BalClor®
Ballast Water Management System

Sunrui Marine Environment Engineering Co., Ltd
1. Introduction of SunRui
Company Info & Structure

A wholly-owned subsidiary of China Shipbuilding Industry Company (CSIC) since 1961, built up as Research Institute (Code 725).

- SunRui (Headquarter in Qingdao)
  - Shanghai Branch
  - Tokyo Office
  - Singapore Office
  - Hamburg Branch
  - Hong Kong Office

Oversea Offices are in charge of regional marketing & after-sale service works.
R&D Strength

Key Laboratory of Science and Technology for National Defense

- Qingdao Experimental Station
- Sanya Experimental Station
- Xiamen Experimental Station
- Open Sea Experimental Station
Technologies & Products

- Electro-Chlorination
  - Land-based Electrolysis System
  - BalClor BWMS
- Desalination
  - Sewage Treatment System
  - Seawater Desalination Plant
- Corrosion Control
  - Sacrificial Anodes
  - ICCP
- Ship Exhaust Treatment
  - Scrubber
2. BalClor BWMS
Side-stream Technology
Advantages of BalClor BWMS

   --- Small system size, less modifications on ballast pipe;
   --- 1% ballast water to be electrolyzed, high electrolysis efficiency.
   --- Easy arrangement for existing ships with limited available space.

2. Low maintenance cost.
   --- A unique coating developed from 30 years research experience in electrolysis technology guarantees a life-time service of electrodes in BalClor BWMS.

   --- A mature hydrogen separation technology developed from 20 years operation experience in 12 nuclear power plants and more than 100 thermal power plants guarantees safety operation onboard.
3. Approvals
Certificates

- March 2011
- August 2012
- February 2013
- April 2013
- May 2013
- May 2013
- June 2014
- May 2015

Sunrui Marine Environment Engineering Co., Ltd
Tests for USCG Type Approval

- Land-based tests
  - Freshwater treatment: Five successful tests required. Accomplished.
  - Brackish water treatment: Five successful tests required. Accomplished.
  - Seawater treatment: Five successful tests required. Accomplished.
- Ship-board tests
  - Six month min. duration: Five successful tests required. Accomplished.

All tests successfully done as scheduled, type approval application soon will be submitted to USCG.
USCG Land-based Testing Approval

Estimated to receive Type Approval from USCG before end of 2016.
A crucial question owners should ask the makers:

COMPARING
the ballast water treatment systems makers are selling or have sold to you,
TO
the systems makers are using or going to use for USCG type approval testing,

Any difference?

SunRui’s answer:
No, all the BalClor BWMS are designed to produce 7.5ppm of oxidants (mainly hypochlorite). The system SunRui is using for USCG testing is the same. No increase of oxidant concentration, no additional equipment.
4. Production Capacity
Reference List (Till 2016.04.22)

- Ordered: 487 System No. 328 Ship No.
- Delivered: 201 System No. 142 Ship No.
## Reference List  (Till 2016.04.22)

<table>
<thead>
<tr>
<th>No.</th>
<th>Vessel Type</th>
<th>Order No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>TANKER</td>
<td>106</td>
</tr>
<tr>
<td>2</td>
<td>BULK CARRIER</td>
<td>155</td>
</tr>
<tr>
<td>3</td>
<td>CONTAINER</td>
<td>25</td>
</tr>
<tr>
<td>4</td>
<td>LNG CARRIER</td>
<td>8</td>
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<tr>
<td>5</td>
<td>VLOC</td>
<td>10</td>
</tr>
<tr>
<td>6</td>
<td>MULTI PURPOSE CARRIER</td>
<td>7</td>
</tr>
<tr>
<td>7</td>
<td>OTHER</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>TOTAL</td>
<td>328</td>
</tr>
</tbody>
</table>
Reference List --- Retrofitting orders

Ordered

- System No.: 65
- Ship No.: 42

Delivered

- System No.: 18
- Ship No.: 15
- Reference List --- Main Chinese clients

  China Merchants (mainly tankers & VLCCs)
  China Shipping Tanker (mainly tankers)
  China Shipping LNG Investment (174k m³ LNG)
  International Far Eastern Leasing (mainly bulkers)
  Sinotrans (mainly bulkers)
  Minsheng Leasing (mainly bulkers)
  
  .
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  .

<table>
<thead>
<tr>
<th>Reference List --- Main overseas clients</th>
</tr>
</thead>
<tbody>
<tr>
<td>NYK Line (Japan)</td>
</tr>
<tr>
<td>MOL (Japan)</td>
</tr>
<tr>
<td>Frontline (Norway)</td>
</tr>
<tr>
<td>Dockwise (Netherlands)</td>
</tr>
<tr>
<td>TRF (Norway)</td>
</tr>
<tr>
<td>MMS (Greece)</td>
</tr>
<tr>
<td>TMS Tankers (Greece)</td>
</tr>
<tr>
<td>Neda (Greece)</td>
</tr>
<tr>
<td>Naess (Switzerland)</td>
</tr>
<tr>
<td>JO Tankers (Norway)</td>
</tr>
</tbody>
</table>
Production Capacity

- Before 2014: 100 Sets
- Now: 500 Sets
- Long-term: 1000 Sets

Sunrui Marine Environment Engineering Co., Ltd
5. Retrofitting & After-sales Support
Estimated duration of a retrofitting project

| Item                     | Weeks | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| Onboard Inspection       |       |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Designing & Class Approval |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Shipyard Preparation     |       |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Purchasing & Manufacturing|     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| FAT & Delivery           |       |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Installation             |       |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Commissioning            |       |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |

Note:
1. Min. time cost for a project is at least 23 weeks upon order confirmation.
2. Onboard inspection should be arranged right upon order confirmation.
3. For overseas projects, delivery time should be considered.
4. SunRui can provide full project management for Owners.

Sunrui Marine Environment Engineering Co., Ltd
A Summary of Challenges

1. Are sister vessels all the same?

2. Any professional Risk Assessment the maker has done?

3. Communication between ship’s control systems and ballast water treatment system.

4. Does design company understand the ballast water treatment system?

5. Misplacement of small components.

6. Does everyone understand each other’s languages?

7. Is yard experienced of ballast water system installation?
Status of SunRui’s traditional After-sales service network

Service agents all over the world are controlled directly by SunRui headquarter.

When a service is required, SunRui headquarters will allocate the work to one agent and arrange service engineers from headquarter in case required.

Challenges:

1. SunRui headquarters are based in China.
2. Servicing of vessels worldwide by engineers is both costly and time-consuming.
3. SunRui has to support and train their agents worldwide.
SunRui’s new plan to meet the challenges

SunRui (Headquarter in Qingdao)

- Shanghai Branch
- Tokyo Office
- Singapore Office
- Hamburg Branch
- Hong Kong Office

SunRui is building up several overseas offices and branches. Then service engineers will be sent out to stay there for a certain period of time.

These engineers are mainly in charge of services in local area as well as the management and training of local agent during practical onboard services for BalClor BWMS.

SunRui headquarters will manage and supervise the branches and offices.
Thanks!

For more info, please contact SunRui’s representative:

Marineplus

139, Doiranis Str. & Skra
176 73 Athens - Greece
Tel: +30 210 9373880/1 Fax: +30 210 9373898
E-mail: info@marineplus.gr