Experience with the new rules & regulations

Atle Falk  -  Perth Nov.14th
Schat-Harding and Noreq joint together June 2013. NEW OWNER are Hercules (private equity)

• More than 900 employees
• More than 30 offices
• Operation in 15 countries
• The worlds largest service network
• HQ Rosendal - NORWAY
New Regulations at NCS > 2015

DNV-OS-E406  NORSOK R-002
Background for the DNV-OS-E406
Canopy GRP weakness...
Canopy deflection....
## OLF Development program

<table>
<thead>
<tr>
<th>Phase</th>
<th>Time Period</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase 1</td>
<td>2005 - 2007</td>
<td>Hull- strength and integrity, G-forces (some types)</td>
</tr>
<tr>
<td>Phase 2</td>
<td>2007 – 2009</td>
<td>G-forces (all types &gt; CAR index), Headway Analysis, DNV-OS-E406 and development of NORSOK R-002</td>
</tr>
</tbody>
</table>
## Today, yesterday and 2015

<table>
<thead>
<tr>
<th></th>
<th>2005</th>
<th>2013 (today)</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Design Standards</strong></td>
<td>Solas/NMD853</td>
<td>DnV-OS-E406 Norsok R002</td>
<td></td>
</tr>
<tr>
<td><strong>Waves and Wind</strong></td>
<td>NO</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td><strong>Realistic test protocol</strong></td>
<td>NO</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td><strong>Person size and weight</strong></td>
<td>75 kg</td>
<td>100 kg / 140-210 cm</td>
<td></td>
</tr>
<tr>
<td><strong>Requirements to G-forces seat &amp; belts</strong></td>
<td>To weak, and not including Waves</td>
<td>YES, waves included</td>
<td></td>
</tr>
<tr>
<td><strong>Engine and Headway</strong></td>
<td>6 knots flat sea</td>
<td>Demand of more engine power</td>
<td>Refine requirements and new methods (like CFD)</td>
</tr>
<tr>
<td><strong>Certification requirements</strong></td>
<td>YES</td>
<td>No, but process ongoing.</td>
<td>Harding have priority on making an influence based on our experience by development of the products.</td>
</tr>
</tbody>
</table>
MODEL TESTING

- Wind tunnel
  - Drag coefficients
  - Marintek

- Model testing
  - Flat water
  - Accelerations
  - Headway
  - Marintek

- Model testing
  - Friction btw ramp and boat
  - Marintek

- Model testing
  - Waves
  - Acceleration
  - Headway
  - Marintek

- Model testing
  - Validate CFD
  - Marintek

- Model testing
  - Trim/list
  - Acceleration
  - Headway
  - Marintek
SIMULATIONS

- CFD
  - Determine Loads
  - Slamming
  - Logdive
  - Umoe Mandal

- FEA
  - Evaluate Strength
  - Finite Element Analysis
  - Umoe Mandal

- Accelerations
  - Varuna
  - Freefall in waves
  - Marintek

- Injury
  - Accelerations personnel
  - Validate seating og seatbelts
  - TNO

- Stability
  - Intact stability
  - Waterfilled stability
  - Ice on the canopy
  - DDC

- FMECA
  - Risk analysis
  - DnV / Harding
FF1200 – Full Scale Testing

Freefall
- Fixed installations
- Overheight 65.2 meters

Floating installation
- Trim/list 17/17
  First!

Seatrials
- Speed
- Stability
- Functional

Boarding test
- 70 persons
- 3 minutes

Heavy Wether Test
- Måløy/Stad

Manned freefall
- Falck Nutec
FIND THE LOADS DURING FREEFALL
Acceleration Forces  FF1200 vs «old»

- Gammel båt 20m: 1.48
- FF1200 20m: 0.88
- FF1200 33m: 0.57
- FF1200 46m: 0.57
- FF1200 60m: 0.49
• **Norsok R-002** standard for lifting appliances and lifting accessories on all fixed and floating installations, mobile offshore units, barges and vessels, as well as land based plants where petroleum activities are performed.....as well as:

• Launching and recovery – life saving equipment

• Means of connection and release systems – life saving equipment

• Foundations and suspensions – lifting appliances
# MACHINERY DIRECTIVE VS R-002

## COMMON OVERALL REQUIREMENTS

<table>
<thead>
<tr>
<th></th>
<th>MACHINERY DIRECTIVE (MD)</th>
<th>R-002</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PRINCIPLES OF SAFETY INTEGRATION</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>RISK ASSESSMENT</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>PRIORITIZATION OF RISK REDUCING MEASURES</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>INSTRUCTIONS (USER MANUAL / MARKING)</strong></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>EQUIPMENT</strong></th>
<th>MD</th>
<th>R-002</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lifting appliances / winches</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Lifting accessories</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Skidding Track</td>
<td>NO</td>
<td>YES</td>
</tr>
<tr>
<td>Load carrying structure</td>
<td>NO*</td>
<td>YES</td>
</tr>
<tr>
<td>Foundation</td>
<td>NO</td>
<td>YES</td>
</tr>
<tr>
<td>Parts of Lifeboat / Rescue boats</td>
<td>NO</td>
<td>YES</td>
</tr>
</tbody>
</table>

*MD applies to load carrying structure integrated in lifting machinery*
R-002 Davit

- Concept invented by Schat-Harding
- Designed for Horizontal / Vertical Loads
- Weight Optimized Design
- Hinged Skids
- Boat lifted vertically
- Fully Electric Winch.
- Full access for maintenance
- No need for complex Hydraulics
R-002 FF Lifeboat Davits

- Full Compliance to NORSOK R-002 Sep 2012
- Risk Assessment – DNV (4.11)
- Designed for Horisontal & Vertical Loads
- Fully Electric Winch. No need for complex Hydraulic piping
- PLC (Programmable Logic Controller) Required (5.4.6)
- Hoisting speed reduced to 50% before the end stop is activated. (PLC - App A 2.4.3.3)
- Motion limiters, incl backup. (PLC – App A 1.9)
- Constant speed control. (App A 2.4.2.2.1)
- Extra high hoisting speed during pickup to prevent reentry (min: 52m/m -App A 1.6)
- Self-tension system. Not mandatory acc to R-002. A must after Risk Assessment!
- Emergency Operating System (5.15.3)
- Secondary back up system (App A 1.11)
- Designed for 100% Redundancy (no single technical failure result in risk - 4.1)
- 3rd party Verification acc DNV OSS-308 Medium (4.14)
- DNV SOLAS Certification for Mobile Offshore Units
- Atex classification in acc with IECC 61892. Verified by 3.party (5.3)
**Design against fatigue failure**

**R-002** does not mention design against fatigue from wave induced accelerations at all. The Fatigue Limit State (FLS) is however often governing for the joint design, giving additional brackets, increased steel thickness, grinding, NDT etc.

- With brackets to improve FLS design:
- Similar design without FLS concerns:
Fatigue Basis Harding Design

- Fatigue design life 30y. DFF = 1
- FLS accelerations:
  - horizontal: 0.39g (3.82 m/s²)
  - vertical: 0.43g (4.22 m/s²)
- Assessments based on recommendations in DNV-RP-C203 «fatigue analysis of offshore steel structures».
- Joints and details analysed using FEM where simplified methods based on standards not is available.
Testing acc. R-002

For Floating Units:
Horisontal load ≈ Vertical Load

For Fixed Platforms:
Horisontal load needs to be taken into account

- Static overload test does not document such strenght
- If this is used to document sufficient strenght, potentially dangerous designs can be the result
Harding program for new FFLB

- FF975 – 35 p
- FF1050 – 40 p
- FF1075 – 50 p
- FF1100 – 60 p
- Feasability Studies ongoing – customized Brownfield
- New models Tailor-made for existing structure
- New LB design according to new regulation
Assisting clients to meet NOPSEMA requirements

M T Kuganesan / Perth Nov.14th
Safety Case Assessment

Safety Case assessment by NOPSEMA, regulating all offshore areas in Commonwealth waters, as well as designated coastal waters where functions have been conferred.
Lifesafety setup in a offshore vessel

- Weight as per SOLAS regulation  82.5kg/men

- Requirement to meet 90-95kg /mer

- Combination of lifeboats and liferafts on one side.
  - 100% POB of lifeboats on one side.
Upgrade on limited space

Already installed Traditional davit systems

New-proposed Compact System
Enclosed davit system

- **Paint**
  - Coating 250 microns.

- **Compact davit system**
  - All components integrated inside the structure.

- **2 speed winch**

- **Digital accumulator indicator**

- **Accumulator**
  - Automatically refilled accumulator.

- **Reduces maintenance**
  - Inspection hatches for easy access to equipment.

- **Lifeboating only**
  - NFD davits will not have the block.

- **Easy Installation**
  - Small footprints & welding. Stainless steel bolts.
SPACE REQUIREMENTS
Ship davit
NPDL – if limited space availability
NPDL 7500

PRELIMINARY

NOREQ NPDL 7500 H

- SWL
- Boating lowering speed:
- Dead ship lowering speed
- Design spec:
- Wind type
- Shock Absorber
- Wave compensation:
- Operation:

7700 kg (as specified)
5 knots / 18 m/s (average vacuum) 95.4 ft (29.1 m)
10 deg. trim, 20 deg. list simultaneously
Manning 7200 (as specified)
At request
Remote control

NOREQ TOTALLY ENCLOSED LIFEBOAT

<table>
<thead>
<tr>
<th>TYPE</th>
<th>DRAFT (m)</th>
<th>CAPACITY (P)</th>
<th>LENGTH (m)</th>
<th>BAYAR LOAD (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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NOTE: Dimensions and capacities are approximate and subject to change.
RIG DAVITS
NRDS – Rescue Boat Davit Rig
Workboat davit

- The new Noreq workboat davits are
- specifically designed for the safe and
- efficient launching and retrieval of workboats.
- The davits are used for both rescue boats
- and workboats
Plug & Play System
Easy transport & Installation
Thank You for the attention!

Please Meet us at the exhibition area for more Information

Atle Falk  /  Kuganesan Mahathevan
14.10.2013
Perth Australia