Subsea Processing – Valve Makers Rise to the Challenge

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Overview

• Severn Glocon Group
• Fields of the Future - Subsea Processing
• Valve Technology and Challenges
• Subsea Valve R&D
• New Processing Demands - New Thinking
With more than 50 years’ experience, Severn Glocon Group provides world-class engineered valve products and services to onshore, offshore and subsea systems across the globe.

- Over 800 employees
- Facilities in the UK, Middle East, USA, India and Australia
- Dedicated subsea businesses: LB Bentley and Severn Subsea Technologies
Fields of the Future

- Deepwater and ultra-deepwater over 3,000m
- Difficult environments e.g. Northern North Sea, Arctic, Gulf of Mexico, Brazil
- Environmental restrictions e.g. Arctic
- Field types: heavy oil, marginal fields, longer ‘step outs’ (over 300 km)
By 2019 – 11% of Subsea Wells will be HPHT (SLB 2008)
Fields of the Future - Challenges

- Cost and logistics driving offshore - subsea processing trends
- More remote fields
- Reduction in field development costs
- Delivering the Subsea Factory
Subsea Processing

- Christmas trees, manifolds, pipelines: separation, boosting, injection, and soon gas compression
- Deepest subsea tree 2,700m
- Technical limits: 3,000m, -46 °C to +205 °C, pressure up to 20,000 psi
- Conventional subsea technologies no longer adequate
Subsea Processing

- Greater subsea processing needed to develop some deepwater fields
- Size, weight and complexity of processing modules
- Valve developments geared to the new challenge
Subsea Valve Technology

- Valves typically used include:
  - choke valve, needle valve, directional control valve, through conduit valve, rotary gate valve, HIPPS etc.
- Reliability critical
- Choice determined by fluids, temp, pressure, resistance to processing hazards (hydrogen sulphide, hydrate formation)
Valve Technology Challenges

- No such thing as a ‘standard’ subsea valve
- HPHT conditions:
  - pressures up to 20,000psi
  - broad temperature range -46 C to +205 C
- Need to reduce weight and size of valves
• Specialist in bespoke Small Bore Subsea Valves
• Typically used on chemical injection systems
• Patented, 25 year field proven products
• Pioneered metal to metal sealing technology
• Products: rotary gate valves, through conduit gate valves and check valves
Rotary Gate Valve Technology

- Key enabling technology for subsea processing systems
- Smaller and lighter than through conduit and needle valves
- Simple 1/4 turn operation, metal to metal sealing
- 3/8” to 3/4” range - minimum of moving parts
- Valve internals cannot be damaged by “over torque”
Subsea Valve R&D

- Severn Subsea Technologies - Severn Glocon Subsea R&D
- Subsea valves, HPHT downhole tools, smart intervention tools, and camera systems
- DCVs, HIPPS, Stab Plate manufacture assembly and test
- Key skills: mechanical engineering, heat shielding, electronics and software engineering
- Precision engineering, Class 7 cleanroom, hyperbaric chamber proof testing up to 425 Bar
Subsea Valve R&D

- Development of subsea valves to meet new subsea challenges
- Integrated systems approach
- Subsea processing and downhole tools
- Broaden the scope for Severn Glocon valves subsea
Directional Control Valves

- ‘Next generation’ DCVs
- More adaptable to meet project requirements
- Compatible with all subsea and surface hydraulic fluids types
- Material selection for direct immersion in sea water
• Mechanical HIPPS (High Integrity Pipeline Protection System)
• Simpler operation than current electronic HIPPS systems
• Higher resistance to wax deposition and hydrate formation
• Remote monitoring without supporting infrastructure
Rising to the Challenge

- No such thing as a ‘standard’ subsea valve
- Valve is a key component in optimising subsea processing equipment design
- New subsea processing demands and current procurement practices mismatch
- Greater collaboration needed between operators and vendors
Valve as Design & Processing Enabler

- Valve is part of the solution to achieving a range of design and performance objectives
- Small bore rotary valves now up to 1" - allowing replacement of larger and heavier through conduit, and needle valves – greater reliability
- Compact subsea process equipment design makes size, shape and interface more important than ever
- ROV interfaces and hydraulic connections - optimise interfaces and flexible mounting configurations
Conclusion

- Need intelligence-led approach to valve specification
- New thinking needed to ensure valve location and interfaces fully optimised – tap into valve makers’ experience
- Avoid complexity - simple operation
- Valve envelope dimensions can be customised to fit available space, for example, stem extensions, panel mounted, dual and quad block
- Involve valve manufacturer earlier at feasibility / FEED stage

We’re here to help.
Thank you

Severn Subsea Technologies