

就航船へのBWMS搭載工事

— ClassNK-PEERLESS を用いて —

株式会社三和ドック

Retrofitting BWMS with ClassNK-PEERLESS

15 April 2016
Isamu Teranishi, CEO
SANWA DOCK CO., LTD

I. BWMS Retrofitting

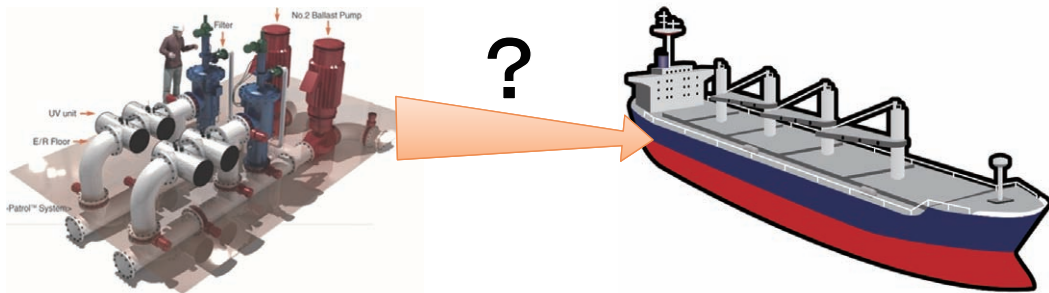
II. About “Sanwa Dock Co., Ltd”



Difficulty of BWMS Installation

3

- a) Confined engine room space (already optimized to house existing machinery, with no additional space for BWMS)
- b) BWMS equipment is large and installation of extensive network of connection pipes is challenging
- c) Difficult to obtain accurate 3D models of engine rooms required for detailed planning



Difficulty of BWMS retrofitting

4

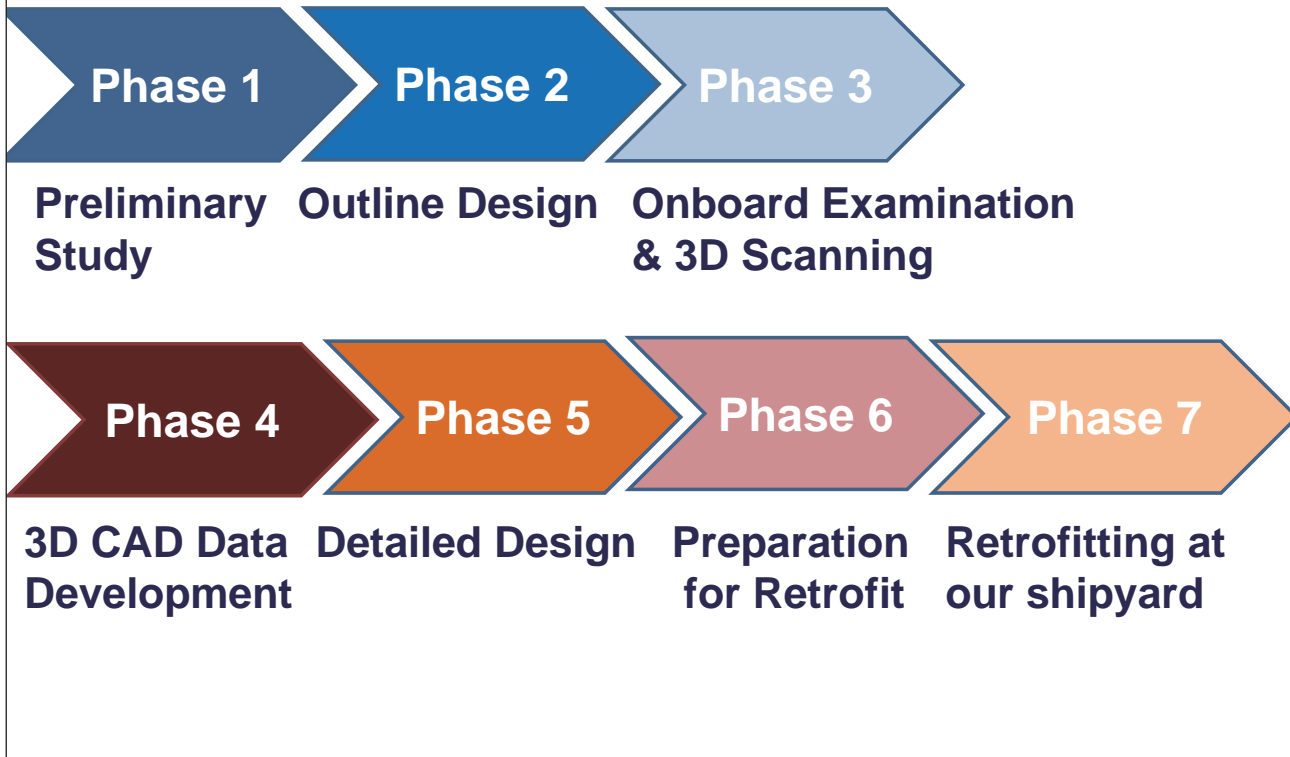


LOWER FLOOR in ENGINE ROOM
(Before & After floor plates taken out)



Process of BWMS Retrofitting

5



Preliminary Study

6



- ✓ There are over 40 kinds of BWMS which have already approved by IMO.
 - ✓ UV
 - ✓ Chemical
 - ✓ Electrolysis
 - ✓ Ozone
- etc....

Check Points

- ◆ Space assessment of engine room and pump room for BWMS location
- ◆ Electrical capacity assessment for BWMS
- ◆ Assessment of ballasting/de-ballasting speed, capacity etc.
- ◆ Cost assessment including running costs



Decision on which type of BWMS to install

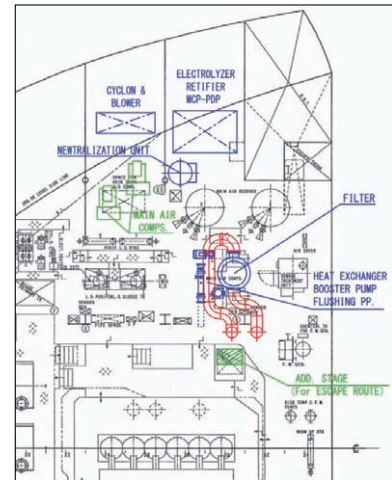
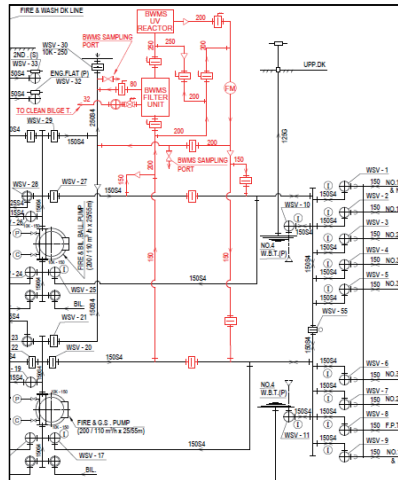


Outline design

7

Phase 2

Outline Design



- ✓ Rough planning BWMS Retrofitting, such as BWMS location, piping arrangement, etc., according to existing 2D plans



Onboard Examination

8

Phase 3

Onboard Examination



Check Points

- ◆ Deciding installation locations and ancillary work for machinery installation
- ◆ Pathway planning of additional pipes
- ◆ Electrical modifications including ballast control system
- ◆ Onboard delivery route of machinery

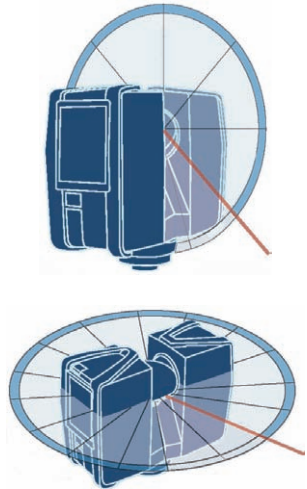


Onboard 3D Scanning

9



Onboard 3D Scanning

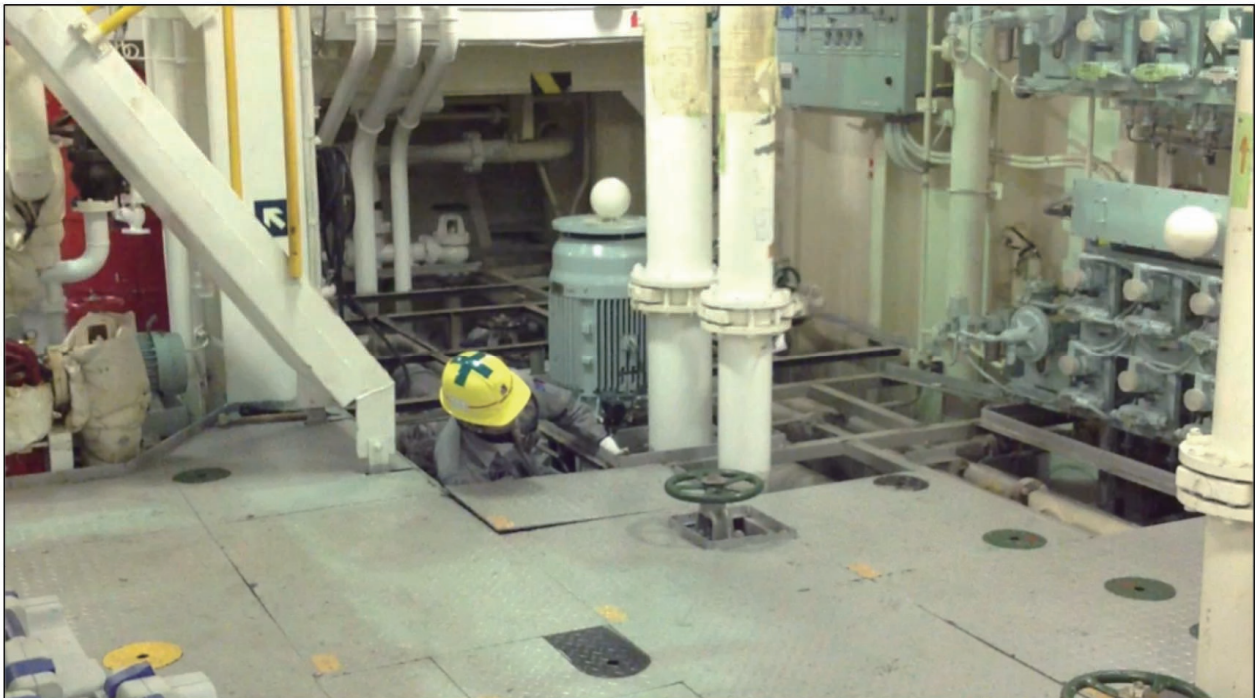


Scanning Range : 0.6 - 330m
Scanning Angle : Horizontal ; 360 , Vertical ; 305
Scanning Speed : Max 976,000pt / Sec
Accuracy of measurement : +/-2.0mm



Onboard 3D Scanning

10

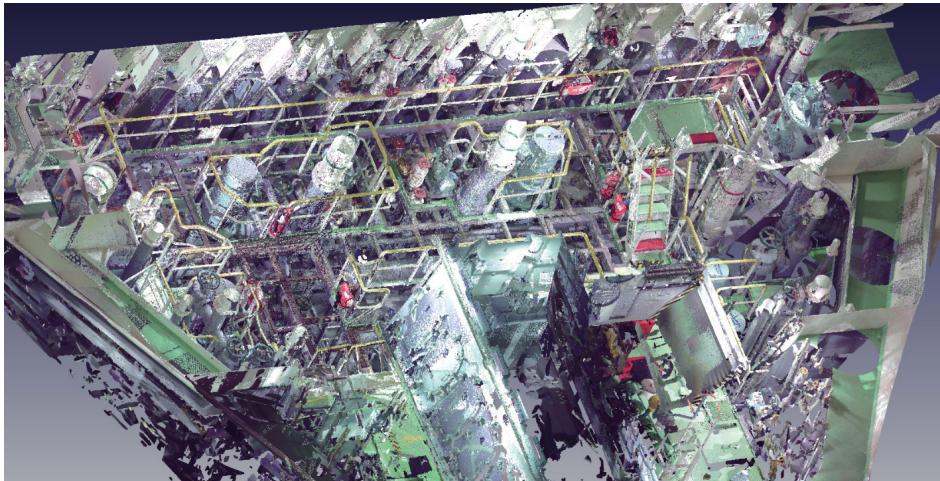


Video of 3D Scanning (1 min.)



Onboard 3D Scanning

11



- a) 3D scanning is carried out according to the design outline developed during the onboard examination stage.
- b) Complete scan can be carried out in 3 to 6 hours by just two engineers
- c) Collected data consists of between billions of point data coordinates containing XYZ and RGB information.

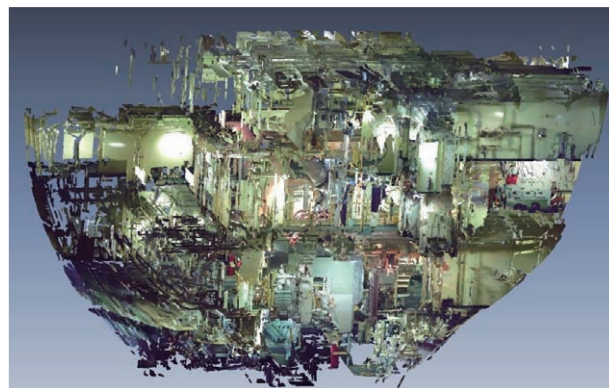
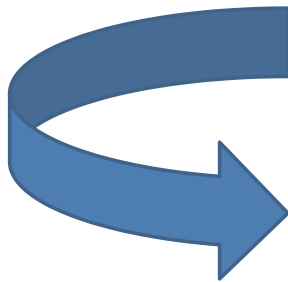


3D CAD Data Development

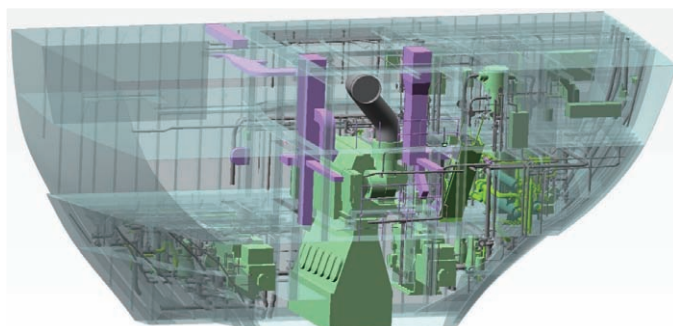
12



**3D CAD Data
Development**



Point Cloud Data



3D CAD Data



Need for New Software

13

- ✓ Conventional software is not suited to processing large amount of point data required in engine room
- ✓ Conventional software takes many hours to process data (No database for pipes, valves or structural components. Developing 3D models is difficult.)



Large number of BWMS retrofit works should be carried out in short period.



New Software is urgently necessary



Joint R&D supported by ClassNK

14

R&D of new technology for application in 3D laser scanner

Project Period: April 2012 – June 2014

Object: To develop software with highly accurate measurement capabilities that can allow for quick utilization of measurement data from 3D laser scanning data of ships

Participants: ClassNK, NYK Line, Mitsui O.S.K. Lines, "K" Line, Sasebo Heavy Industries, Sanwa Dock, MTI, The University of Tokyo, ClassNK Consulting Service, ARMONICOS, S.E.A. Systems

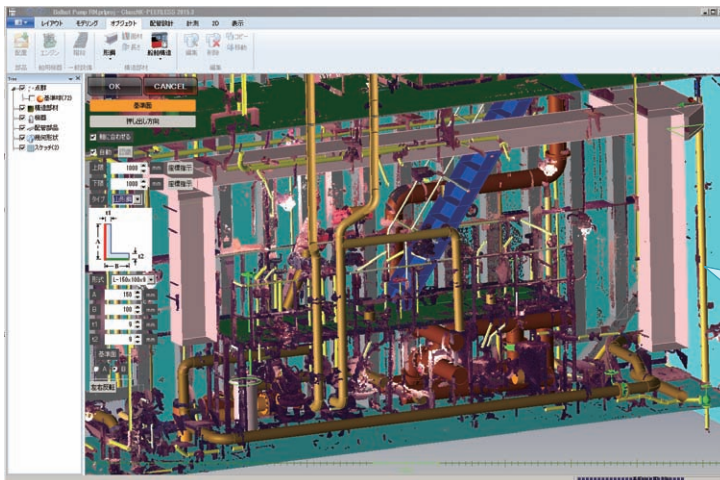




- a) Software can be used on basic computers
- b) Can handle vast amounts of data required for BWMS installation planning
- c) Database of standardized components allows for easy insertion of suitable objects, such as pipes, valves, etc.
- d) Automatic pipe recognition function
- e) Automatically deletes point data after modeling completion (unfinished modeling prevention function)
- f) Easy transfer of 3D CAD data to Marine 3D CAD Software



- ◆ More accurate 3D modeling can be streamlining the after process and lowering costs
- ◆ Processing period of one month using conventional methods shortened to one week



For more details
Please contact
ClassNK

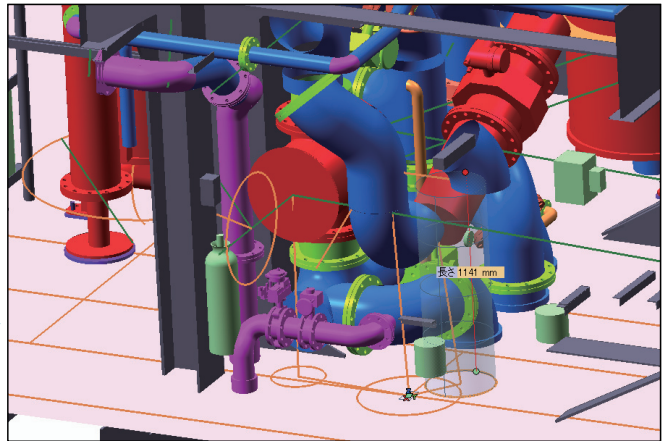


Detailed Design

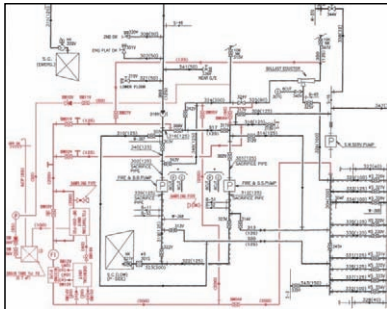


Detailed Design

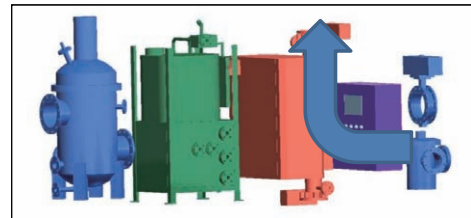
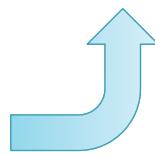
**3D Data created by
ClassNK-PEERLESS**



3D Design Model



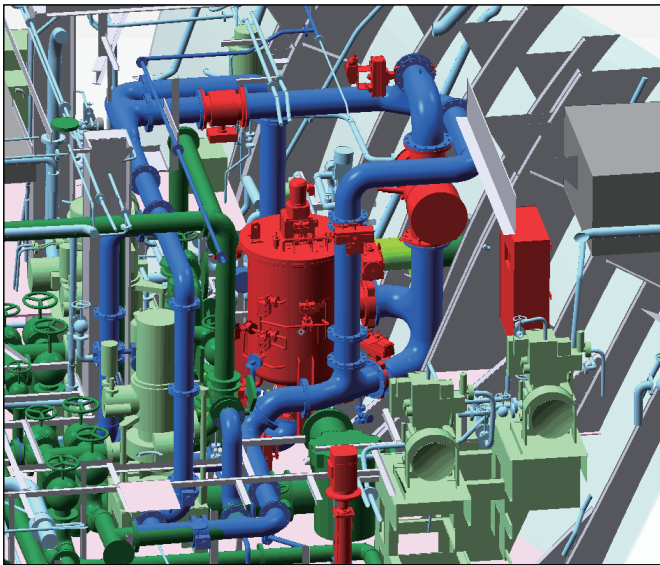
Basic design



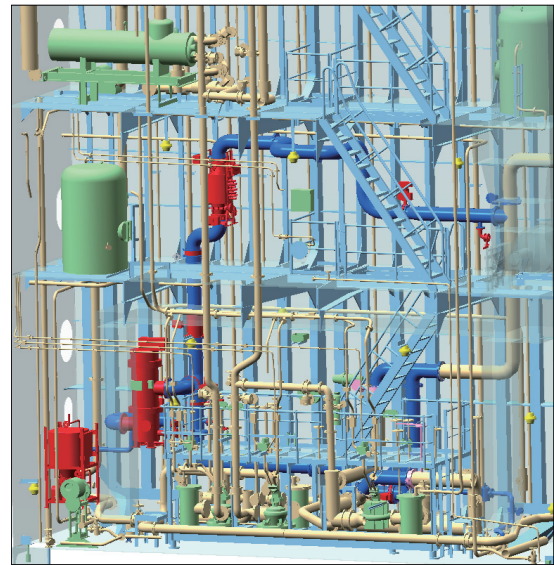
BWMS 3D Model



Detailed Design



Engine room
(for Bulk carriers, PCC, etc.)

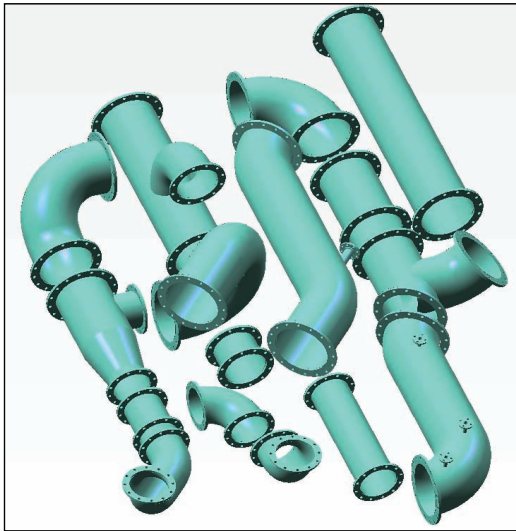


Pump room
(for Oil Tankers, Chemical Tankers)

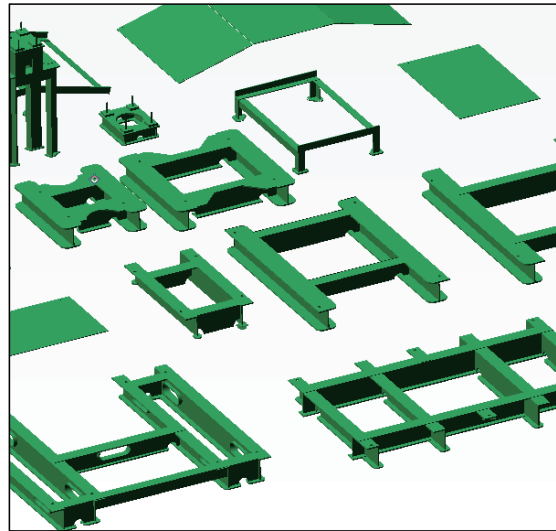


Detailed Design

19



3D model of distribution pipes



3D model of Machinery stands

Can create highly detailed designs including Distribution pipes, Pipe support, Machinery stands, etc.



New Machines for Pipe Works

20



Pipe Coaster



Pipe Form



Elbow Cutter



Positioner

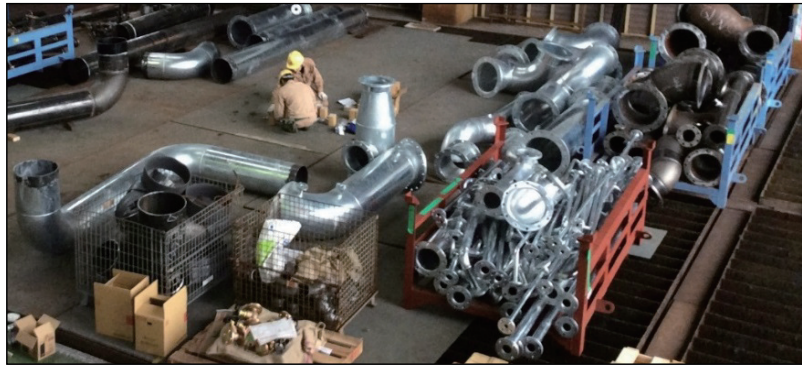


Preparation work for retrofits

21

Phase 6

Preparation for Retrofitting



Very important to prepare machine supports, and etc. in advance



Retrofitting at our shipyard

22

Phase 7

Retrofitting in our shipyard



- ✓ Highly experienced engineers and onsite staff provide high quality construction services
- ✓ 3D Model should be used on sight.
- ✓ Short docking period (Depends on complexity of work, but only takes 10 days to 3 weeks on average)



Our experiences of BWMS retrofit

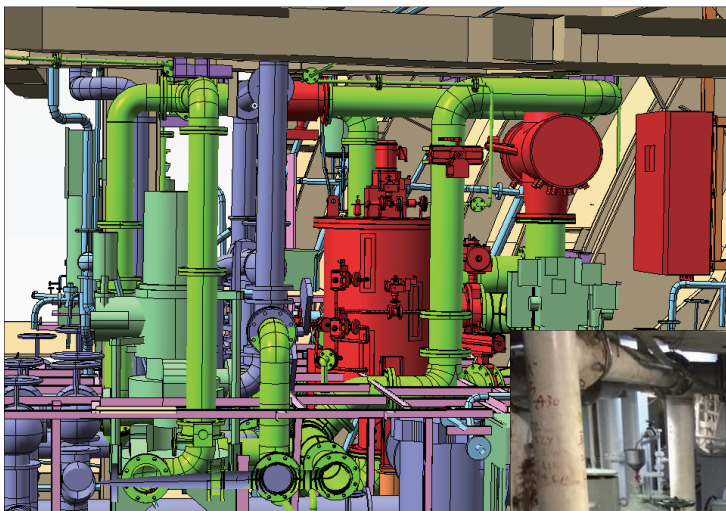
Type of Ship	D/W	BWMS Maker	BWMS Capacity	Work Finish	JG App.※2
General Cargo	10,000	KURARE	250 m ³ /h	2010 / 10	○
General Cargo	12,000	KURARE	250 m ³ /h	2013 / 01	○
General Cargo	14,000	SUMITOMO	250 m ³ /h	2013 / 11	—
General Cargo	13,000	PANASIA	150 m ³ /h	2014 / 03	○
General Cargo	12,000	BSKY	500 m ³ /h	2014 / 07	—
Chemical Tanker※1	20,000	ALFALAVAL	600 m ³ /h	2014 / 10	○
Chip Carrier※1	54,000	N K	1,500 m ³ /h	2015 / 03	○
Chip Carrier※1	54,000	N K	1,500 m ³ /h	2015 / 05	○
LPG Carrier	9,200	ALFALAVAL	250 m ³ /h	2015 / 05	○
RORO	11,000	MIURA	200 m ³ /h	2015 / 07	○
PCC※1	19,000	JFE	500 m ³ /h	2015 / 10	○
Bulk Carrier※1	28,000	SUMITOMO	1,000 m ³ /h	2015 / 11	—
LPG Carrier	4,600	ALFALAVAL	250 m ³ /h	2016 / 02	○
Chemical Tanker	3,500	MIURA	300 m ³ /h	2016 / 03	○
PCC※1	19,000	JFE	500 m ³ /h	2016 / 04	○
Chip Carrier※1	52,000	N K	1,500 m ³ /h	2016 / 04	○
Bulk Carrier※1	58,000	JFE	1,900 m ³ /h	2016 / 05	○

※1 Designing and engineering work only

※2 Inc. similar system has been approved by JG.



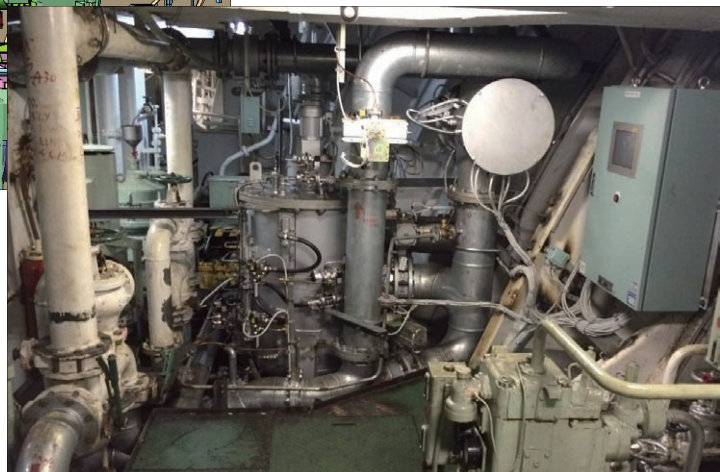
Retrofitting at our shipyard



<Processing>
Filtration + UV

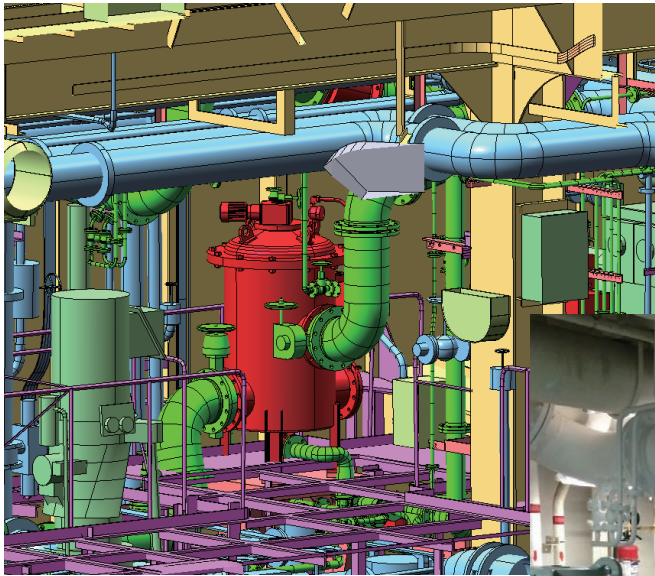
<Capacity>
500m³/h

- BWMS EQUIPMENT
- NEW BALLAST PIPE
- EXIST. EQUIPMENTS
- EXIST. PIPE LINES
- HULL CONSTRUCTION
- FLOOR JOISTS





Retrofitting at our shipyard



<Processing>
Filtration
+ Chemical Injection

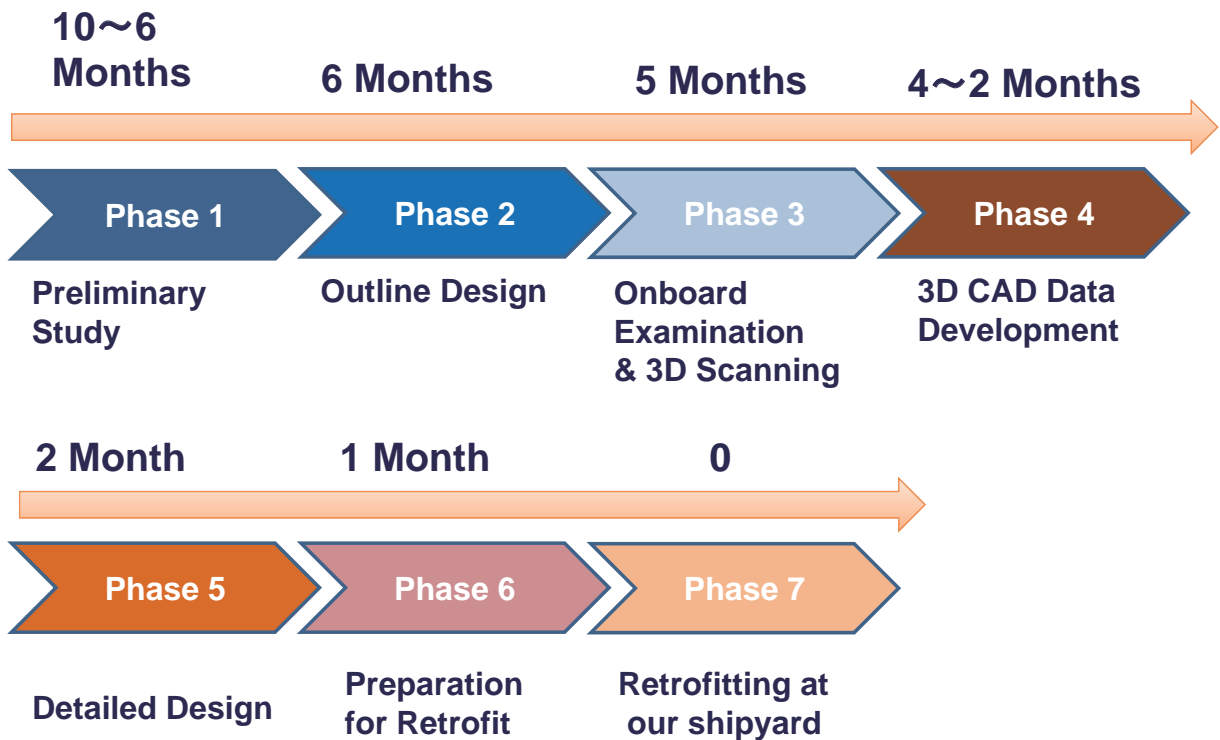
<Capacity>
500m3/h



- BWMS EQUIPMENT
- NEW BALLAST PIPE
- EXIST. EQUIPMENTS
- EXIST. PIPE LINES
- HULL CONSTRUCTION
- FLOOR JOISTS



Time schedule





1. We identify the key positions for scanning, rather than just scanning at random.
2. The merits of 3D modeling with ClassNK-PEERLESS
3. Onboard examinations and detailed 3D design are carried out by design engineers as well as construction engineers.
4. Our state-of-the-art pipe processing machinery and techniques
5. Highly skilled design engineers and construction engineers
6. Experienced workers



**High quality BWMS retrofit
in a short period at low cost**

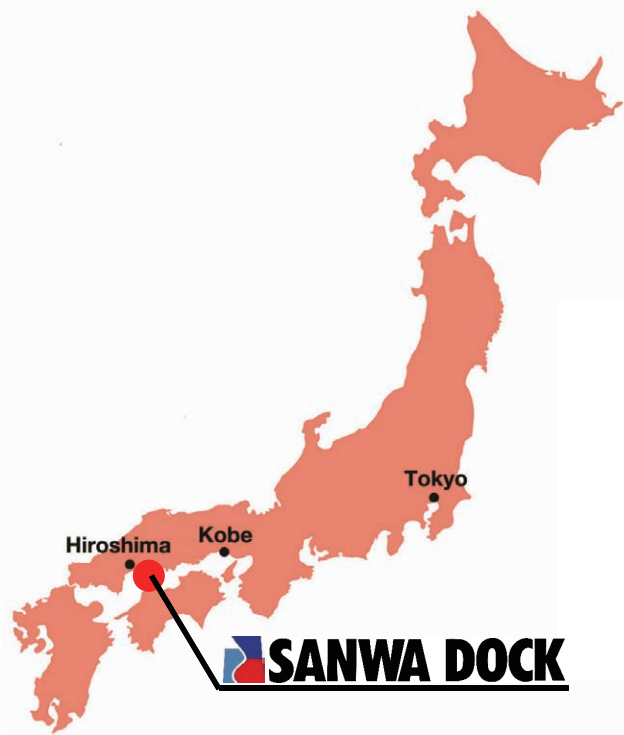
I. BWMS Retrofitting

II. About “Sanwa Dock Co., Ltd”



Position of SANWA DOCK

29



Clean & Comfortable Facilities

30

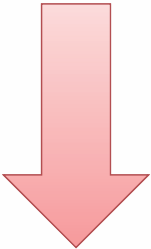




- a) **Specialized “Ship Repair” Dock**
Domestic ships repair can reduce currency rate affect.
- b) **Family-owned business**
Quick decisions and a medium to long-term vision.
- c) **Always in profit since establishment**
- d) **Long-term focus on investment of new facilities and technologies**
- e) **Acquisition and Training of Highly Skilled Engineers and Workers**



in 1992



in 2012





New Dock, Factory, Office for 2016

33



Large size Dry Dock under construction

34



Length x Breadth : 220.0m x 45.0m
Docking capacity : 63,000 G/T
Scheduled Completion Date : May 2016



1. Safety

2. Environmentally friendly

- Clean & Comfortable Facilities
- Konki-Jet Blasting System

3. New Technologies

- 3D Reverse Engineering Technology
- Pipe Processing Machines
- High Pressured Cleaning Machine

4. Acquisition and Training of Highly Skilled Engineers and Workers



Shipbuilding Skill Training center



Entrance Ceremony



Gas Cutting Training



Welding Training



Plate Bending Training



Konki-Jet Blast System

- ✓ Reduce blast media use
- ✓ Reduce powder dust



1. Our high level of design capabilities for BWMS work and others.
2. Our highly skilled hull, machinery, electrical, and plumber engineers.
3. Our young and highly skilled workers
4. The latest machinery and dock facilities
5. The new technologies such as 3D reverse engineering, Konki-Jet Blast system and high pressured cleaning machines.



Thank you for your kind attention.



This technology was developed with the support of ClassNK as part of the ClassNK Joint R&D for Industry Program.