Aasta Hansteen Field Development

Johnny Almelid
Substructure project manager
Aasta Hansteen – a pioneer

• Born December 10, 1824 in Kristiania, deceased April 13, 1908

• Norwegian painter, writer and suffragette

• Subsisted as Christiania’s only portrait painter

• As a writer with a native “bokmål” tongue - used both “nynorsk” and “landsmål”

• Female activist
Aasta Hansteen – pioneer in Norwegian deepwater

Dry gas field
- 1300 m water depth
- Reserves 47 billion Sm³
- Process capacity 23 million Sm³/day
- Seven production wells

Production start up: 2017

Licence Partners:
Statoil 75% (Operator)
OMV 15%
ConocoPhillips 10%
Polarled pipeline project
Aasta Hansteen - opening a new area
Key Area Objectives

- Opening up a new area with new infrastructure gives Statoil a key position in the region
- Considered to be a promising area
- Development supports Statoil’s production ambition from 2017 and onwards
- Maintain and extend options for further developments

Resulting effects

- Develop competence and experience in a harsh deep water environment
- Contribute to develop the industry in the region
Aasta Hansteen challenges

- New area and long distance from shore
- Water depth 1300 m
- Harsh weather conditions
- World’s largest spar – NCS first, and first spar FPSO
- Need for technology qualifications
Harsh environment

![Hs versus Tp contour lines](image)

- Data
- **1 yr**
- **10 yr**
- **100 yr**
- **1000 yr central GoM**
- **10,000 yr**

API RP 2 MET - Draft
Increased fatigue loading

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<th>1.2</th>
<th>2.3</th>
<th>3.4</th>
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<th>5.6</th>
<th>6.7</th>
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<th>8.9</th>
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GoM
Hs: 1~6 m
Tp: 1~10 s

Aasta Hansteen
Hs: 1~14 m
Tp: 3~20 s
Floater concept selection

Key parameters for floater concept at Aasta Hansteen:

- Deep water and harsh environment
- Distance from shore
- Need for condensate storage and offloading
- Floater concept is a combination of hull, mooring and riser considered as one system
Evaluated riser concepts

Hybrid Riser

Flexible riser

Steel Catenary Riser

Less floater motion acceptable
Floater concept selection

Selected concept:
• Spar FPSO, Polyester mooring, SCRs

Characteristics:
• Spar platform has very robust motion characteristics – allows for SCRs
• Volume in spar allows for condensate storage
• Low offset of spar due to taut polyester mooring
Aasta Hansteen – Floater key information

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<tr>
<th>Substructure</th>
<th>Topside</th>
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<tr>
<td>• Total length</td>
<td>• Dry weight</td>
</tr>
<tr>
<td></td>
<td>23.000 tonnes</td>
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<tr>
<td>• Spar deck freeboard</td>
<td>• Conventional gas processing plant</td>
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<tr>
<td>198 m</td>
<td>• Gas turbine power generation</td>
</tr>
<tr>
<td>• Hard tank diameter</td>
<td>• Produced water treatment and disposal to sea</td>
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<tr>
<td>21 m</td>
<td>• LQ 100 beds</td>
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<td>• Displacement</td>
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<td>146.000 tonnes</td>
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<tr>
<td>• Condensate storage</td>
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</tr>
<tr>
<td>25.000 Sm³</td>
<td></td>
</tr>
<tr>
<td>• Steel catenary risers - 12 riser and 4 umbilical slots</td>
<td></td>
</tr>
<tr>
<td>• 17 point polyester tautline mooring system</td>
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</table>
FPSO

- Design according to Norsok
- Condensate storage
- Marine systems
- Working environment
- Material handling
Marine operations and installation

Short installation season due to harsh environment

• Several marine operations
• Long duration due to depth

➢ Mooring lines and risers need to be designed for optimal/effective installation
Aasta Hansteen - main contracts

- **Topside EPCH**
  - **Hyundai Heavy Industries**

- **Substructure EPC**
  - **Technip/Hyundai**

- **Subsea system**
  - **Aker Solutions**

- **Tow to field and mooring installation pipelines and marine operations**
  - **Subsea7**

- **Template Installation**
  - **EMAS- AMC**

- **Umbilicals EPC**
  - **Aker Solutions**

- **Fibre optic cable**
  - **DeepOcean**

Classification: Open

2014-02-04
Aasta Hansteen Facilities Project – Main locations

- Stavanger, Norway: Subsea 7
- Oslo, Norway: EMAS Template Installation
- Moss, Norway: Aker Subsea Umbilical
- Fornebu, Norway: Home Office
- Fornebu, Norway: Aker Subsea SPS
- Darlington, UK: Deep Ocean Fibre Optic Cable
- Rotterdam, Netherlands: Hertel LQ
- Houston, USA: Substructure Engineering
- The Hague, Netherlands: Hyundai/CBI Topside Engineering
- Ulsan, South Korea: Technip/Hyundai Substructure Construction
- Ulsan, South Korea: Hyundai Topside Construction
- Singapore: Hyundai/CBI Topside Engineering

2014-02-04 Classification: Open
Aasta Hansteen Project
Construction Steps

- **TOPSIDE DECK**
  - Hyundai – South Korea
  - Load Out
  - Transportation to Norway
  - Floatover

- **FLARE STACK**
  - Hyundai – South Korea
  - Inshore Mating
  - Inshore Hook-Up Norway

- **LIVING QUARTER**
  - Hertel - Holland

- **SUBSTRUCTURE**
  - Technip/Hyundai
  - South Korea
  - Load Out
  - Transportation to Norway
  - Upending

Field Installation and Completion

**Hyundai / CB&I**

**Technip/Hyundai**

**Subsea 7**

**Hyundai – South Korea**

Integration with facility site

Date: 2014-02-04

Classification: Open
Summary

• Key challenges - combination of deep water, harsh weather and remote location

• Key focus on:
  − Systematic approach to technology qualifications, development of new solutions and experience transfer
  − Risk-based involvement in critical interfaces, internally and externally

• The project contributes to increased competence and experience within deep water technology

• Aasta Hansteen – can we make her smile in 2017?
There's never been a better time for good ideas

Aasta Hansteen Field Development

Johnny Almelid
Substructure Project Manager
E-mail address: joal@statoil.com
Tel: +1 713 572 5863

www.statoil.com