Compact subsea gas compression solution for maximized recovery

Aberdeen, 6th February 2014

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Why subsea gas compression

■ Gas fields require boosting of the reservoir flow as pressure depletes

■ Advantageous to place the compressor close to the well
  ■ Increased production
  ■ Reduced CO2 emissions

■ Subsea gas compression replaces the need for an offshore platform or onshore compression facility

■ Safer due to unmanned operation
Aker Solutions experience and current design

2006 – 2011 Ormen Lange Subsea Compression Pilot

- 15 MSm$^3$/d max flow rate
- 12.5 MW compressor power
- 900 m water depth
- 120 km step-out distance
- Subsea Variable Speed Drives, Circuit breakers and UPS

2010 – 2015 Åsgard Subsea Compression System

- 21 MSm$^3$/d flow rate
- 2 x 11.5 MW compressor power
- 300 m water depth
- 40 km step-out distance
- Topside Variable Speed Drives, Circuit breakers and UPS
Åsgard subsea compression project status

Manifold station

Compression station template
Industry needs for subsea gas field developments

- Maximized production… qualified and reliable system
- Reduced CAPEX… simplified and robust design
- OPEX saving, with easy intervention… compact and modular solutions
- HSE focus… safe operation and minimized environmental footprint
- Flexibility for future developments… building-block design
Compact Subsea Gas Compression System

Main objective

Design, qualify, build and test a compact subsea gas compression system

Applications

Medium to small sized gas & gas/condensate fields, including long step-out and deep water
Key enabling technologies

- Cooling module
  - Active Cooler
  - Gas Piston Pump

- Compression module
  - Compact Scrubber
  - Subsea Compressor

- Power module
  - RotoConverter™
Active Cooler development

Current Challenge
■ Passive coolers with big footprint and temperature control by design prior to installation

New Design
■ Forced convection cooler through pump

Benefits
■ Footprint and weight reduction
■ Temperature control during operation
■ Possibility to reduce hydrate inhibitor by controlling minimum temperature
Gas Piston Pump development

Current Challenge
- Subsea pump requiring barrier fluid and Variable Speed Drive
- Recycling for low liquid content

New Design
- Pneumatic transport by using pressurized gas from the compressor

Benefits
- Low cost for pumping
- High reliability
- Simple control system
- No need for electrical supply and power components
RotoConverter™ development

Current Challenge
- Long distance transmission requires low frequency - Typical subsea loads require high frequency

New Design
- Low frequency transmission, 15-50 Hz, and local subsea frequency step-up

Benefits
- Enables more power for longer distances
- Reduced CAPEX
- Increased cable performance
- Leverages existing topside design
Subsea Compact Gas Compression system benefits

- Maximized production
  - Simplified system functionality
- Reduced CAPEX
  - Reduced size and weight
  - No pump Variable Speed Drive
  - No barrier fluid HPU and tubing
  - Reduced cable cost
- OPEX saving, with easy intervention
  - Reduced module retrieval weight
- HSE focus
  - Remotely operated from on-shore locations
- Flexibility for future developments
  - Configurable system
Summary

- Implementing lessons learned from previous technology qualification programs and projects
- Close cooperation with the industry for the next generation of subsea gas compression systems
- Enabling technology for smaller fields and applications in remote areas
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