Technological Trends for Bulk Carrier

China Ship Marketing Research Center

22-23rd, November 2012
Guangzhou, P.R.China
The most important ship type in world fleet

- No.1 ship in the world fleet.
- Dry bulk cargo refers to iron ore, coal, grain, steel products, fertilizer and etc., vital for world economic growth and human life.
- In 2012, the total tonnage of bulk carriers is around 680 m dwt, 44% of the world fleet.
In 2011, bulk carrier deliveries reached **96.8 million dwt**, 60% of total vessel deliveries. From Jan.—Oct., 2012, the deliveries stand at **88.2 million dwt**, 65% of the total.

Bulk carrier is very important for shipbuilding industries of China, Japan and South Korea.

<table>
<thead>
<tr>
<th>Proportion of bulker deliveries by DWT</th>
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<tbody>
<tr>
<td></td>
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<tr>
<td>China</td>
</tr>
<tr>
<td>2011</td>
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<tr>
<td>2012 (Jan.–Oct.)</td>
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<table>
<thead>
<tr>
<th>Proportion of bulker orderbook by DWT</th>
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<tr>
<td></td>
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<tr>
<td>End of Oct. 2012</td>
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Source: Clarksons.
The summary of technological trend

- Bulk carrier is almost the simplest ship type in the world fleet.
- Over the last decades, there is no huge change in the bulk carrier technology.

![Diagram of Single Hull and Double Hull](image)
Diverse trend in technology

- Improvement of ship sci-tech.
- IMO rules and regulations, as well as Classification Societies.
- Requirements by shipowners and shipping companies.

↓  ↓

- New technological trends have been seen in recent years, but most are not specifically for bulk carrier.
- Larger and energy-saving vessels are more welcomed in recent years.
More large-sized vessels

- With the permitted conditions of berths, waterways, canals and trade volumes, larger ships can reduce unit cost and emission.

- However, the trend to becoming large is not so significant as containerships.

- Some shipowners and shipping companies still love standard type. Easy transaction is an important factor.
More large-sized vessels

- overall length increased: Handymax: 190m→195m→200m;
  Panamax: 225m→229/230m
  Capesize: 300m

- block coefficient enlarged

- beam widened: Capesize: 46m→50m

- depth/draft increased (with owner permission)

<table>
<thead>
<tr>
<th></th>
<th>focus on 30,000 — 40,000 dwt</th>
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<tbody>
<tr>
<td>Handysize</td>
<td>focus on 30,000 — 40,000 dwt</td>
</tr>
<tr>
<td>Handymax</td>
<td>up to 66,000 dwt</td>
</tr>
<tr>
<td>Panamax</td>
<td>up to 83,000 dwt</td>
</tr>
<tr>
<td>Capesize</td>
<td>focus on 200,000 — 210,000 dwt</td>
</tr>
<tr>
<td>VLOC</td>
<td>up to 400,000 dwt</td>
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</table>
More large-sized vessels

Average deadweight of bulk carrier contracts

<table>
<thead>
<tr>
<th></th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Handysize</strong> (10–40k dwt)</td>
<td>30,476</td>
<td>32,171</td>
<td>33,341</td>
<td>34,426</td>
</tr>
<tr>
<td><strong>Handymax</strong> (40–66k dwt)</td>
<td>56,373</td>
<td>53,283</td>
<td>55,205</td>
<td>55,596</td>
</tr>
<tr>
<td><strong>Capesize</strong> (150–210k dwt)</td>
<td>180,273</td>
<td>188,822</td>
<td>192,429</td>
<td>——</td>
</tr>
</tbody>
</table>

Source: Clarksons.
More large-sized vessels

Proportion of Larger Handymax contract by numbers

<table>
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<th>2011</th>
<th>2012</th>
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</thead>
<tbody>
<tr>
<td>40–60k dwt</td>
<td>89%</td>
<td>≈99%</td>
<td>81%</td>
<td>65%</td>
</tr>
<tr>
<td>60–66k dwt</td>
<td>11%</td>
<td>≈1%</td>
<td>19%</td>
<td>35%</td>
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</table>

Proportion of larger Capesize contract by numbers

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<tr>
<th></th>
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<tr>
<td>150–200k dwt</td>
<td>90%</td>
<td>64%</td>
<td>50%</td>
</tr>
<tr>
<td>200–210k dwt</td>
<td>10%</td>
<td>36%</td>
<td>50%</td>
</tr>
</tbody>
</table>

Source: Clarksons.
Energy-saving

- Emission reduction required by IMO, EEDI
- Environmental protection observed by more countries
- Less fuel consumption required by operators

![Graph showing 380CST price]

USD/ton

380CST price

Rotterdam  Japan
Reduce speed?

- Although many bulk carriers’s operating speed has reduced to 10-11 knots, as a low-speed vessel, the design speed of bulk carrier may not reduce more, even in Capesize and VLOC, they will keep at 14-15 knots.

- Operating speed is dependent on operators demand.
Energy-saving methods

- Excellent engine
  (MAN — ME  Wärtsilä — RT Flex)

- Energy-saving equipment
  (rudder fin, hub fin, duct …)

- Improvement of hull lines
  (especially in stem and stern)

- Others
**Engines**

- Engine plays the most important part in energy-saving effort;

- Engine makers provide excellent diesel, which can get better fuel-saving in many operating conditions;

- Ship designer can get more choices to improve propulsive efficiency, such as MAN-G engine, which can use more diameter propeller at lower rotating speed.
Energy-saving equipment

- Different equipments may be used together or individually, the actual effect need exactitude calculation and hydrodynamic test.

- In fact, many equipments are not new, but have more attention now.
Improvement of hull lines

- Over the past, designers take more time on stern, but the change in stem now gets more attention now.

Bulbous Bow

Vertical Bow
Other trends

- Load on the weather deck
- Change structure of hatch
- Box-shape or half-box shape cargo hold
- Shallow-draft design, lower draft to 12m even 11m
  
  … …

- All these changes focus on Handysize/Handymax, first depend on owner’s demand.
Thank you!