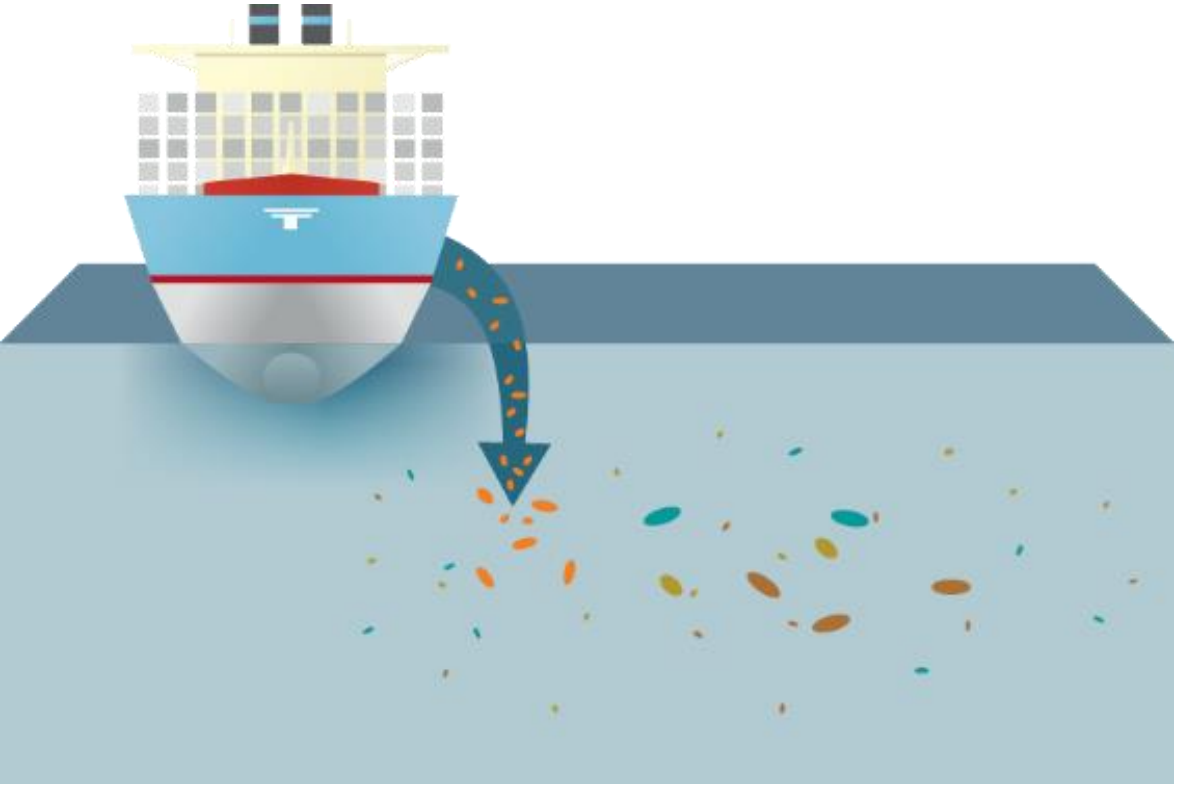
▲ Electro-Cleen™ System

▲ ECS-HYCHLOR™ System

What is Ballast Water?



BWM Convention



To protect the marine environment
from the transfer of harmful aquatic organisms
in ballast water carried by ships

IMO BWM Convention

Adopted : 2004
Ratified : 2016.09.08
Entry into force : 2017. 09. 08

International Regulations

Constructed year		Schedule
New vessels		Constructed on Sep. 8, 2017
Existing vessels	Completed IOPP renewal survey Sep. 8, 2014 ~ Sep. 7, 2017	1st IOPP renewal survey after ratification
	Completed IOPP renewal survey Sep. 8, 2012 ~ Sep. 7, 2014	2nd IOPP renewal survey after ratification
	Not completed IOPP renewal survey before Sep. 8, 2017	1st IOPP renewal survey after Sep. 8, 2019
	Not apply IOPP certification scheme	By Sep. 8, 2024 at least

- The BWM Convention stipulates that it will enter into force 12 months after ratification by a minimum of 30 countries representing 35% of world's merchant fleet tonnage.
- As of September 8, 2016, Finland's ratification brought the combined tonnage of 35.1441% with 52 countries.
- The BWM Convention entered into force on **September 8, 2017**.

04. Product

ECS
- Composition
- Flow Diagram
- Operation
- Approval Status

ECS-HYCHLOR
- Composition
- Flow Diagram
- Approval Status

Global Network

ECS (Electro-Cleen™ System) : Composition

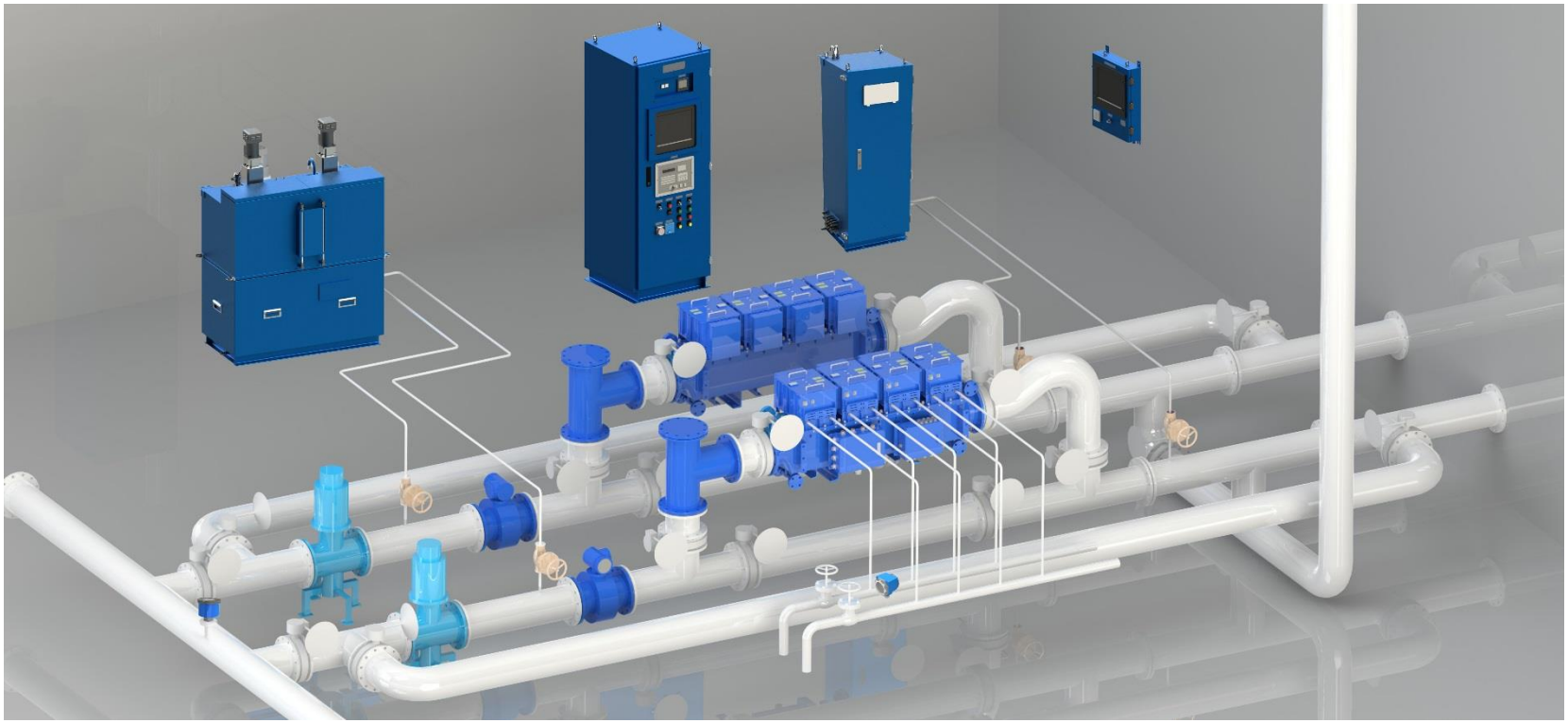
ECU (Electro Chamber Unit)
ECS, the main component of ECS that actually treats all the incoming ballast water and sediment, is divided into 5 models according to its capacity.

PDE (Power Distributor Equipment)
Supplies AC 440V from the ship to all components of ECS controls communication parts of all equipment of ECS.

TSU (TRO Sensor Unit)
Measures TRO concentrations. TSU informs CPC the level of TRO concentrations during ballasting, de-ballasting and stripping operation.

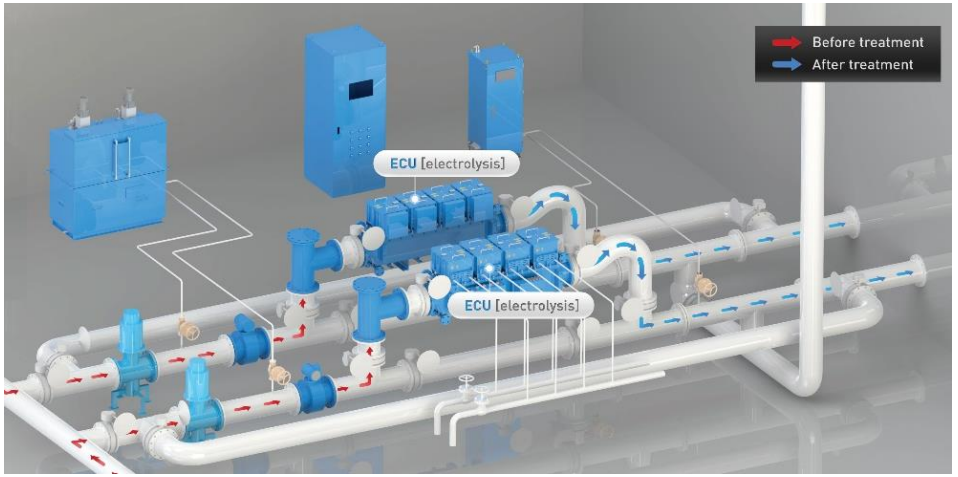
ANU (Auto Neutralization Unit)
Injects neutralizing solution automatically to neutralize residual TRO prior to de-ballasting and stripping operation.

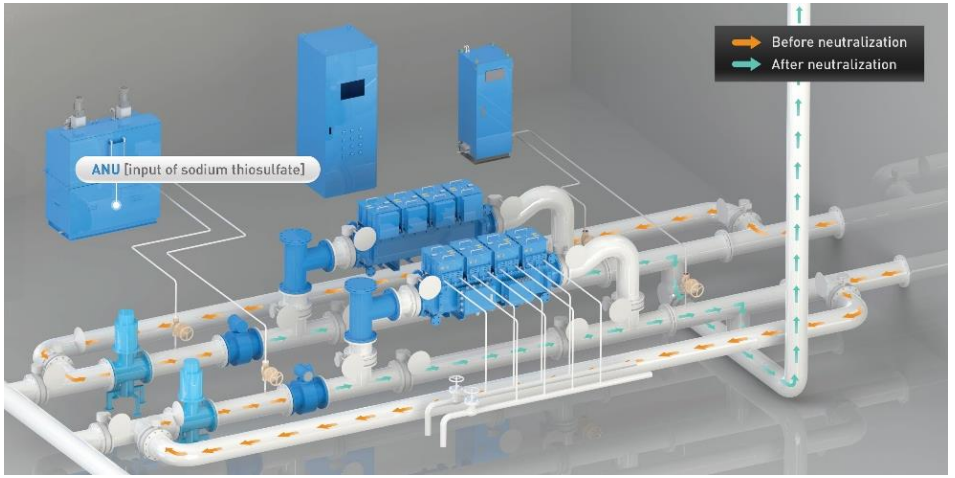
ECS (Electro-Cleen™ System) : Flow Diagram (Direct Electrolysis Method)



ECS uses the principle of electrolysis to effectively disinfect ballast water. With the application of electric currents to the titanium electrodes, the electric potential produced increases disinfection efficacy by destroying cell membranes of microorganisms as a result of generating voltage. In addition, OH- radicals generated during the electrolysis procedure by the electrodes also disinfect microorganisms. Through electrolysis, sufficient amount of TRO is generated, preventing the re-growth of micro-organisms and maintaining disinfection efficacy.

ECS (Electro-Cleen^{TM} System) : Operaion





Ballasting

ECS differs from typical electro-chlorination systems. In the case of ECS, all the ballast water is treated directly as it passes through the Electro Chamber Unit then this fully treated water flows into the ballast tanks. After treatment, the treated sea water containing residual hypochlorite flows into the ballast water tanks.

Deballasting

The residual hypochlorite in the water maintains disinfection efficacy in the ballast tank and prohibits re-growth of microorganisms. Any residual TRO will undergo a natural degradation process or will need to go through a neutralization process before being discharged. This neutralization process minimizes any negative impact to the marine environment.

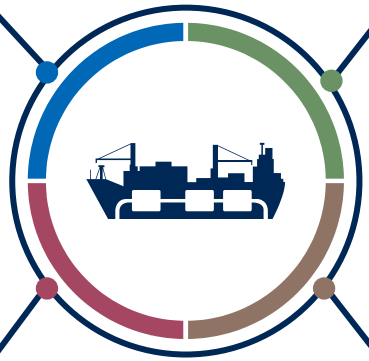
ECS (Electro-Cleen™ System) : Approval Status

IMO

- Basic Approval (2006)
  - World's First Approval
- Final Approval (2008)
- New G8 Approval (2020)

USCG

- Alternate Management System(AMS) Approved (2013)
- Type Approval (2018)
  - Korea First Approval



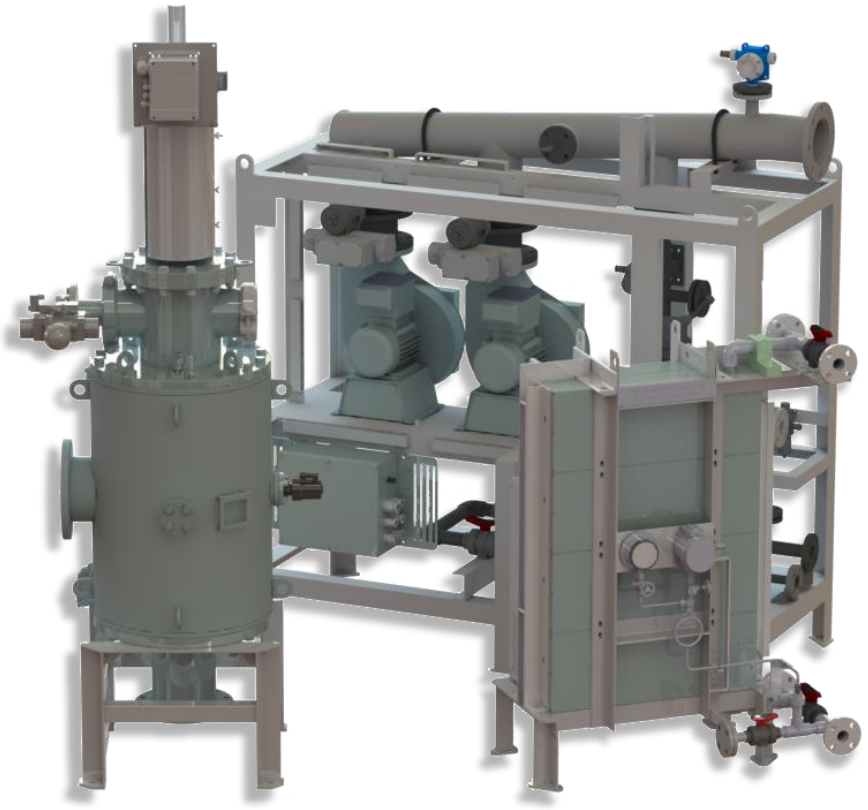
Flag State

- Korean Government (2008)
- Japanese Government (2016)
- Danish Government (2017)
- Panama Government (2017)
- Turkish Government (2017)
- Greek Government (2017)
- Liberian Government (2018)
- Norwegian Government (2018)
- Malaysian Government (2019)
- Chinese Government (2019)
- Australia, Cyprus, Marshall, Singapore, Taiwan, Cayman Islands, Brazil, Bermuda, Malta, Madeira, Thai, Netherlands, India, Faeroe Islands, UK

Classification Societies

- KR Type Approval (2019)
- ABS Type Approval (2019)
- BV Type Approval (2018)
- RS Type Approval (2018)
- RINA Type Approval(2018)
- LR Type Approval (2020)
- DNV & GL Design Assessment(2016)
- CCS Type Approval (2019)
- BKI Type Approval (2019)
- INSB Type Approval (2020)

ECS-HYCHLOR (ECS-HYCHLOR™ System): Composition



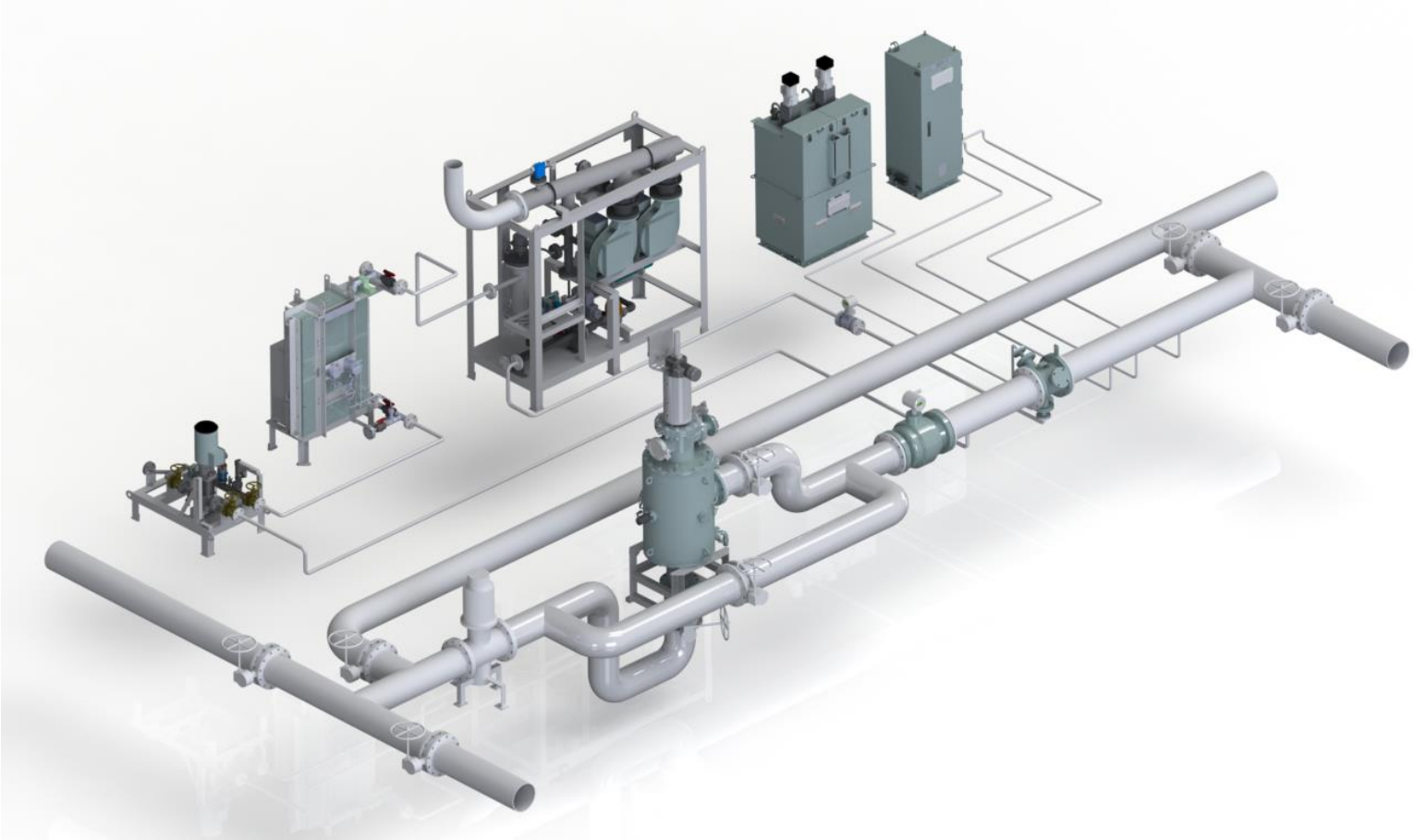
HGU (Hypochlorite Generation Unit)
HGU is indirect electrolysis component in the form of side stream. It generates oxidants by electro chlorination and disinfects microorganisms filtered by AFU.

AFU (Auto Filter Unit)
Removes particles >50㎛ during ballasting.

DMU (Degas Module Unit)
Dilutes and discharges H_2 gas, which is generated during electrolysis, by an air vent valve and a blower.

SMU (Static Mixer Unit)
Injects high concentrated TRO to the main ballast pipeline for the dilution by side stream method during ballasting and injects neutralizing agent during deballasting.

ECS-HYCHLOR (ECS-HYCHLOR™ System) : Flow Diagram (Indirect Electrolysis Method)



HGU operates only during ballasting to disinfect microorganisms filtered out AFU. Only 1% of total ballast water flows to the HGU to be used to generate the highly concentrated TRO. This concentrated TRO is injected to the main ballast line to be mixed with the rest of ballast water and help to disinfect.

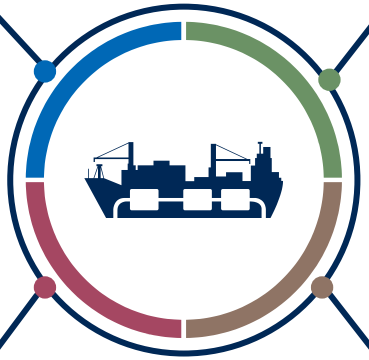
ECS-HYCHLOR (ECS-HYCHLOR™ System) : Approval Status

IMO

- Basic Approval (2015)
- Final Approval (2016)
- New G8 Approval (2020)

USCG

- Type Approval (2020)



Flag State

1. APPROVED

•Norway Government (2020)
•Madeira, Panama, Liberia, Australia, Cyprus, Marshall Islands, Singapore, Taiwan, Brazil, Faeroe Islands, India, Malta, UK, Denmark, Bermuda

2. APPROVAL IN PROCESS

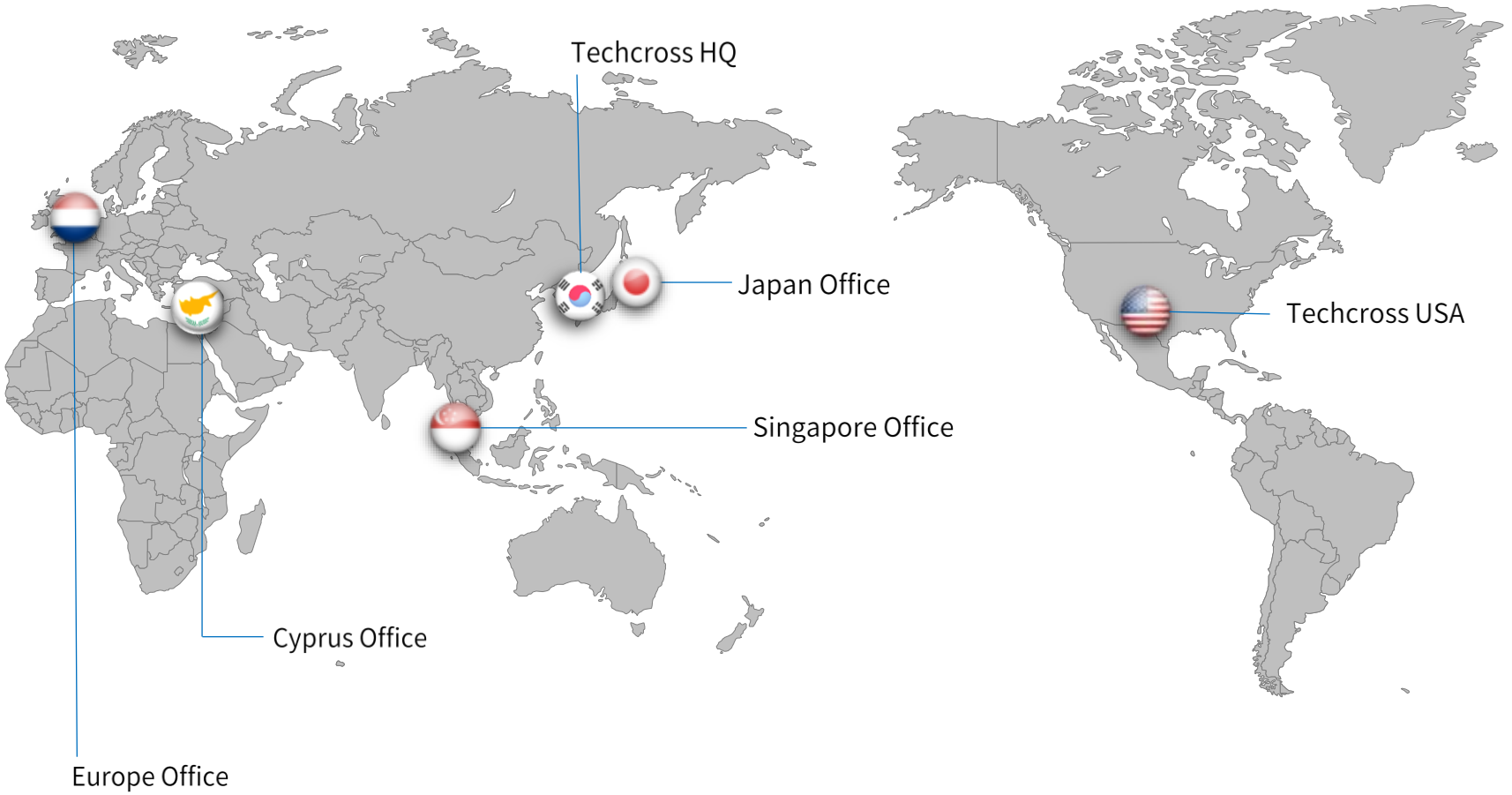
•Japan

Classification Societies

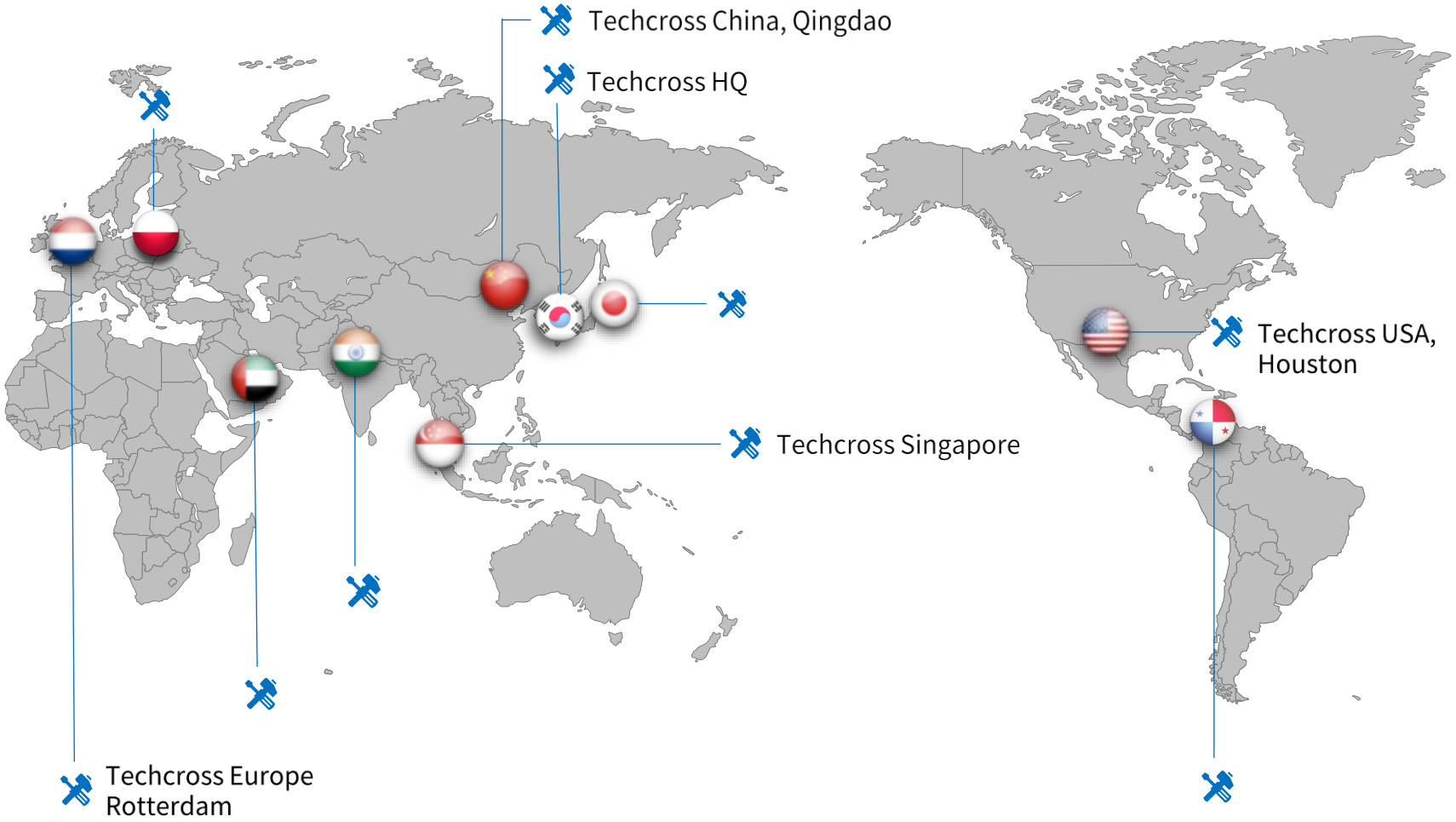
1. APPROVED

•DNV GL (2020)
•KR (2020)
•ABS (2020)
•LR (2021)

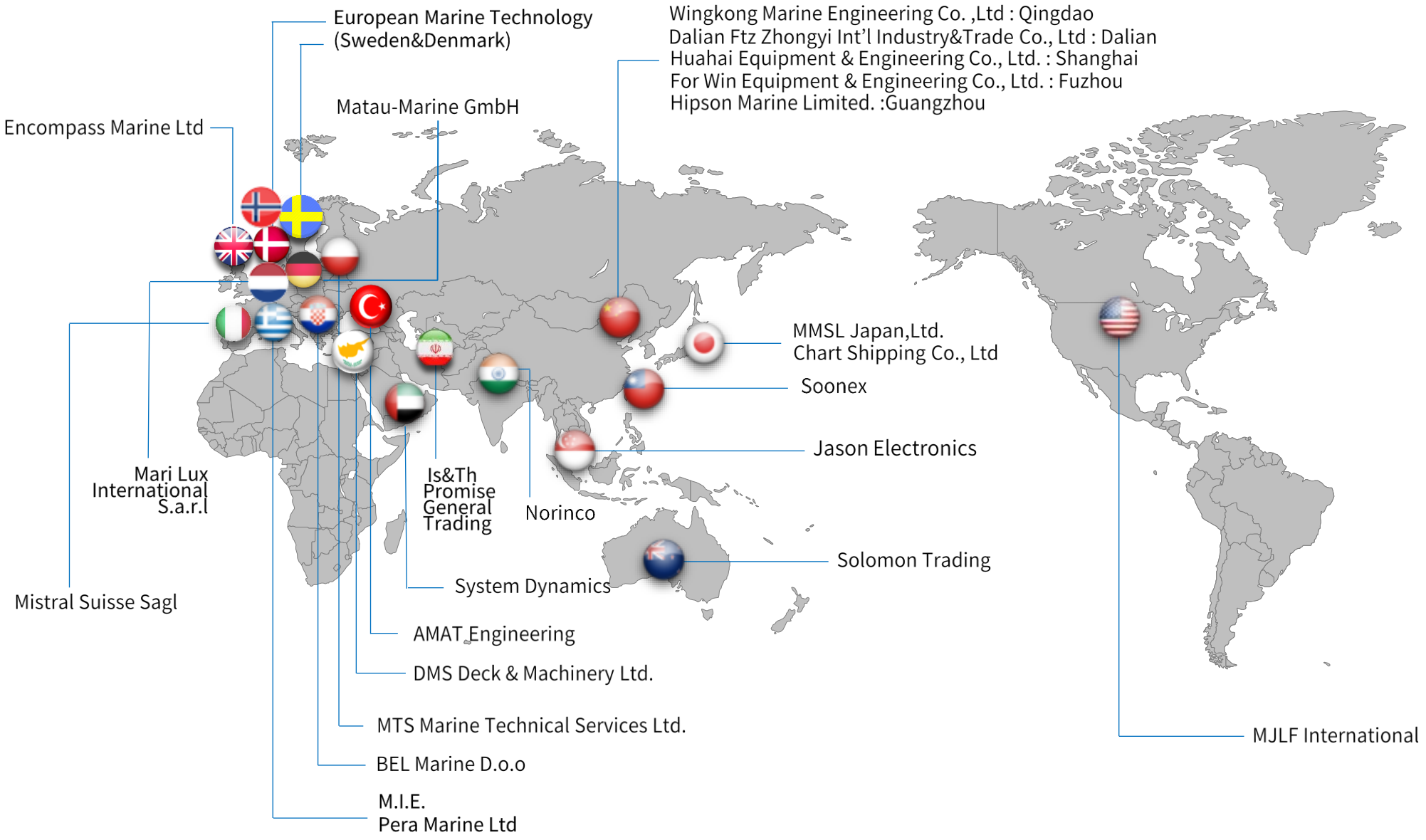
Global Network : Techcross Overseas Offices



Global Network : A/S Service Agents



Global Network : Sales Agents



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