MARINE SOLUTIONS: GROWTH THROUGH A SMART MARINE ECOSYSTEM

Roger Holm, President, Marine Solutions & Executive Vice President
Positive global economic conditions support shipping tonnage demand growth, while political and regulatory uncertainty limit the market recovery.

World seaborne trade and GDP

Newbuilding price index

Yr/Yr change

Clarksons average earnings

(USD/Day)

Deliveries, removals and net fleet growth

Source: Clarksons Platou
Despite higher oil prices, US onshore production growth delays the offshore recovery

Source: Clarksons Platou, Rystad Energy
General market sentiment is cautiously optimistic

Source: Clarksons Platou, Wärtsilä Internal Analysis
Drivers and sentiment vary in different vessel segments

**Cruise**: There is continuing optimism over the prospect for global expansion of the cruise fleet. Increased interest towards small expedition ships. There is growing interest in LNG power. Record order book.

**Tankers**: Markets remain tough for crude. Market fundamentals expected to improve. High levels of demolition recently. Interest in scrubbers and scrubber ready.

**Offshore**: The long-term outlook for large mobile production projects has further improved, helped by ongoing project cost management efforts. High levels of demolition have continued providing some support for utilization in the rig market. Order book remains significant in the drilling and OSV sectors.

**Bulk**: Price increases have slowed interest. Fundamentals suggest charter market conditions will improve but volatility remains.

**LNG**: Strong demand growth in Asia. Market sentiment expects the market to continue to improve. Increasing interest in small scale LNG and bunkering. FSRU also going to expand.

**Containers**: Order potential improving.

**LPG**: LPG shipping markets may gradually recover this year, key factors remain US supply and Chinese and Indian imports, while recovering newbuilding demand and using LPG as bunker fuel could have a longer-term impact.

Source: Marine Solutions BI internal analysis, Clarkson Platou

31 May 2018
Transforming our operations to meet market requirements
Realignment and operational excellence has significantly improved our competitiveness...

Capacity cost decreased with ~120 MEUR over the past two years

FTEs decreased with ~1,000 FTEs over the past two years
...and we have new targets for further improvements

### Lead time reduction achieved (2016–2018)
- Production lead time -20%
- Main assembly lead time -25%
- Standard hours/MW -32%

### Targets for further optimisation (2017–2020)

<table>
<thead>
<tr>
<th>Area</th>
<th>Target</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Machine stop reduction</td>
<td>40%</td>
<td>By enabling Predictive Maintenance</td>
</tr>
<tr>
<td>Defect reduction</td>
<td>15%</td>
<td>Less internal mistakes due to reworking or bad recording of data.</td>
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<tr>
<td>WIP reduction</td>
<td>30%</td>
<td>By a better resources utilisation &amp; flexible planning</td>
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<tr>
<td>Reduction in energy usage</td>
<td>25%</td>
<td>By smart energy management systems</td>
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<tr>
<td>Reduction of survey costs</td>
<td>30%</td>
<td>By means of remote survey &amp; data streaming</td>
</tr>
<tr>
<td>Ease new products introduction</td>
<td>20%</td>
<td>By enabling production data analytics about issues and production set up</td>
</tr>
</tbody>
</table>

* Example from one factory
Marine power solutions

Top player
Gas carriers
Cruise & ferry
Offshore

Mid-player
Special vessels

Challenger
Navy
Traditional merchant

- Power supply
- Power conversion
- Propulsion,
- Exhaust treatment

Processing solutions

Top player
Gas carriers

Mid-player
Special vessels

Challenger
Traditional merchant

- Water & waste
- Flow solutions
- Gas solutions

Voyage solutions

Top player
Cruise & ferry
Traditional merchant
Ports
Academy

Mid-player
Special vessels

Challenger
Navy

- Automation, navigation & communication
- Entertainment systems
- Simulation & training solutions
- Fleet operations solutions
- Ship traffic control solutions
- Special products

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Leading the industry transformation towards a Smart Marine Ecosystem
FROM PRODUCTS TO A SMART MARINE ECOSYSTEM
20 BEUR waste is incurred annually from poor fuel efficiency & time at terminal

<table>
<thead>
<tr>
<th></th>
<th>Fuel efficiency</th>
<th>Time at Terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Offshore</td>
<td>0.2 BEUR</td>
<td>0.7 BEUR</td>
</tr>
<tr>
<td>Cruise</td>
<td>0.5 BEUR</td>
<td>-</td>
</tr>
<tr>
<td>Ferry</td>
<td>1.3 BEUR</td>
<td>-</td>
</tr>
<tr>
<td>Gas Carrier</td>
<td>0.3 BEUR</td>
<td>1.0 BEUR</td>
</tr>
<tr>
<td>Containership</td>
<td>14.5 BEUR</td>
<td>2.1 BEUR</td>
</tr>
</tbody>
</table>

Total global shipping fuel bill of roughly 100 BEUR today
The Smart Marine Ecosystem
Towards a zero emission future

Eliminating sources of waste through digitalisation
Environmental legislation creating growth opportunities

- **2016**: NOx Tier III in NECA (North America), Amended IMO MEPC.227(64)
- **2017**: IMO Ballast Water Management Convention, IMO Polar Code
- **2018**: Inert Gas System mandatory for newbuild tankers above 8,000 DWT as of 1 January 2018
- **2019**: Global 0.5% SOx limit reviewed
- **2020**: Global cap 0.5% SOx, North sea and Baltic sea become NECA
- **2025**: NOx Tier III proposed for North Europe
- **2050**: Carbon emissions halved

Requirements for sewage discharges in the Baltic Sea

31 May 2018

Roger Holm
SHIPPING TODAY: WÄRTSILÄ CASE

Saving per voyage with just-in-time arrival:

74.5 tons of fuel*
22,200 EUR**

CASE:
5,500 TEU Containership
Distance: 1,150 Nautical Miles

* Assuming average SFOC : 230 g/kwh
** Assuming fuel price: 300 EUR/t

964 MWh actually consumed –
640 MWh simulated consumption

324 MWh potential savings

3.5 days
CONNECTING SMART VESSELS TO SMART PORTS

Smart Energy Management

Navigation & Intelligent Automation

Smart Ports
THE VOYAGE OF THE FUTURE REQUIRES AN INDUSTRY TRANSFORMATION

CONNECTED TO ECOSYSTEM

REAL TIME SLOT INFORMATION

OPTIMISED OPERATION

AVOID CONGESTION

ARRIVE TO PORT JUST IN TIME

OPEX SAVINGS

* Wärtsilä case study from one major port identified the range of 100-200 million euros per year of total fuel savings and CO₂ emission reduction potential in the range of 1-2 millions of tons per year
Our customers view on future shipping
“Making shipping a cleaner, more effective way of transporting goods.”

The main ecological and economical features compared to traditional vessels:

• $\text{CO}_2$ eq. reduced by more than 42%
• NOx reduction of 80%
• SOx and particles almost entirely eliminated
• Use of VOC as fuel reduces bunkering of 40%
• Reduce machinery running hours of 29%
• Reduce overall fuel consumption of 10%
“A mutually beneficial partnership.”

Norwegian ro-ro passenger ship Folgefonn, owned by ferry operator Norled.

Autodocking is one of the first steps in fully autonomous shipping.

Wärtsilä’s autodocking technology delivers notable benefits to operators. These include:
• improved safety
• less wear and tear
• greater efficiency in docking
“Creating the world’s fastest and most reactive tug models.”

SeaWays has worked closely with Transas over the past 10 years.

• 360° TugSim- the most advanced in the world

• Simulation benefits: realistic exercises, improved safety, time and fuel savings

• Training benefits: enables to operate the company assets with greater efficiency and vastly reduce fuel burn and carbon emissions
"Growth is at no time by mere chance; it is the result of forces working together."
THANK YOU