3-D SCANNING AND DETAILED ENGINEERING FOR CARGO CARRIER BWT RETROFIT

SCAN & ENGINEERING COMPLETED TO SUPPORT SHIPYARD INSTALLATION IN CHINA

Not all Goltens Green Technologies' (GGT) projects are complete turnkey installations of systems. Often GGT projects are more tactical in nature to help customers plan and execute these complex retrofits during a planned shipyard period in a more proactive and controlled manner.

This was the case with the retrofit for the Saga Pioneer, a 46,559 DWT general cargo carrier which completed retrofit in the Spring of 2013. Saga Shipholding is proactively undertaking a 3D scanning and detailed engineering design project for 24 open-hatch bulk carriers (consisting of 4 different ship types). Each type has a completely different design but within each class the design is very similar, the small differences are taken out by the laser scanning adjusted in the detailed drawings. The objective is to complete ballast water retrofitting of the vessels at a rate of 6-8 per year during normally scheduled shipyard periods.

An Optimarin OBS 2,000 m^3/hr system had been purchased and Goltens was engaged to 3D scan the vessel, determine the proper location for the system, identify any challenges and obstacles to be dealt with and to deliver a complete engineering package for the Chinese shipyard that would complete the installation.

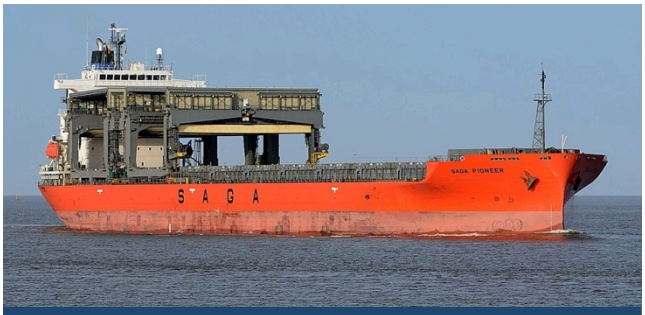
BALLAST WATER TREATMENT RETROFIT WORK CONSISTED OF:

- 3-D Scanning and Modeling
- Detailed engineering
- Delivery of custom made switchboards and other electrical components

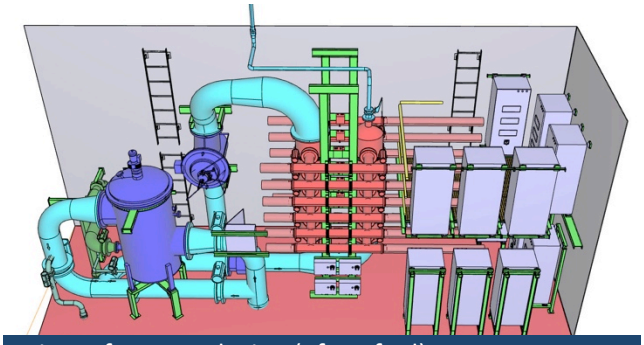
BWT RETROFIT RESULTS:

The engineering package was so detailed that the Chinese yard used it to fabricate and install the entire system, including the extensive modification of the center ballast tank that was required to accommodate the installation.

PROJECT FACTS:	SAGA PIONEER
Vessel type:	**General cargo carrier**
Ballast flowrate:	**2000 m^3/hr**
Total ballast capacity:	**16,616 m^3**
Ballast treatment system:	**Optimarin OBS 2000 m^3/hr**

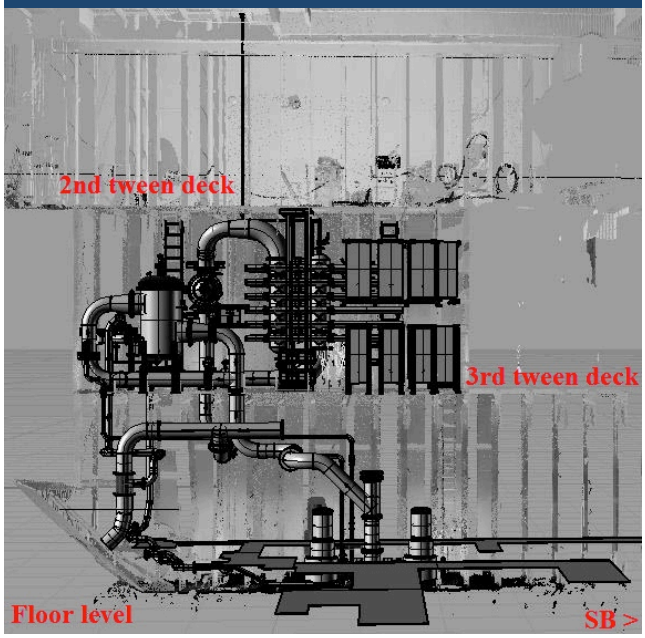


Saga Pioneer



View of system design (aft to fwd)

Complete BWT system overview overlaid on 3D scan output



Existing Ballast Pump area (pre-install) – Left and Detailed engineering of Ballast pump area (right)