Technology Seminar for Column-stabilised Unit

Air Gap and Slamming Load Predictions

HOUSTON, 1st February, 2017
### Houston, 1 February 2017

#### AGENDA

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Speaker</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:30-9:00</td>
<td>Registration and Coffee</td>
<td></td>
</tr>
</tbody>
</table>
| 9:00-9:15  | Welcome and Introductions                    | Jenny Lu  
Head of Section, Offshore Technology and Approval Center, DNV GL |
| 9:15-10:00 | Presentation of OTG-013                      | Won Ho Lee  
Principal Engineer, Offshore Technology and Approval Center, DNV GL |
| 10:00-10:30| Case Study, OTG-013                          | Tao Wang  
Aker Solutions |
| 10:30-10:45| Coffee Break                                 |                             |
| 10:45-11:30| Presentation of OTG-014                      | Thomas Berg Johannesen  
Principal Specialist, Hydrodynamist and Metocean, DNV GL |
| 11:30-12:15| Lunch Break                                  |                             |
| 12:15-12:45| Case Study, OTG-014                          | Won Ho Lee  
Principal Engineer, Offshore Technology and Approval Center, DNV GL |
| 12:45-13:30| Q&A -Panel Discussions                       | Moderator: Piotr Szalewski  
Principal Engineer, Offshore Technology and Approval Center, DNV GL |
| 13:30-14:00| Summary and Way Forward                      | Heather Davis  
Senior Engineer, Offshore Technology and Approval Center, DNV GL |
Practical Information
Technical Seminar – OTG 13/14
Houston, 1st February 2017

Jenny Yan Lu
Background

- COSL Innovator was hit by a large wave in a moderate winter storm 30/12/2015
- Several windows on the third deck damaged and the wave impact led to one fatality
- The incident has attracted considerable attention from media, the industry and PSA
Stakeholder Involvement – Past Year

- Police inquiry
- PSA investigation
- Statoil investigation
- Internal investigation
- Media

- All stake holders: Charterers and Owners, Designers and Yards, Unions and Trade Organization, Regulators
Objective is to:
- Share Lessons Learned
- Help Improve Industry Practice
- Ensure that class rules provide assurance to all stakeholders:
  - Crew on board
  - Owners
  - Insurance
  - Investors
  - Designers and Builders
  - Charterers
  - Regulators
  - General Public
Two Questions....

Freak wave?
- yes → No actions needed
- no → GM4000 only?
  - yes → Actions on GM4000 only
  - no → Industrial Practice

Industrial Practice:
- OTG 13: Documentation of air gap
- OTG 14: Documentation of horizontal wave loads
From PTIL’s Investigation Report:

*) On the basis of available data it is PSA’s consideration that the wave was steep. However, the weather conditions 30.12 was probably within what the unit should have been designed for.

Units shall have resistance to similar and worse waves than the one that struck COSL Innovator 30.12.2015

*) Translated to English by DNVGL
94 Semi-submersible MOU’s classed by DNV GL
38 units have +/- 2 meters’ still water air gap relative to COSL Innovator

The risk posed by horizontal wave loads cannot be isolated to the GM4000 design only.
Development of OTG’s

OTG 13/14 DRAFT 1

Industry input

JUNE

OTG 13/14 DRAFT 2

SEPT

Technical Seminar

OTG 13/14 FINAL

DEC 1st

Rules 2018

Feb/March

Development of OTG’s
Possible Effects on Existing Units Operating in Harsh Environments – 2016/17/18

Air Gap Assessment (OTG13 or model test)

- Positive
  - No actions

- Negative
  - Wave Load Assessment (OTG14 or model test)
    - Sufficient strength
      - Remove windows
      - HAZID
    - Insufficient strength
      - Reinforcement
      - Restricted services
      - HAZID

HAZID
101 In the ULS condition, positive air gap should in general be ensured for waves with a $10^{-2}$ annual probability of exceedance. However, local wave impact may be accepted if it is documented that such loads are adequately accounted for in the design and that safety to personnel is not significantly impaired.
NOT New Requirements

– The COSL Innovator accident has provided new insight to the MOU industry with regard to air gap and wave slamming.

– Requirement to resist slamming loads is not new. What’s new is the requirement to document this resistance.

– Industrial practice to document air gap have been inconsistent. Generic models, factors and parameters shall be conservative if no better information available.

– Documented factors and parameters can replace generic factors and parameters.

– OTG13/14 will be acceptable ways of documentation. However, class rules can accept alternative methods such as model tests and CFD modelling.
THANK YOU