Remote Hot Tapping In Ultra-Deep Water

Katrine Sandvik – Lead Engineer

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Master Thesis

- Evaluate the HTCU – Hot Tap Cutting Unit system for extending its water depth capability to 3000 MSW.
- HTCU present limited to operate below 1000 MSW
  - Control system designed for 1000 MSW
  - HTCU SeaTap designed for 2000 MSW
Objectives of the Master Thesis

- Describe current design
- Describe the Åsgard Subsea Compression Project – Hot Tap
- Discuss potential general improvement issues
- Identify necessary upgrades for 3000 MSW operation
Killingøy - Haugesund

- Statoil
- Technip
Hot tapping is:

- Hot tapping is the process of drilling into a live pipeline (within which in the product is flowing)

- This is done by installing “tees” either during the laying process (pre-installed tees) or by retrofitting branch structures after the pipe is laid (retrofit tees)
PIF/HTCU operation sequence

- Deploy the PIF/HTCU by the ships crane
- Seabed stability, levelling and settling tests
- Rough positioning
- Alignment
- Vertically above ball valve, ready to perform the hot tap
- The hot tap
General improvements based on experience

- Upgrading the HTCU to operate independent of the PIF (vertical handling)
- HTCU handling without PIF – vessel cost
- Optimization of lowering and hoisting speeds
Ultra-deep upgrades

- Subsea System
- Umbilical
- ROV support
- Vessel related

ULTRA-DEEP WATER UPGRADE

Subsea system
Umbilical
ROV support
Vessel related issues

1000 MSW
2000 MSW
3000 MSW

TMS (LARS1)
Subsea System

- Extending from 1000 MSW to 3000 MSW – ambient hydrostatic pressure (300 bar)
- Higher ambient hydrostatic pressure than internal pipeline pressure – reversed pressure differential effect
  - Affect the EDRS, cutting function and seals
- Mechanical, hydraulic and electrical
  - Evaluate compensator capacity
  - Re-design of the hoses
  - Evaluate to replace cylinders
  - Check entire system for enclosed volumes
Subsea System

- The most critical component is the control cards. It has been revealed that the epoxy currently used is inadequate for higher pressures. A new proper professional grade of epoxy must be selected.

- It is also recommended to operate without the HV switch since the HTCU has only one HPU requiring high voltage.

- Cables and connectors are critical. Instead of replacement it is recommended to change supplier (Burton or Seacon).
Umbilical

- Present LARS1 has an umbilical range to 1500-1600 m.
  - New winch with umbilical range
  - New umbilical on the existing winch (widening the drum)
ROV support and Vessel related issues

- Limiting diver-depth is 180m for Norwegian continental shelf
- Operator eyes, operate valves and other support

- ROV support and vessel is not an operational issue
Åsgard Subsea Compression Project Campaigns

- Shallow Water Tests (SWT) and Site Integration Tests (SIT)
- Deep Water Test I (Sognefjorden Jan/Feb 2011)
- Campaign 1 – Deep Water Test II (Nedstrandsfjorden April 2012)
- Campaign 2 – Hot tap preparatory work (Åsgard field May 2012)
- Campaign 3 – Hot tap operation (Åsgard field Aug/Sept 2012)
Åsgard field

- Depth: 265 MSW
- Dimension: 20”
- Midgard Y-101 pressure: 91 bar
- Midgard Y-101 temperature: 8.4 degrees
- Nominated vessel: Scandi Arctic
First ever remote hot tap on an unprepared pipeline

- Åsgard Subsea Compression Project
- CRU – Coating Removal Unit
En rekke millioner inn i milliarder

Statoil med fjernstyrt verdensrekord på Åsgard

HOT TAP PÅ ÅSGÅRD
Her gjør Statoil noe ingen andre har gjort før

For første gang i historien har noen klart å sveise på et grenrør på et gassrør i drift på havdyp som ikke er tilgjengelig for dykkere.

Verdensrekord: Det er første gang i verden at noen har sveiset på et rør i drift på dyp som ikke er tilgjengelig for dykkere.

ÅRETS INGENIØRBRAGD 2012
Verdens dypeste sveis

Statoils verdensrekord er nominert til Ingeniørbragden.

utvikling i Statoil og leder for operasjonen på Åsgard-feltet.
Åsgard video

- Video