Remote Hot Tapping In Ultra-Deep Water

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FFU Seminar Sola Quality Airport Hotel, January 2013

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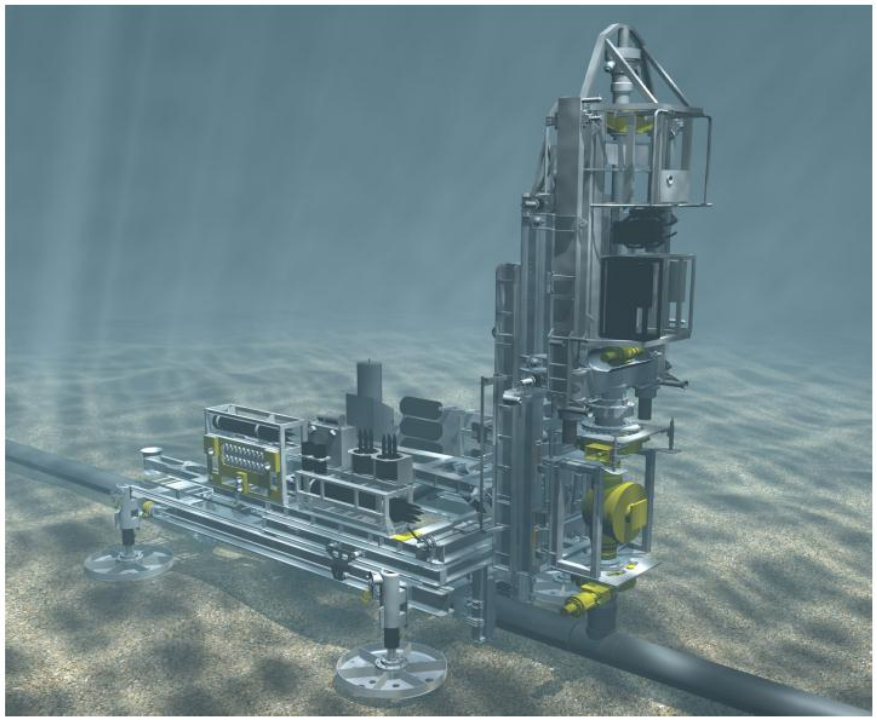
take it further®

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**



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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**

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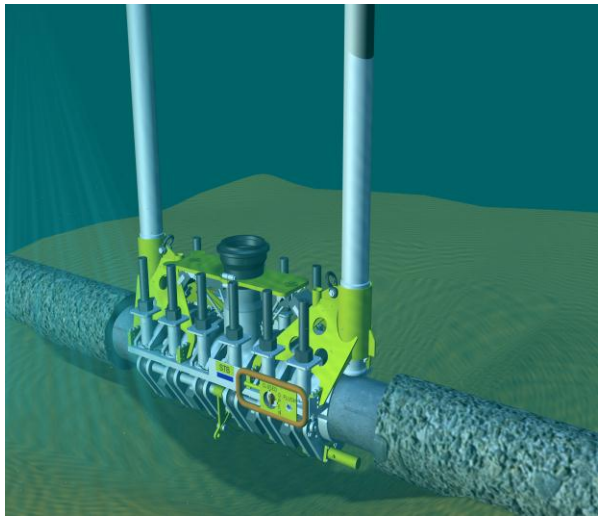
Killingøy - Haugesund

- **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)**



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PIF/HTCU operation sequence

- Deploy the PIF/HTCU by the ships crane
- Seabed stability, levelling and settling tests
- Rough positioning
- Alignment
- Vertically
- The hot ta

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**

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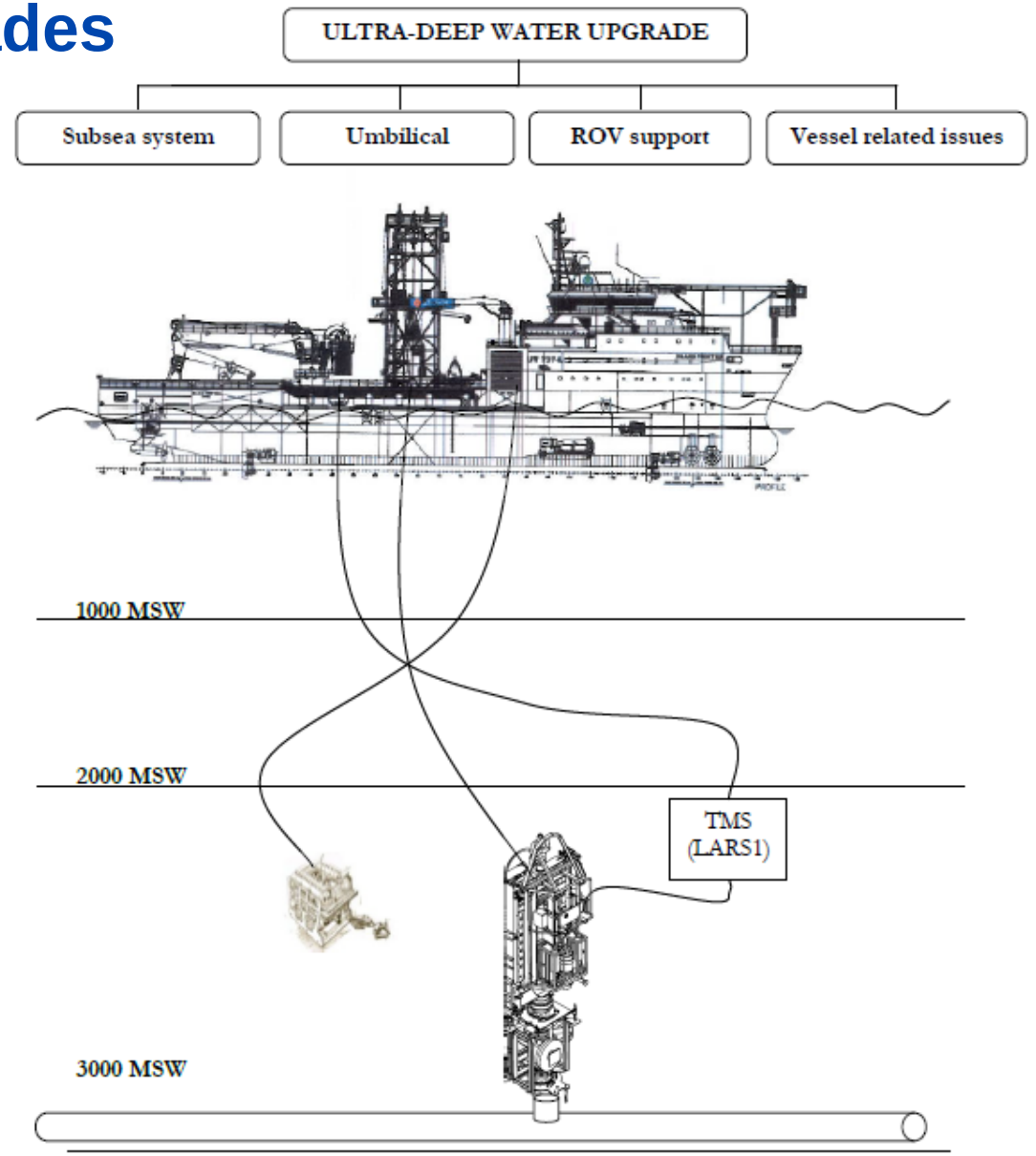
Ultra-deep upgrades

- Subsea System
- Umbilical
- ROV support
- Vessel related



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

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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).**

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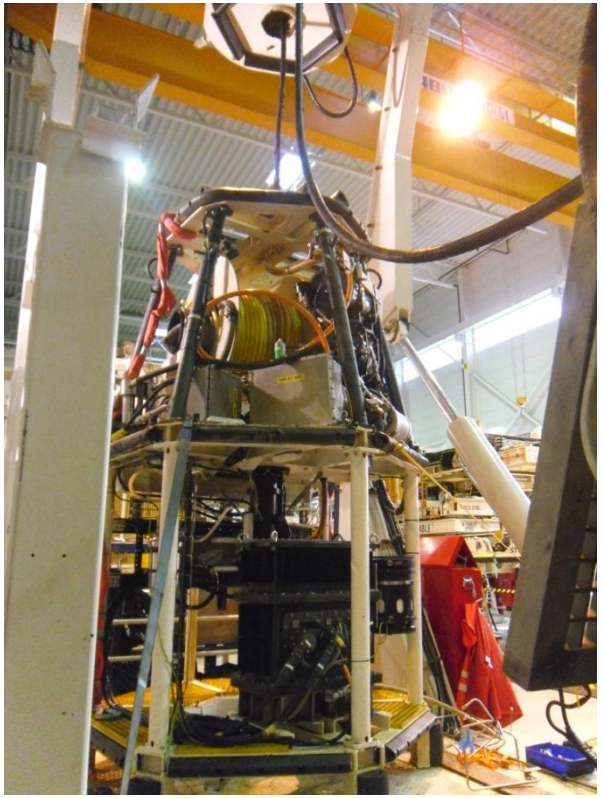
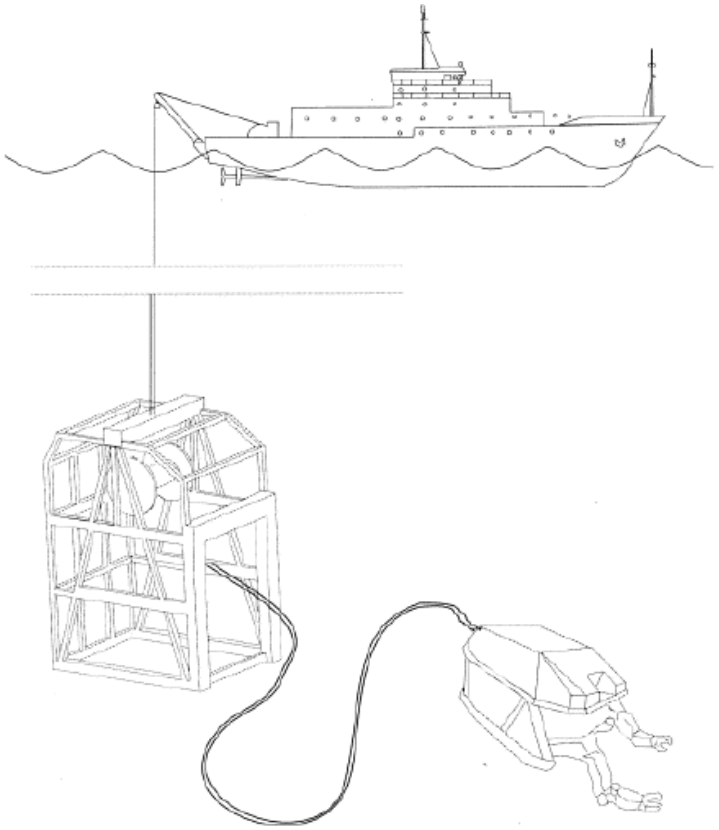
Umbilical

- **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)**

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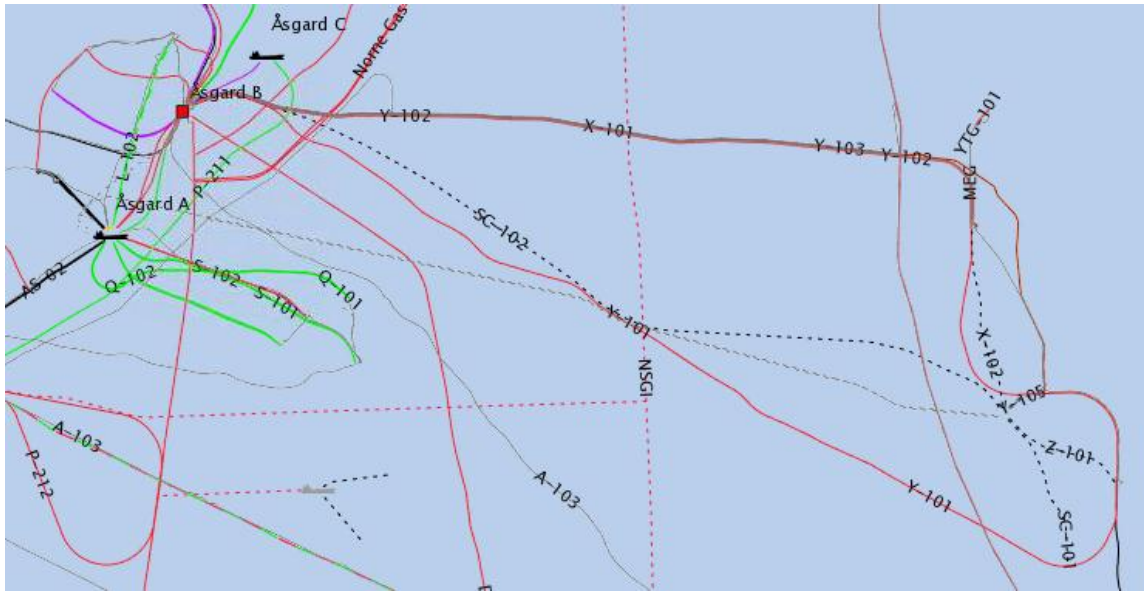
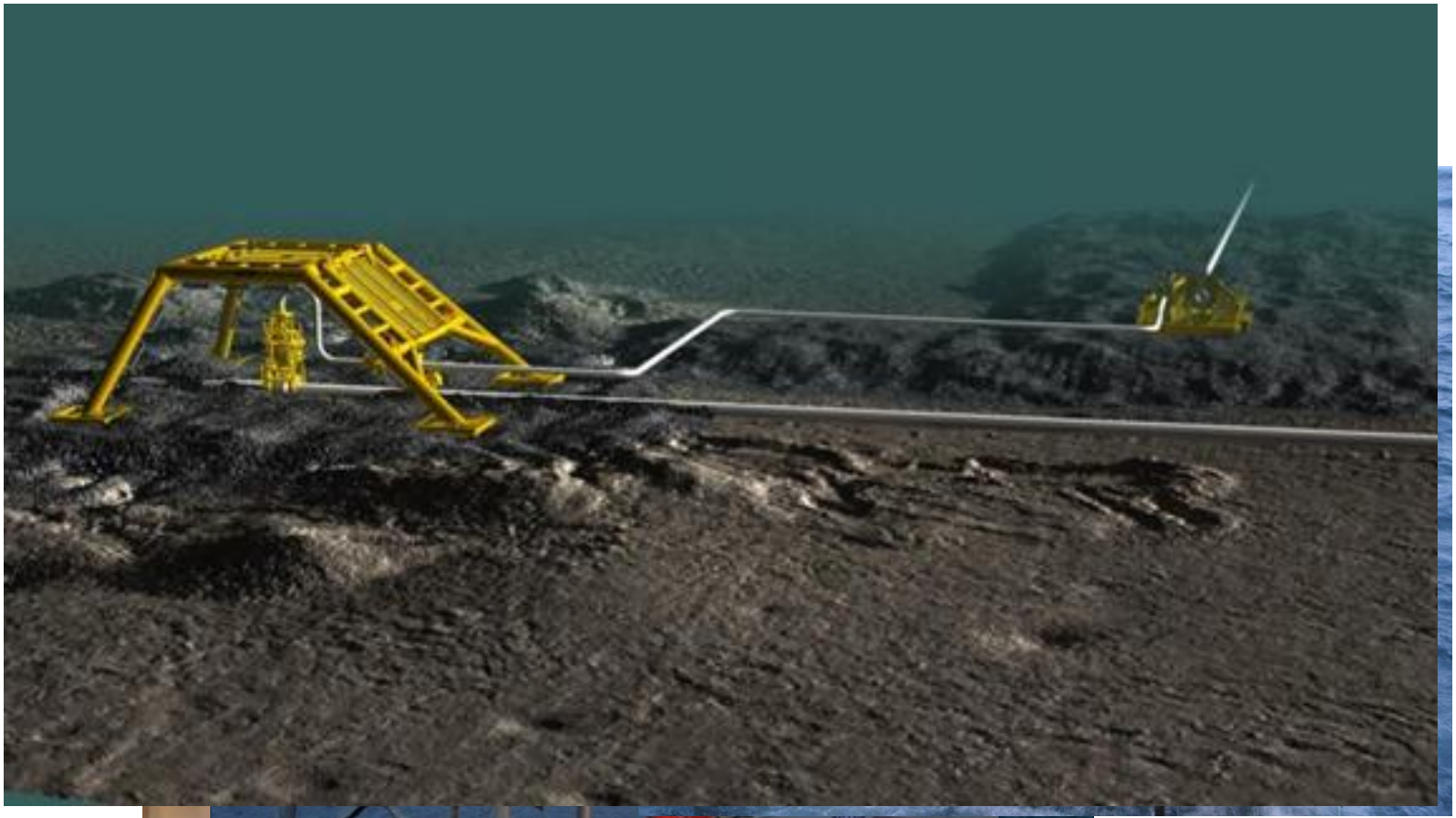
Åsgard field

- **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**



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.

A branch pressure

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

fjernstyrt hot tap-utvikling i Statoil og leder for operasjonen på Åsgard-feltet. (Foto: Rune Solheim)

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

Åsgard video

- Video