Hvor står vi? Hvor går vi?

Roald Sirevaag, Subsea Chief Engineer, Technology & New Energy
Presentasjons innhold

1. Hvor står vi?

2. Hvor går vi?
   1. Vertikal integrasjon
   2. Horisontal integrasjon
   3. Subsea prosessering
   4. Intervensjon
Development solutions & trends

1. Fixed platforms
2. Floating production systems
3. Subsea to shore

460 subsea wells
Global leader in Subsea Processing
12 years history

1986 Gullfaks/Oseberg
First subsea wells

1997 Lufeng
Subsea pumps

2000 Troll
Subsea water removal and injection

2002 Statfjord sat.
Electric chokes

2005 Norne
Electric manifold valves

2007 Tordis
Subsea water and sand removal & injection, oil & gas boosting

Fit for purpose, state-of-the-art separators, pumps, control & power systems
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Challenge/Solution 1: Wellhead and XT fatigue – 350meters NCS

- WOS/LWRP system
- BOP system
- Big BOP system

Fatigue impact:
- Horizontal tree: 1X
- Vertical tree: 10X
- Connector is weak point

Fatigue measures identified:
- Limit use
- Avoid use
- Fatigue measures identified

LRP system

Wellhead
Challenge/solution 1 – added value: New generation LRP

LWI system - Wireline work

TTRD system - Coiled tubing

WOS/LWRP system

LWI system
- In operation

TTRD system
- Ready for use

WOS/LWRP system
- Needs to be specified and built

Adapters

Horizontal or vertical tree

Wellhead

Aker Solutions
Cameron
FMC
GE Vetco
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Challenge / Solution 2: Horizontal integration
Plug and Play – IO & IOR

• -5 / -6 Status / Need:
  – Subsea Instrumentation Interface Standardisation (SIIS) for subsea sensors
    • 4-20 mA
    • Ethernet
    • CanBus
  – Intelligent Well Interface Standardisation (IWIS) for downhole systems
  – SEAFOM for fibreoptics
Limitless remote monitoring and control
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The future

2009
Tyrihans
Raw seawater injection

2009
Tyrihans
DC / FO control system pilot

2010-12
Tyrihans / Peon
Pilot / All electric field development

2013
Gullfaks
2 X 4 MW subsea compression

2014
Shallow / Deepwater
Compact separation

2014
Tucker
Deepwater high pressure oil boosting

2014
Asgard
2 x 8.5 MW subsea separation

2015
Brazil
Deepwater heavy oil separation

2016/20
Luva
Long distance power, boosting and transport

Operational experience from Lufeng, Troll Oil, Tordis IOR, Tyrihans Injection, testing at Porsgrunn and K-lab

Draft – Topics and fields will change
Luva – 1300m water depth – example field layout
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Safe and efficient field operations - enhancing production (1/3)

Efficient Inspection, Maintenance, Repair

• Typical applications:
  – Choke module exchange
  – Control module exchange
  – Scale squeeze

• StatoilHydro operates 4 vessels on around the year basis

• Performs about 600 jobs on 450 wells pr. year

• New vessels operate in 5 m waves
Safe and efficient field operations
- enhancing production (2/3)
Low cost subsea well intervention

• Typical applications:
  – Data gathering (PLT)
  – Perforating short intervals
  – Zone isolation (plug/straddle)
  – Inspection/repair (DHSV)

• 40+ LWI operations since 2003

• Island Frontier and Island Wells server
Safe and efficient field operations - enhancing production (3/3)
Low cost drainage points

- **Trough Tubing Rotary Drilling (TTRD)**
  Operation through existing production tubing and x-mas tree

- The alternative is conventional sidetrack after pulling production tubing and tree.

- 2 subsea TTRD operations (worlds first) with first generation system

- **New state of the art system to be used on Norne/Åsgard from Stena Don in Q2**
Closing remarks

• Implementation of new technology pays off.

• New tools and systems are being developed.

• We can together take the next steps to **new depths** and **new horizons** with **higher reservoir recovery**.

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