Ivo Petrov
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Optimarin

Vision

To be the world's best provider of environmental friendly ballast water treatment system with a simple and flexible solution.

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BWM Highlights

- *8th September 2017 - entry into force of BWM Convention*
- *Ship owners should prepare for compliance with D-2 Standard at their first IOPP renewal after Entry into force*
- *IOPP De-harmonisation concept is pushing compliance till 2022, hence creating bottlenecks in supply of BWMS, Engineering – Consulting Capacity, Drydock slots and Class approval timeline*
- *IOPP De-harminisation does not overcome USCG compliance requirements*
- *Regardless of strategy, it is imperative that Owners start to plan for compliance*

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About Us

- *1994* — *Founded by Capt. Nilsen in Stavanger - Norway*
- *1995 – 1999* — *Five years of development, design, in-house testing and full scale testing*
- *2000 (April)* — *First Commercial Installation on Mv "Regal Princes"*
- *2000 – 2004* — *OBS Installations on Star Princess, Sea Princess, RJ Pfeiffer; Stolt Aspiration; Balticborg & Bothniaborg*
- *2005 – 2009* — *Upgrading Optimarin Ballast System (OBS) to meet IMO Regulation D2*
  New Capital and Organisation Building
- *2009* — *IMO Certification and DNV approval (G8 – No Additives or Chemicals)*
- *2012* — *Reached milestone – 200 systems*
- *2014* — *322 systems signed for, 174 installed and in operation*
  Global Sales Network established, 20 locations worldwide
- *2016* — *2nd December - First in the World to receive USCG Type approval*

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U. S. Department of Homeland Security

United States Coast Guard

Certificate of Approval

Coast Guard Approval Number: 162.060/1/0 Expires: 02 December 2021

BALLAST WATER MANAGEMENT SYSTEM
Filtration/Ultraviolet

Optimarin AS
Sjoveien 34
4315 Sandnes NORWAY

Optimarin OBS/OBS Ex

This is to certify that the above listed BWMS with the listed treatment capacities has been satisfactorily examined and tested by Independent Lab DNV GL in accordance with the requirements contained in 46 CFR 162.060. The system shall be installed and operated in accordance with the manufacturer's listed Operation, Maintenance, and Safety Manual for each model.

DEPT. OF HOMELAND SECURITY, USCG, CGHQ-10030

- *No changes to existing OBS*
- *Existing customers receive USCG TA (500 systems)*
- *No limitation to salinity and flow*

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USCG - IMO Mode Switch

HOME page is showing current mode.

Click on the indication to be able to change mode

IMO mode has 100W/m² UVI limit and power regulation is ON

USCG mode has 600W/m² UVI limit and power regulation is OFF

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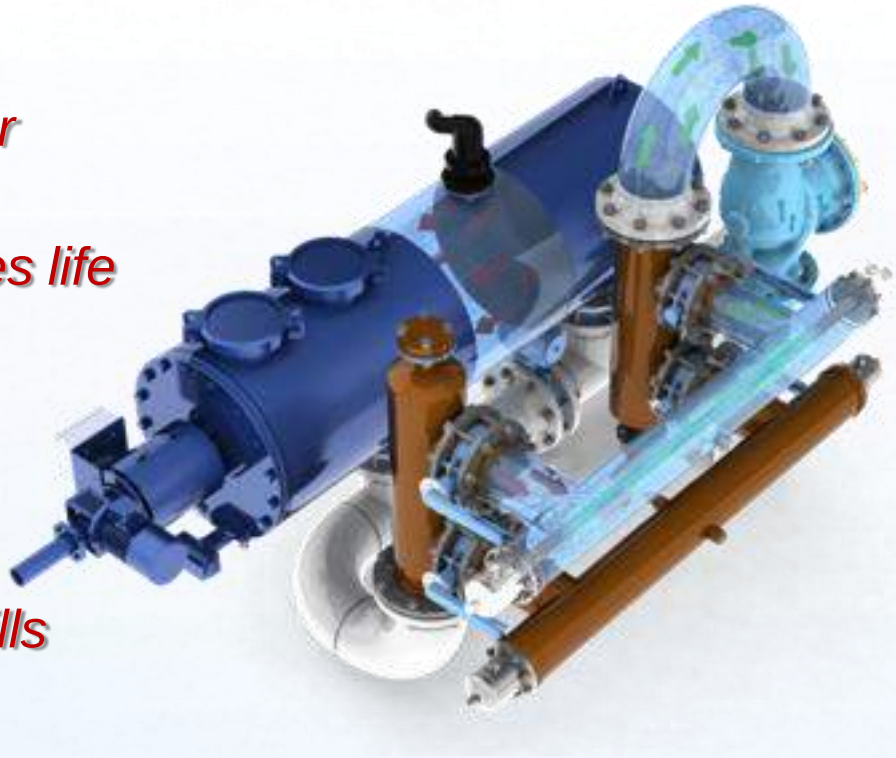
Filter UV ballast process

- *Ballast in*
  - *MicroKill Filter removes larger organisms / particles*
  - *MicroKill UV kills or inactivates life*
- *Ballast out*
  - *Bypass filter*
  - *MicroKill UV 2nd treatment kills remaining life*



NO Added Chemicals or Active Substances!

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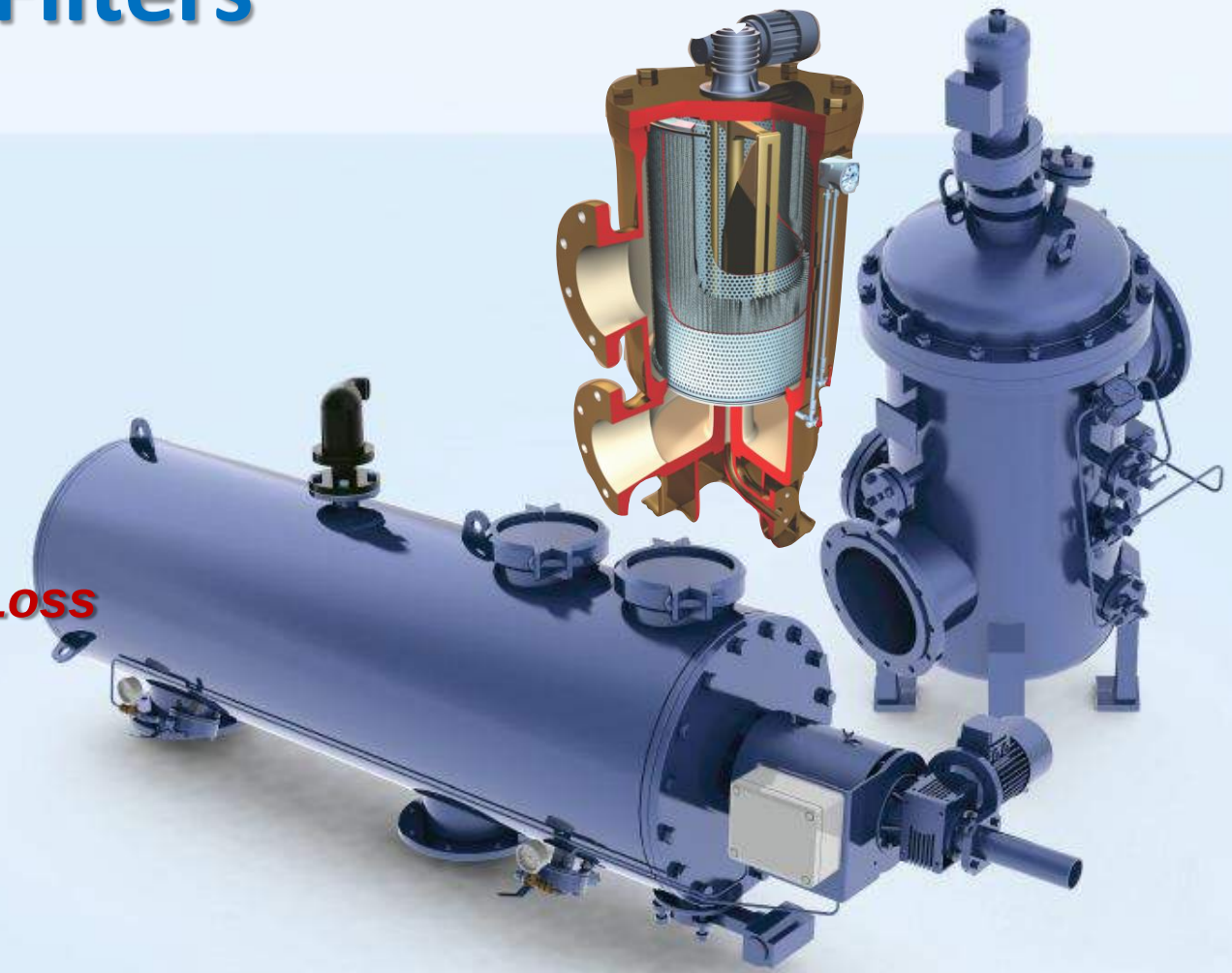
MicroKill Filters

- ***Three Filter Options***
- ***Horizontal or Vertical***
- ***40 Micron***
- ***Low Pressure Loss 0.1 – 0.5 bar***
- ***Self cleaning & With automatic back-flush***



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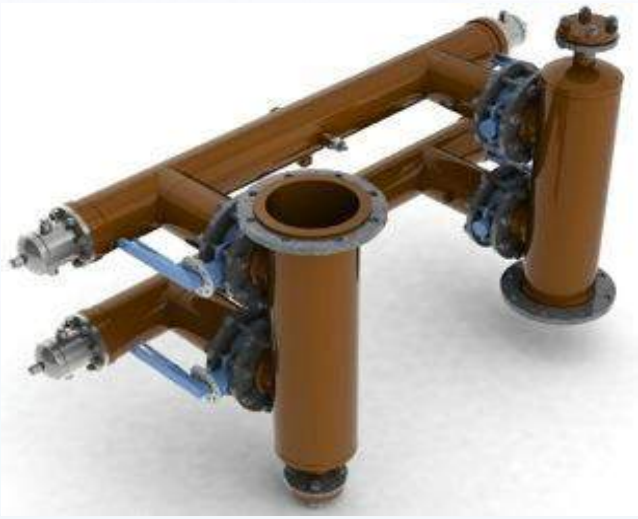
OBS Scalable UV

- *One UV lamp per UV chamber*
  - *Each chamber treats up to 167 m^3/h*
  - *Standard pipe components*
- *Parallel installation on manifold*
  - *Up to any capacity (no limitation)*
  - *Self cleaning with no moving parts*
- *Monitoring*
  - *UV Intensity and Temperature*
- *Power to lamp*
  - *35 kW per UV lamp*
  - *Ensures compliance in worst case water*



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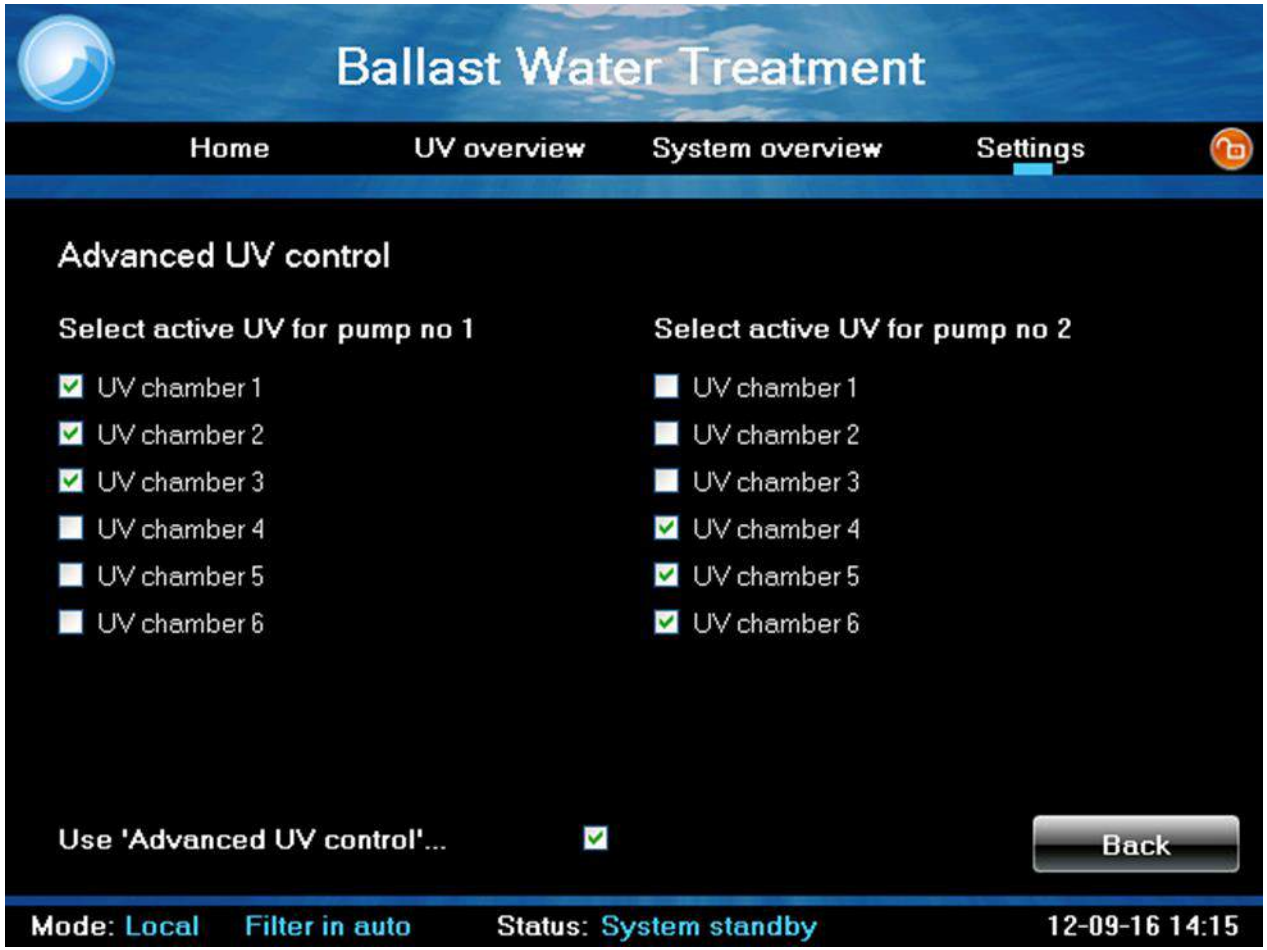
Advanced UV Control



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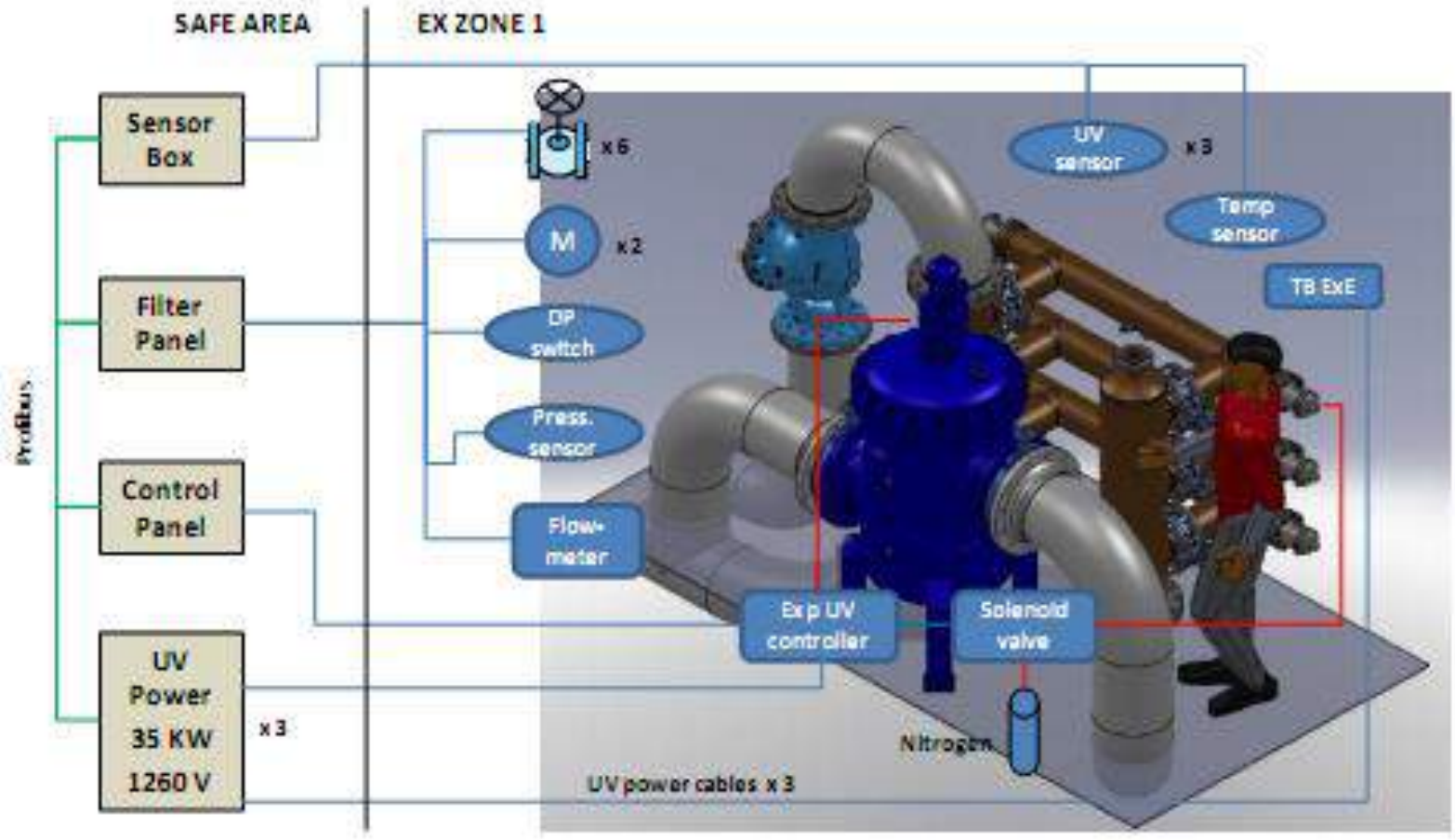
Explosion Approval

Ex - Zone 1, IIC-T4



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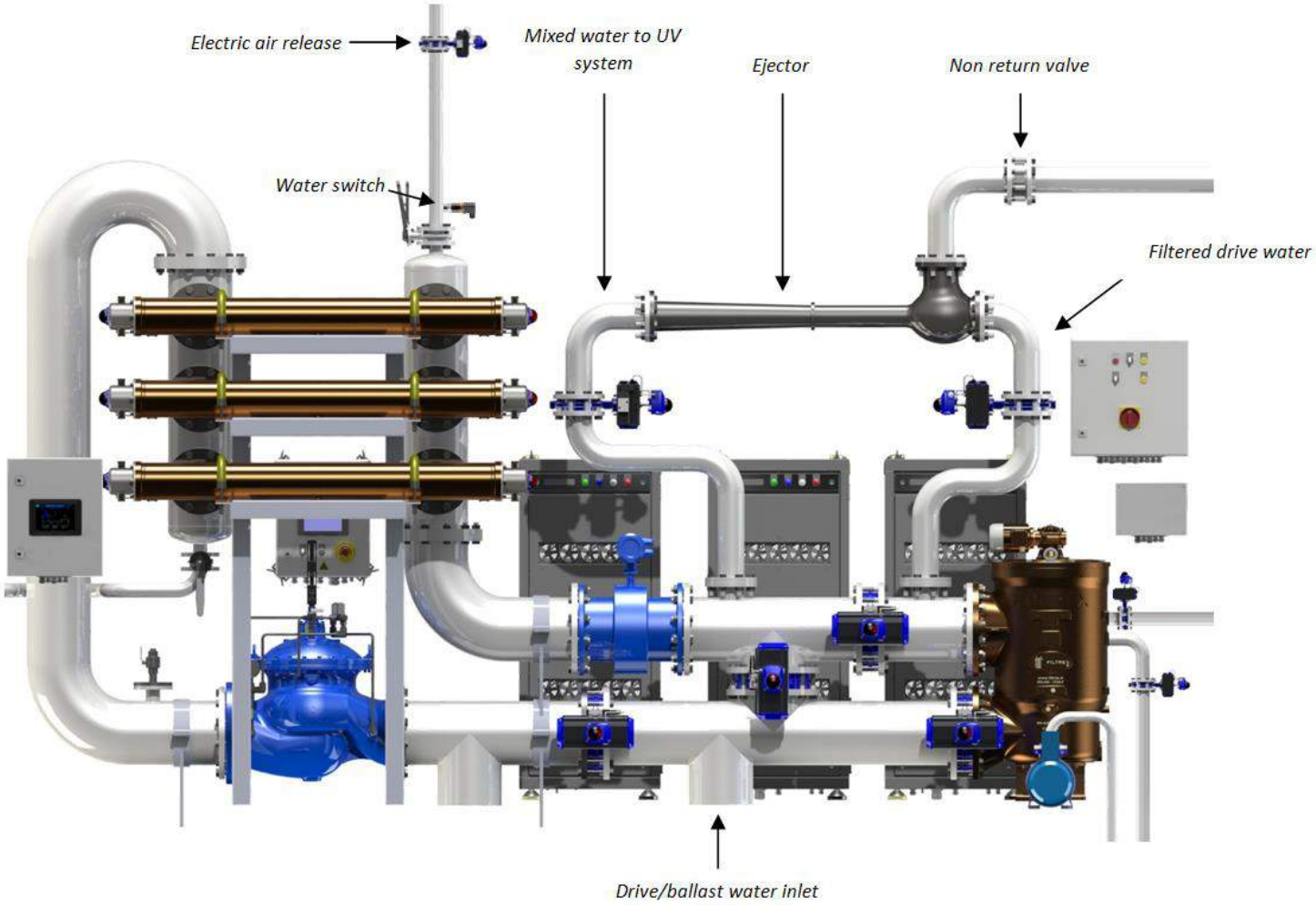
Stripping with ejector



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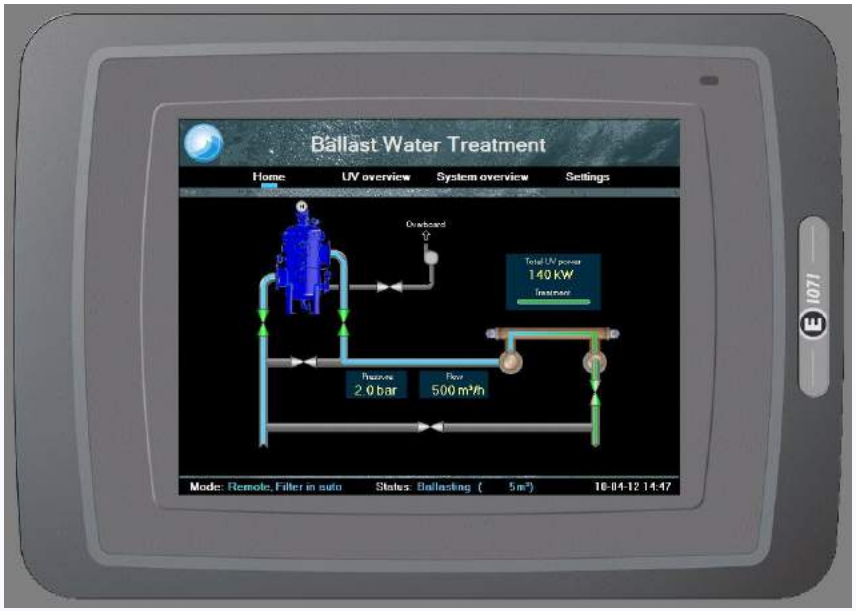
Control and monitoring considerations

- User friendly interface
- Local and Remote Operational Modes
- Two years logging of use and alarms
- Logging of bypass operations
- Integration with Power Management System



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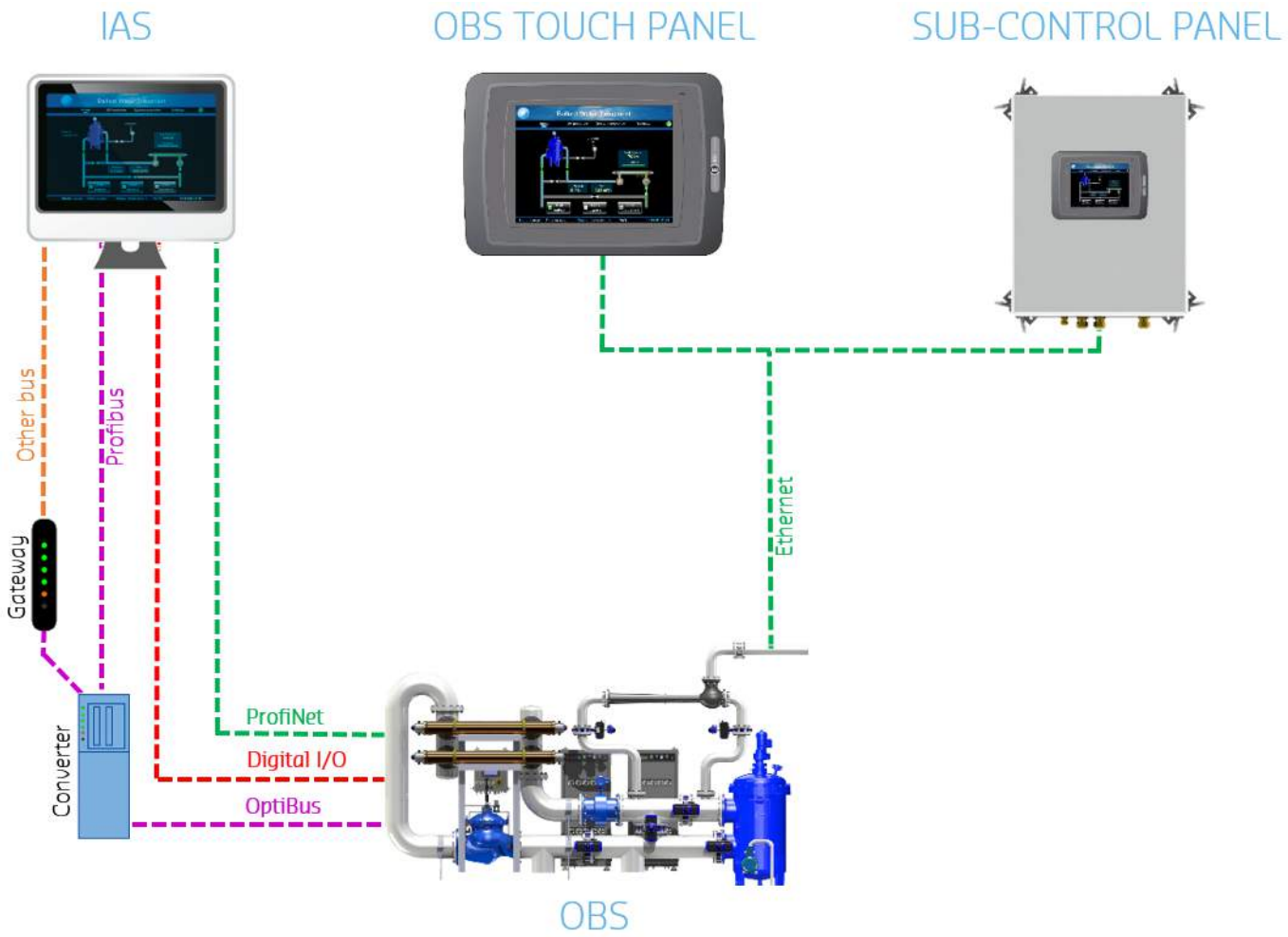
Integration



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Optional Considerations

- *Optilink*
  - *Remote control and monitoring with standard web application*
  - *OBS software upgrade*
  - *Troubleshooting*
- *Fresh Water filter filling (Automatic)*
- *Cabinet heaters (barges arctic etc)*

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Examples of OBS system

Range from 50 m³/h to 3000 m³/h

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500 m^3/h Skid OBS System

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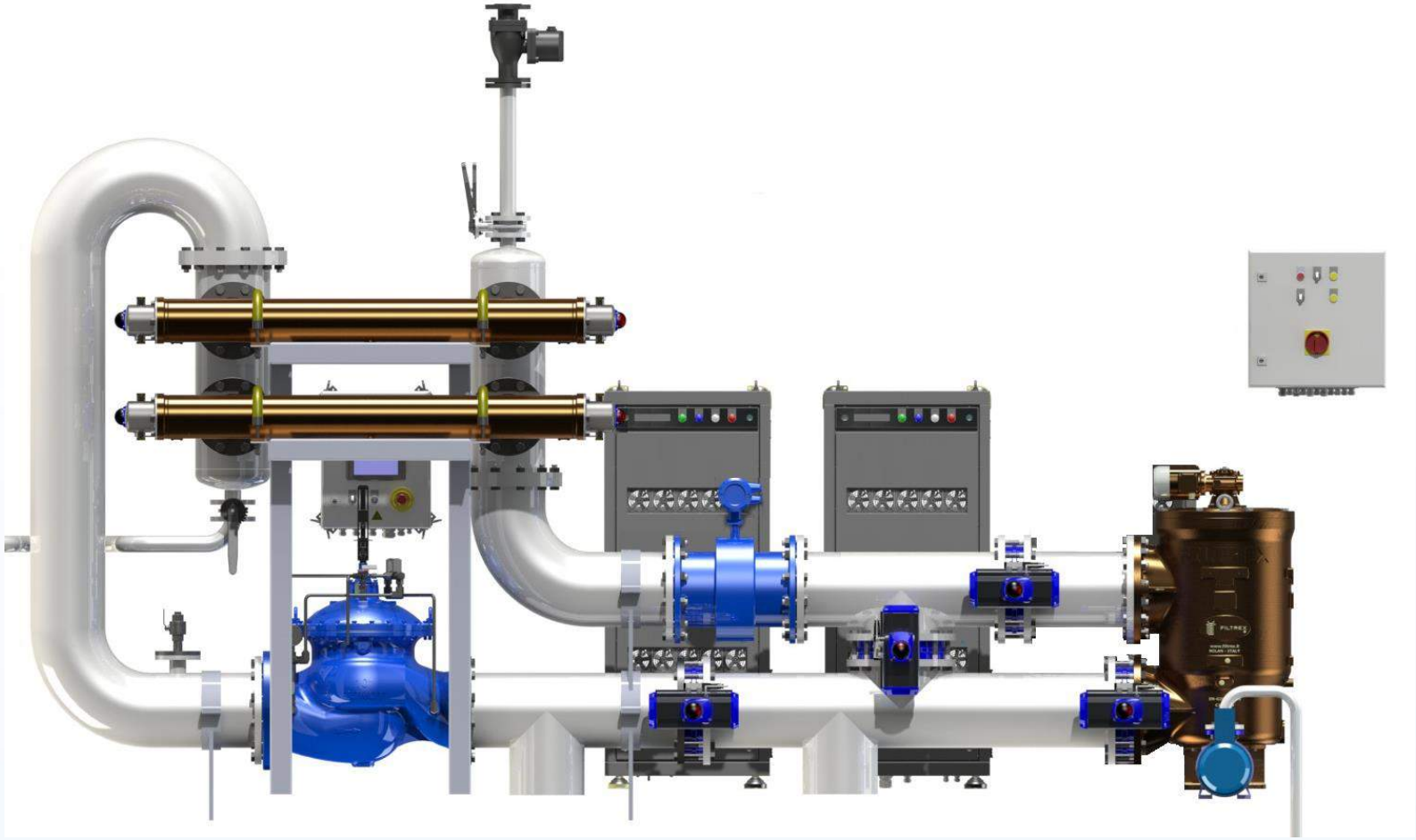

334 m^3/h system

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1000 m^3/h system

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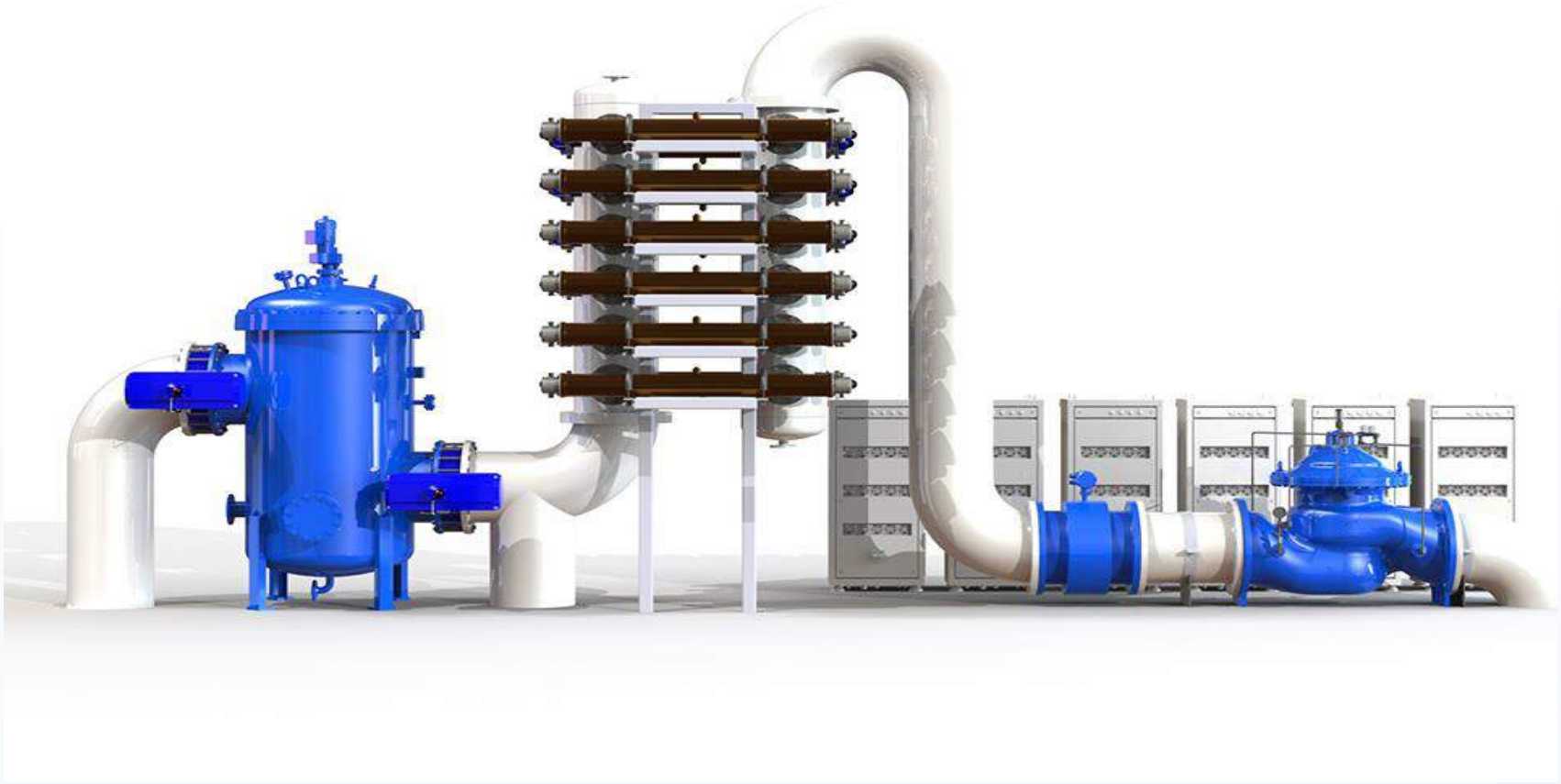

1000 m^3/h system

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Installation considerations

- *Where to Install - available space?*
  - *Engine room, pump room, other void spaces*
  - *Submerged ballast pumps (deck house)*
- *Optimal component selection*
  - *Filter type horizontal, vertical*
  - *UV manifold single sided or double sided*
- *Built together or split up*
  - *Skid is potential for smaller systems*

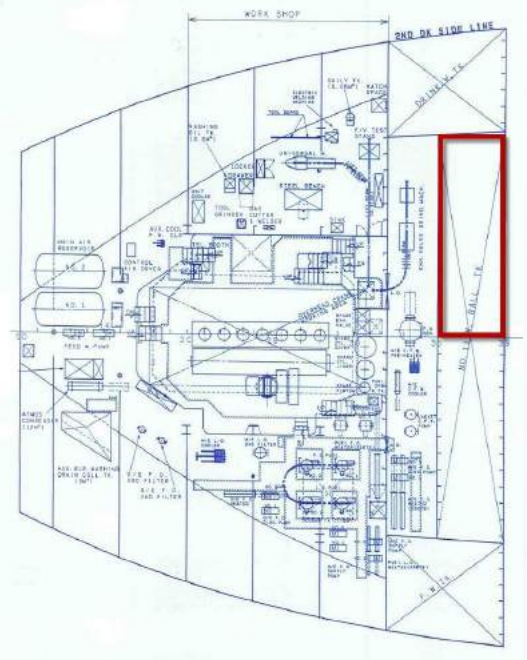

Figure 3: Ballast Tank divided for BWT

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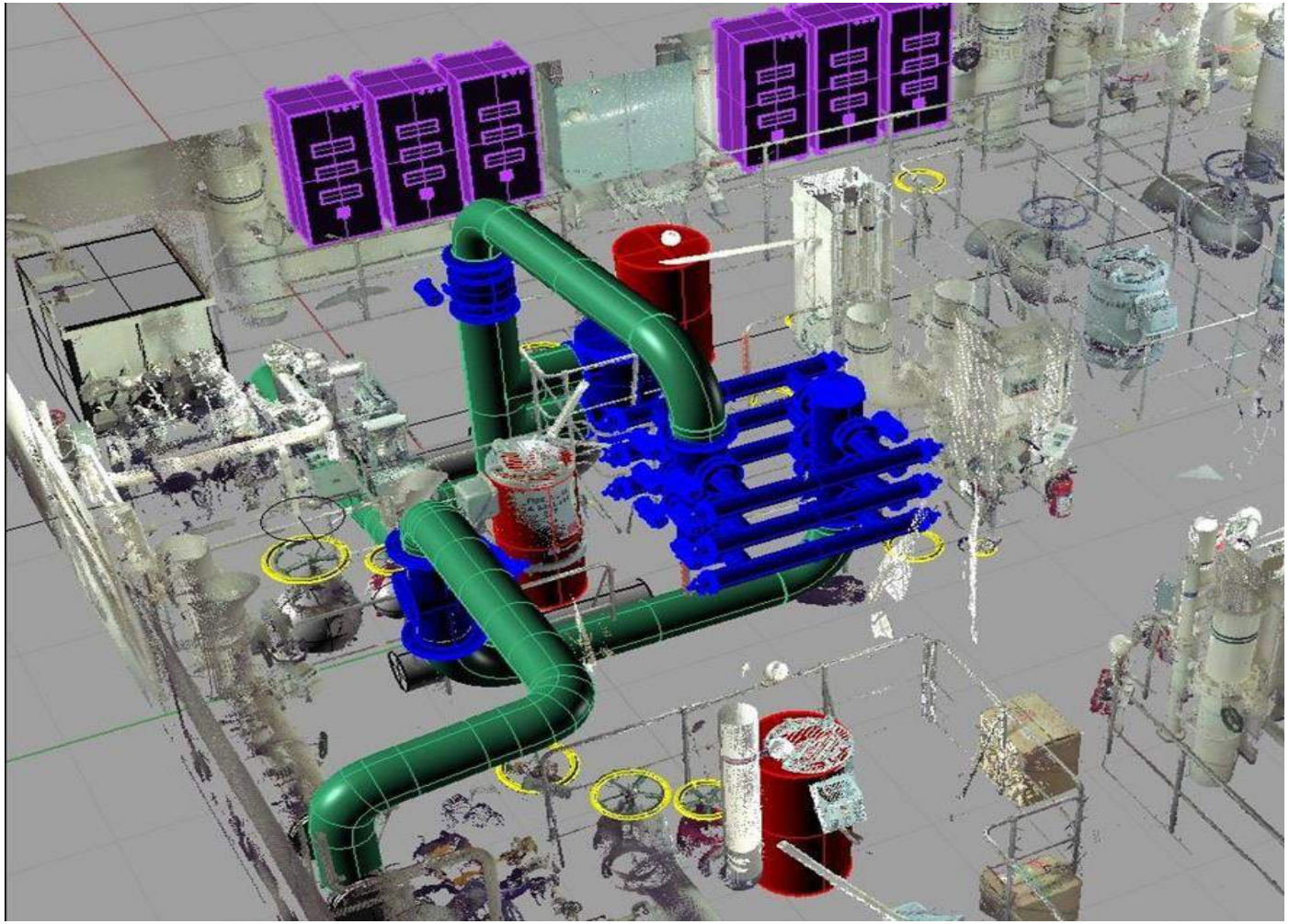
Engineering



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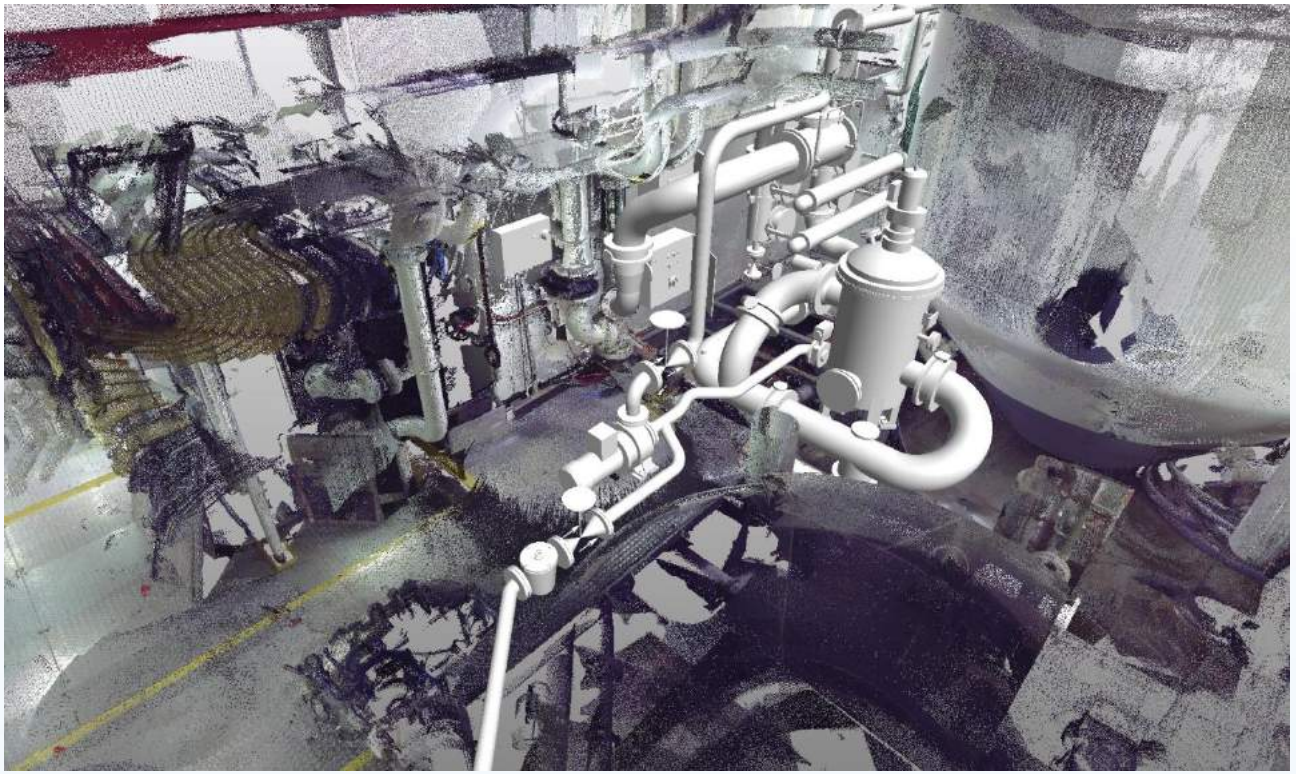

PSV – OBS 334 m^3/h

Goltens Green Technologies modelling

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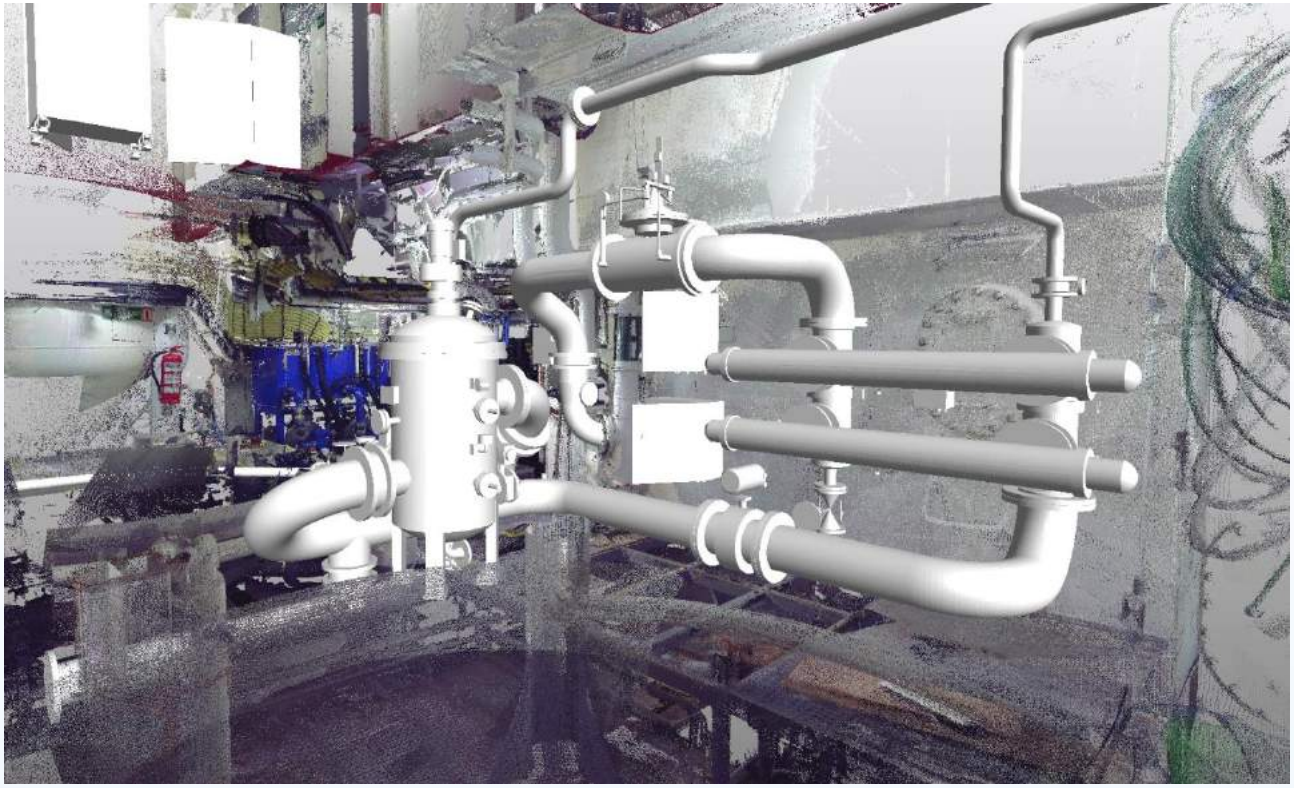
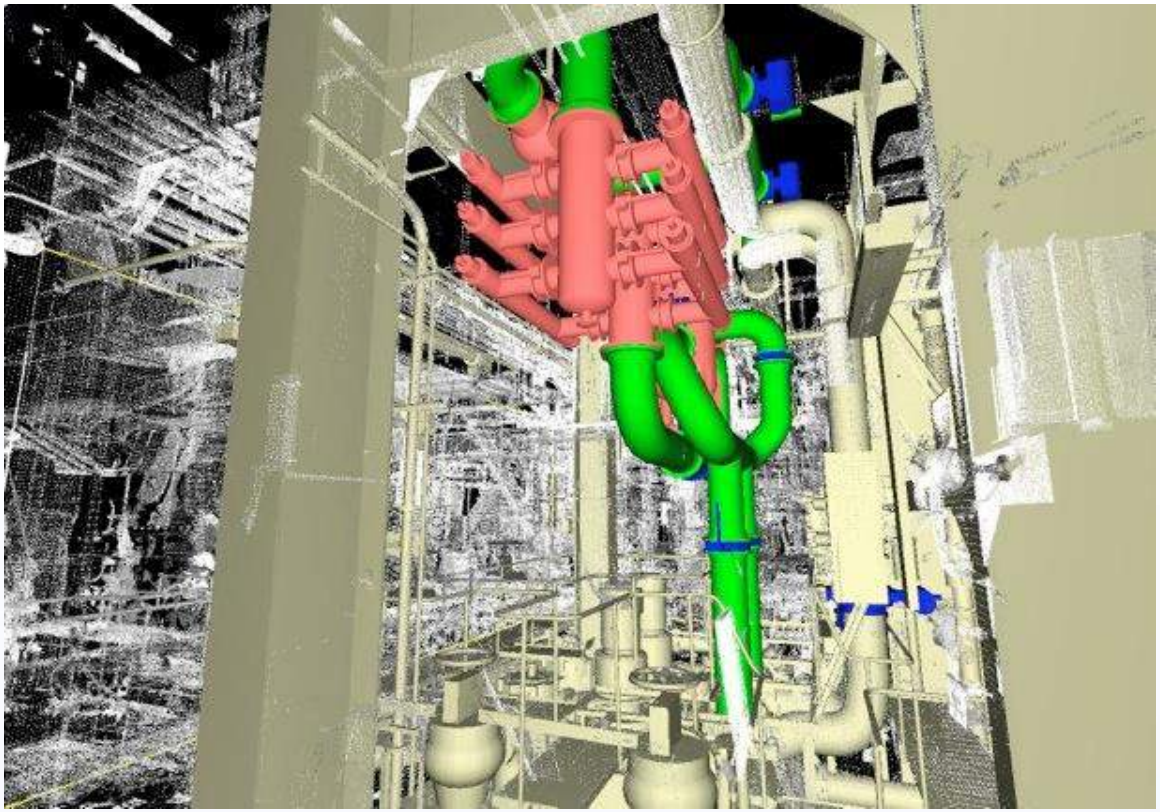


PSV – OBS 334 m^3/h

Goltens Green Technologies modelling

Optimarin



Bulk Carrier "1000 m^3/h"

Goltens Green Technologies modelling

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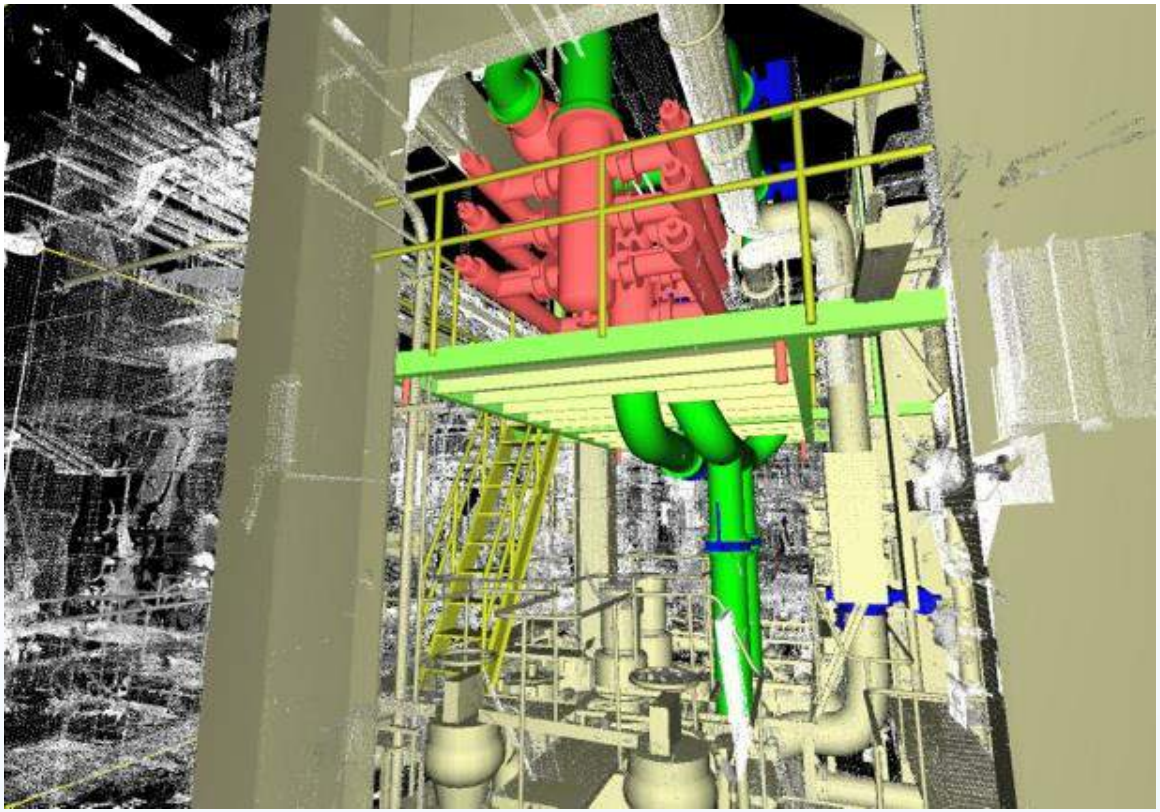

Bulk Carrier "1000 m^3/h"

Goltens Green Technologies modelling

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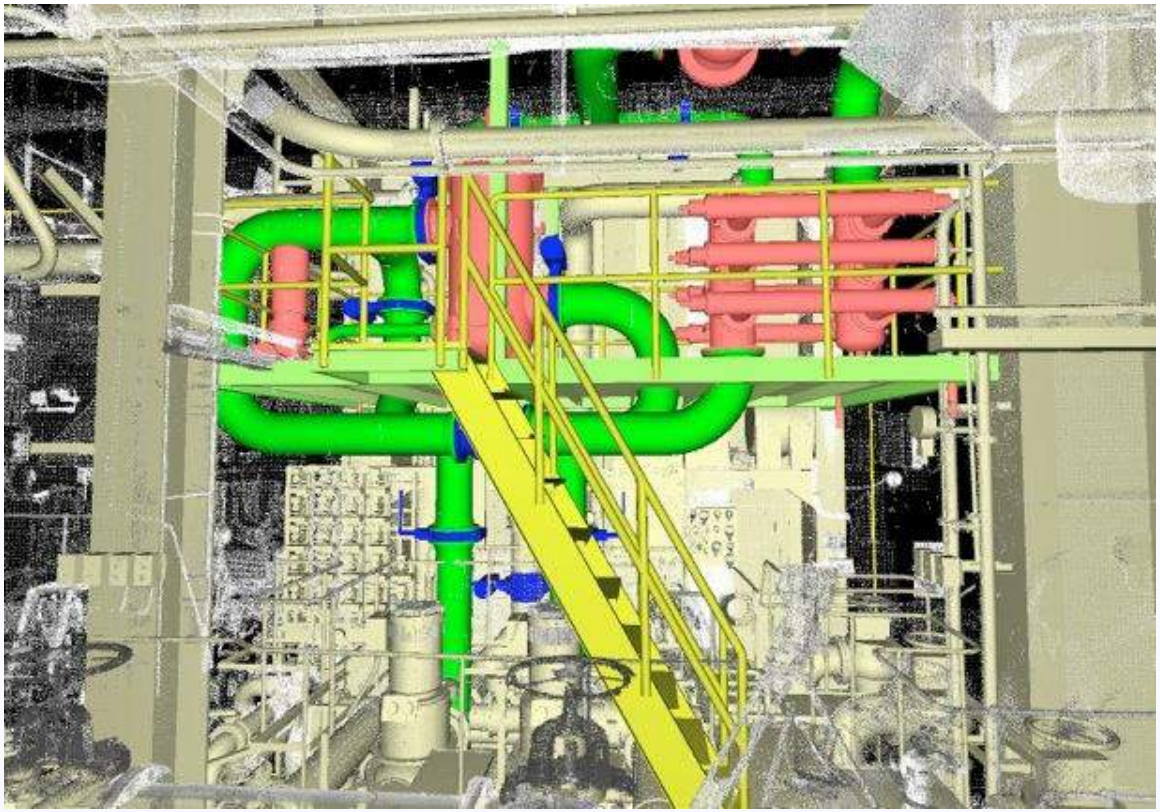

Bulk Carrier "1000 m^3/h"

Goltens Green Technologies modelling

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Practical experience - wide range of vessels

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Siem Garnet and Siem Amethyst

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Farstad 815

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PSV – X-Bow – 250m³/h

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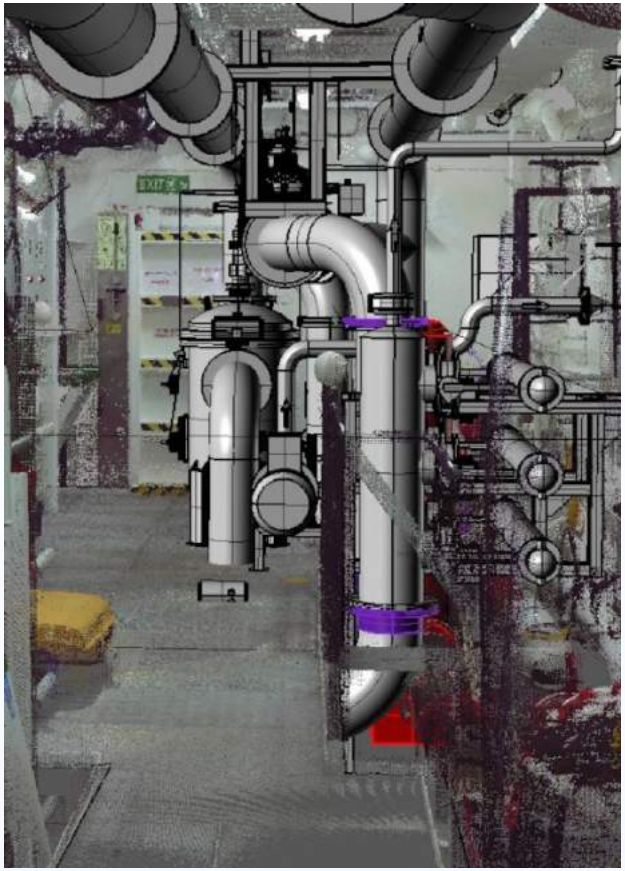

Technip Apache II

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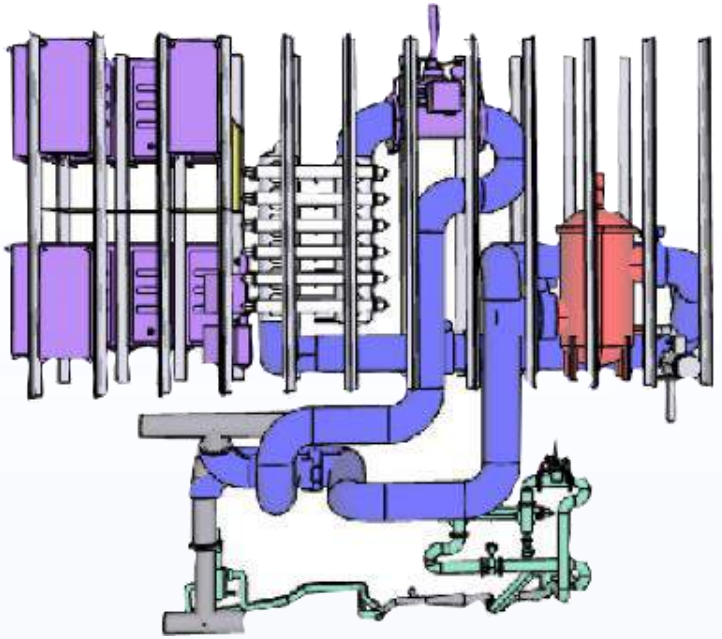

Saga Forrest Carriers 2000 m3/h

Retrofit - installed yard in China

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Hapag Lloyd, MS Europa "167 m^3/h"

Retrofit - Blom & Voss

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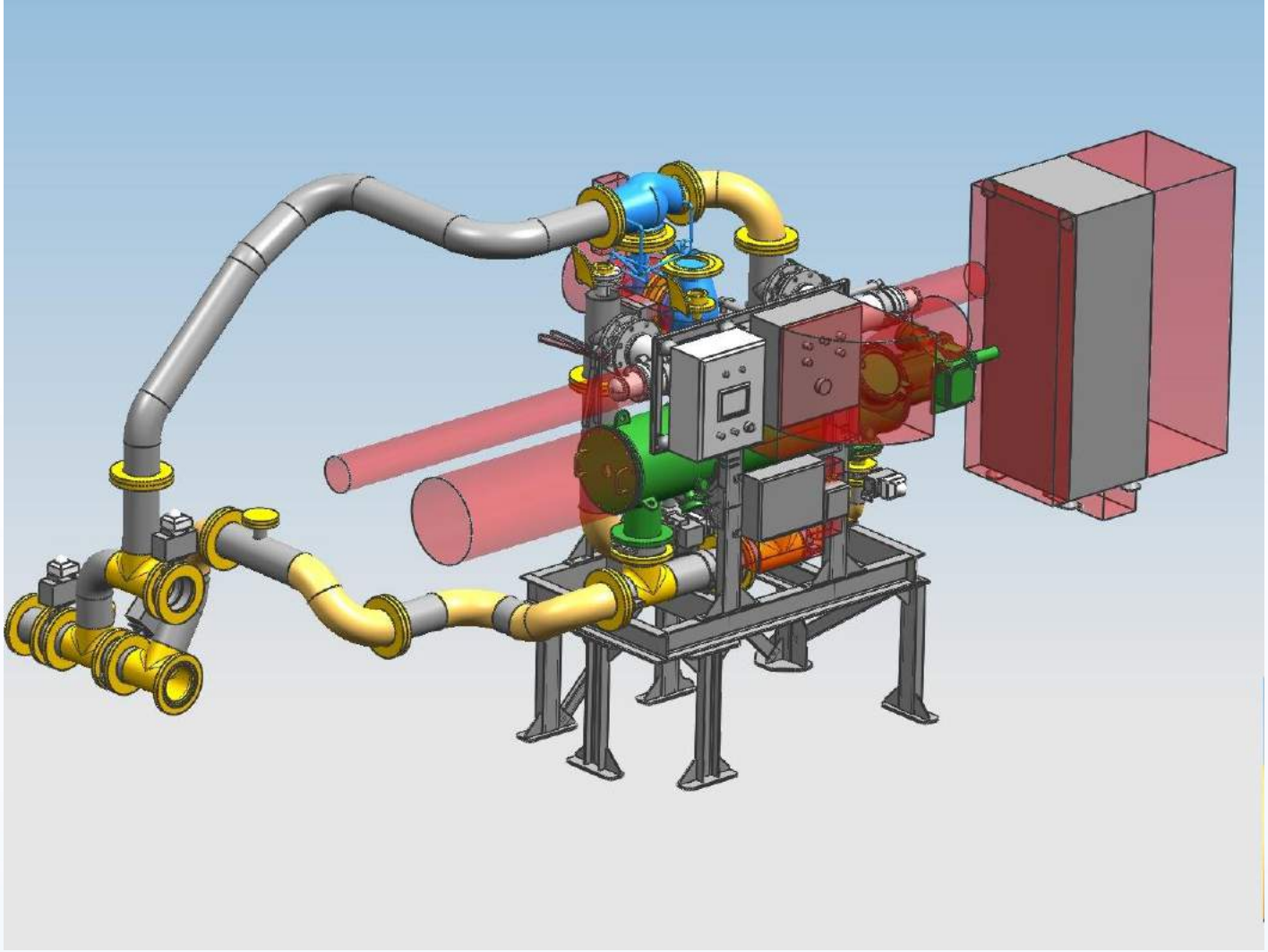

Hapag Lloyd, MS Europa “167 m^3/h”

Retrofit - Blom & Voss

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Hapag Lloyd, MS Europa "167 m^3/h"

Retrofit - Blom & Voss

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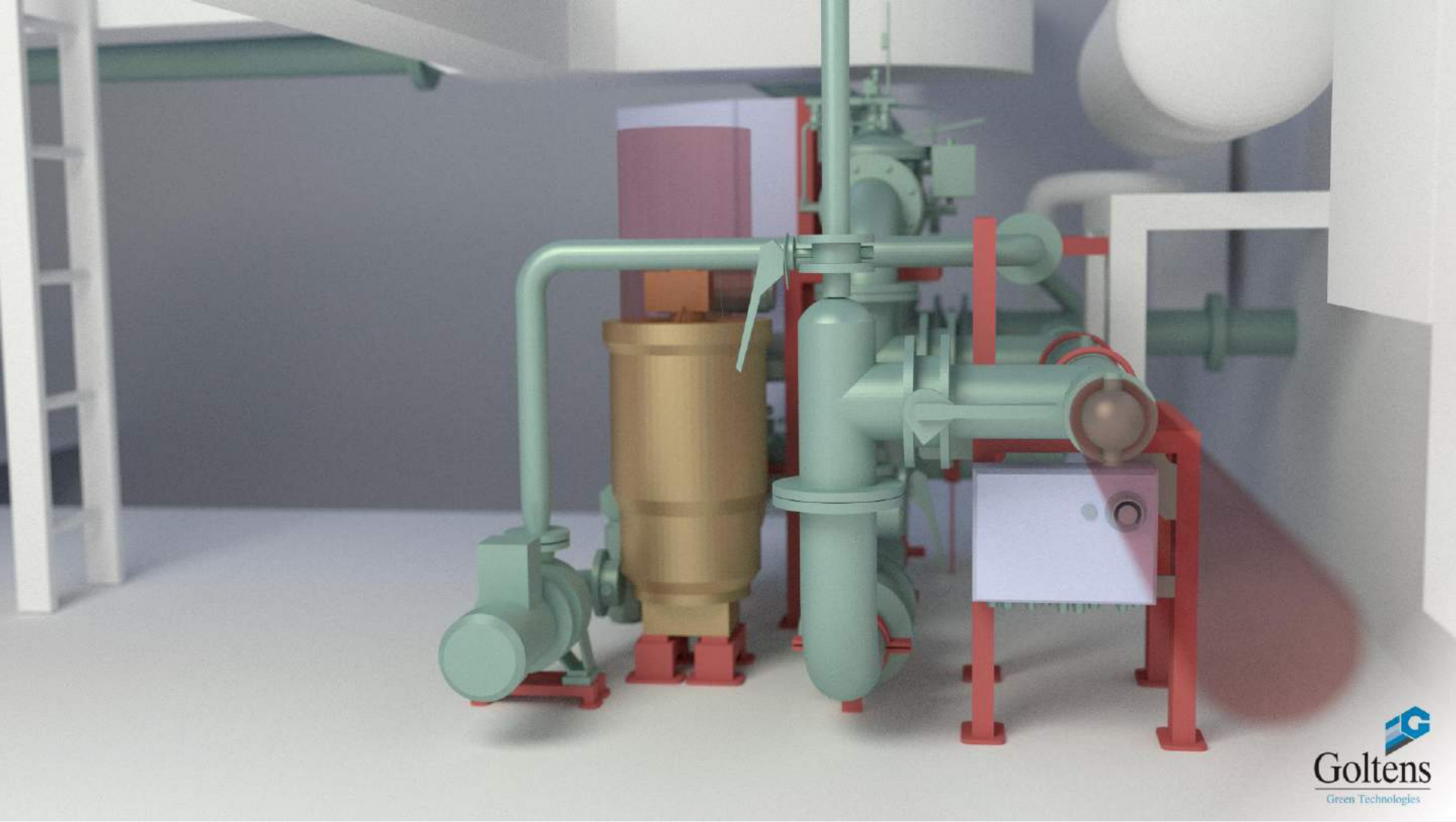

190m³ Filtrex filter. OBS 167m³

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190m³ Filtrex filter. OBS 167m³

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A wide range of Customers

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Saga Forrest Carriers

1000 and 2000 m^3/h - 30 installations (New building & Retrofitting)

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Evergreen

1000 m^3/h - 30 installations

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Optimarin Ballast System performance under icy conditions

OBS 334m³/h Boll & Kirch installed on MV "Cyprus Cement". Vessel stationed at Loviisa – Finland, in local icy-water (water temp -2°C).
Although tested under extreme low temperature, no problems were observed due to low water temperature condition and system working was confirmed as OK.
***Note:** The OBS was installed in engine room under normal ambient conditions (0°C – 55°C)*

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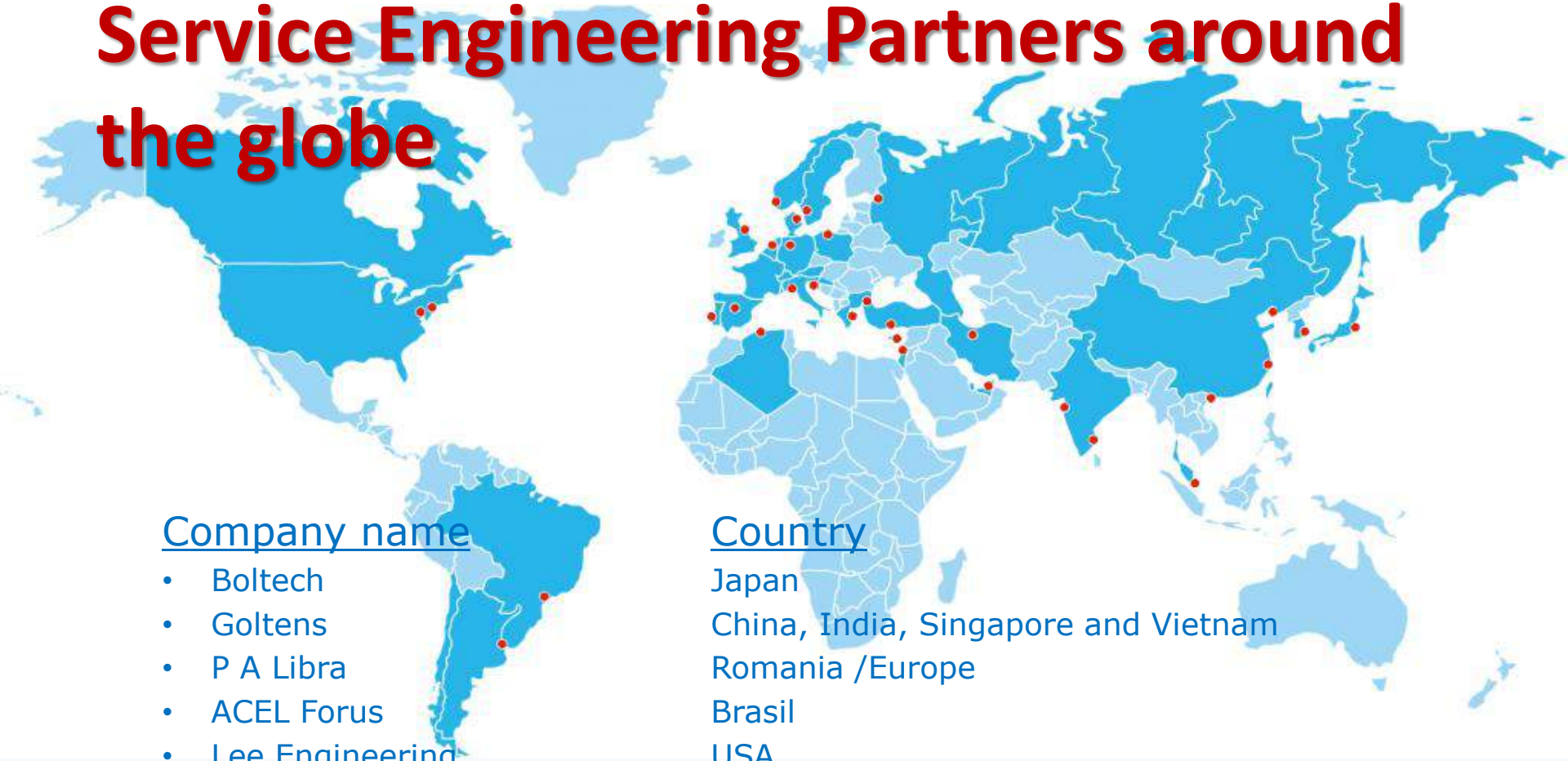
Service Engineering Partners around the globe



Company name	Country
• Boltech	Japan
• Goltens	China, India, Singapore and Vietnam
• P A Libra	Romania /Europe
• ACEL Forus	Brasil
• Lee Engineering	USA
• DAE HWA Engineering	Korea / Rest Asia

These companies will perform commissioning and later also different types of service tasks.

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Training of Crew

- *Sandnes (Norway) – RND & Training*
- *Mumbai (India) - Anglo Eastern training centre*
- *Manila (Philippines) - Anglo Eastern training centre*

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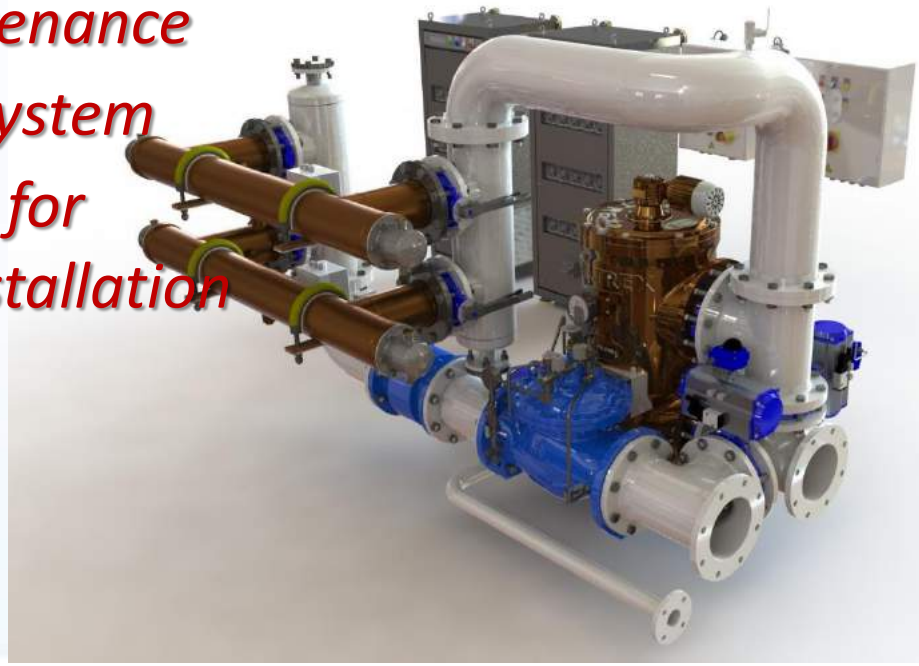
Summary

- *Environmentally friendly*
- *Simple & Flexible design*
- *Low weight, small Foot print*
- *Low need for maintenance*
- *Integrated ballast system*
- *Available resources for Engineering and Installation*
- *Track record*
- *Experience*



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"For Optimarin it is not enough to simply be approved, we operate in accordance with ISO 9001/2008, our vision is to have the most environmentally friendly, easiest, simplest, efficient and most cost-effective ballast water purification system in the world."

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