EXMAR

Shipbuilding

Buyer’s Expectations and Control

IUMI Conference
Singapore – September 14th 2004
Newbuilding Experience (incl. on order)
Overview by ship type (1990 - )

- 5 LNG carriers
- 25 other gas carriers
  - fully refrigerated VLGC and Midsize LPG carriers
  - Semi-refrigerated LPG carriers
  - Ethylene/Chemical carriers
  - fully pressurized LPG carriers
- 24 bulk carriers
  - Capesize
  - Panamax
  - Geared Handy size
- 13 oil tankers
  - VLCC
  - Suezmax
  - Aframax
- 3 container vessels
- 1 RoRo vessel
- 1 FPSO

→ In total 72 vessels
Newbuilding Experience (incl. on order)
Overview by shipyard (1990 - )

• Europe
  • Boelwerf, Belgium (4)
  • Benetti Shipyards, Italy (4)
  • Sietas Werft, Germany (2)
  • Constanta Shipyards, Romania (2)
  • Izar, Spain (1)
  • Merwede, Netherlands (1)
  • Viana Do Castello, Portugal (1)

• South Korea
  • Daewoo H.I. / DSME (13)
  • Samsung Heavy Industries (4)
  • Hyundai Heavy Industries (3)

• Japan
  • Kawasaki Heavy Industries (6)
  • Mitsubishi Heavy Industries (3)
  • Hitachi Zosen (3)
  • Kanrei (3)
  • Tashibana (3)
  • Sasebo Heavy Industries (2)
  • Tsuneishi (2)
  • Hashihama (2)
  • Shin-Yamamoto (1)
  • Shinhama (1)
  • Teraoka (1)

• China
  • Dalian New Shipyards (2)
  • Shanghai Waigaoqiao Shipyards (4)
  • Hudong Zhonghua Shipyards (4)

⇒ 24 different shipyards Worldwide
What Expectations?

• Fit for Service
• Reliable
• Economical
• Safe & environment friendly
• Maintenance friendly

⇒ Criteria for: Design
Construction
Testing
How to define the Criteria?

- Technical Specifications
  - Detailed description of the vessel and its systems
- Classification Society Rules
- Other Rules and Regulations
  - IMO (SOLAS, MARPOL, COLREG, …)
  - Flag state (CE directives!)
  - ILO, USCG, Suez Canal, Panama Canal, …
- Building Standards (for design, tolerances, repair)
  - National & International Standards (JIS, CSQS, ISO, …)
  - Shipyardspecific standards & procedures
  - Other standards: IEC, …
- Key Drawings (GAP, Midship, schematics, …)
- Maker’s list (original maker versus licensee!)
Control ... WHY?

? Classification Society

? Yard Quality Control / Quality Assurance System

✓ Many issues not covered by Rules (coating, operation, ...)
✓ Commercial pressure on Classification Society
✓ Very competitive industry for Shipyards AND Class
✓ Production Dept. often controls Quality Control
✓ Increased drive for productivity leads to Shortcuts
✓ Shipyard’s QC/QA stops at the yard gate (Subcontractors!)
✓ Mainly Prototypes - No series production
✓ Lack of experience/qualification
✓ Lack of management & coordination
Means to Control

• Design Approval (Plan Approval)
• Building Supervision

⇒ Contractual Provisions!

• Plan Approval
  • Extent of drawings for approval / for reference
  • Deadline for reply (existing designs!)
  • Communication with Classification Society

• Building Supervision
  • Role/Authority of the Buyer’s representative
  • Number of people allowed
  • Extent of inspections
  • Access to all working areas, including subcontractors
  • Facilities provided for Buyer’s team
Plan Approval

- Approval of Equipment Vendors

- Review main drawings and vendor documentation
  - Compliance with Specifications, Rules & Standards
  - Compliance with Equipment Maker recommendations
  - General Evaluation of the Detailed Design
  - Any Operational & Maintenance issues
  - Feedback from existing fleet

- Follow up meetings with Shipyards
Building Supervision - Tasks

Follow up the construction (incl. main equipment)

- Compliance with approved drawings
- Check workshop drawing vs approved drawing
- Compliance with building standards
- Compliance with the specifications
- Compliance with “Good Shipbuilding Practice”
- Ease of maintenance & Access
- Follow up testing and trials
- (Pre-)qualification of Subcontractors
- Compliance with HSE
- Construction follow-up and reporting
Building Supervision

- **Scheduled inspections**
  - Extent to be agreed (Steel fit-up, paint inspections!!!)

- **Unscheduled inspections/Patrolling**
  - Critical areas
  - Shipyard’s weak points
  - Bottle necks - Erection in dry-dock, Painting, …
  ⇒ Quick reporting system (Digital Cameras, …)

- **Tests & trials**
  - Shop tests (extent attended by Buyer’s to be agreed)
  - On board testing
  - Mooring trials
  - Sea trials
  - Gas trials ? (before or after delivery)
Subcontracting

- Extent of Subcontracting (can be agreed in contract)
- (Pre)-Qualification of Subcontractors
- Implementation of proper standards & procedures
- Implementation of QC (Subcontractor AND shipyard)
- Scheduled Inspections:
  - at Subcontractor’s premises, or
  - upon arrival at shipyard
- Unscheduled inspections (easy access?)
## Typical supervision schedule LNGC

<table>
<thead>
<tr>
<th>Site supervision</th>
<th>2001</th>
<th>2002</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site manager</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Steel</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Steel</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Steel</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paint application</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paint application</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paint application</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NDT/Cargo containment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Piping/outfitting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cargo system</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrical installation/automation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Machinery engine room</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Machinery deck/cargo</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>