

Heimdal Junction: The past - The present - The future

The Heimdal Facilities

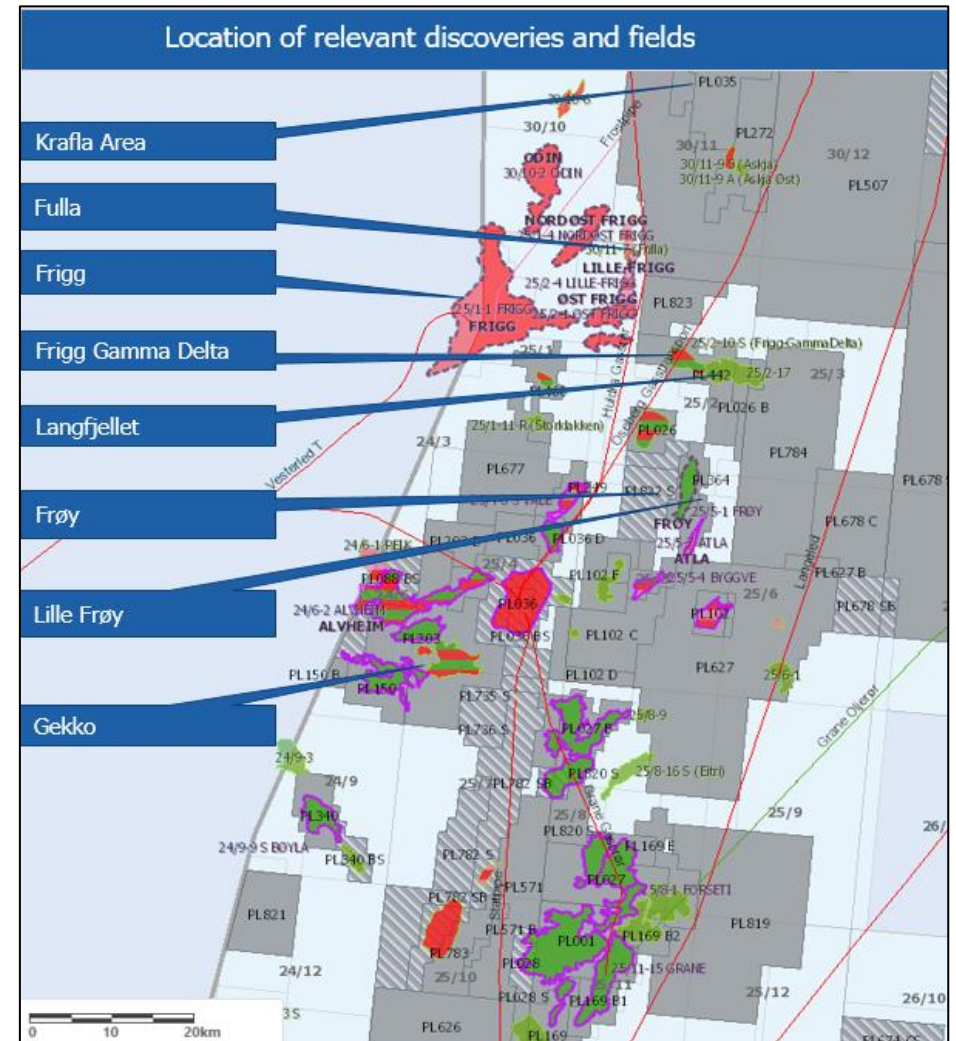


A short Heimdal history lesson and look into the future

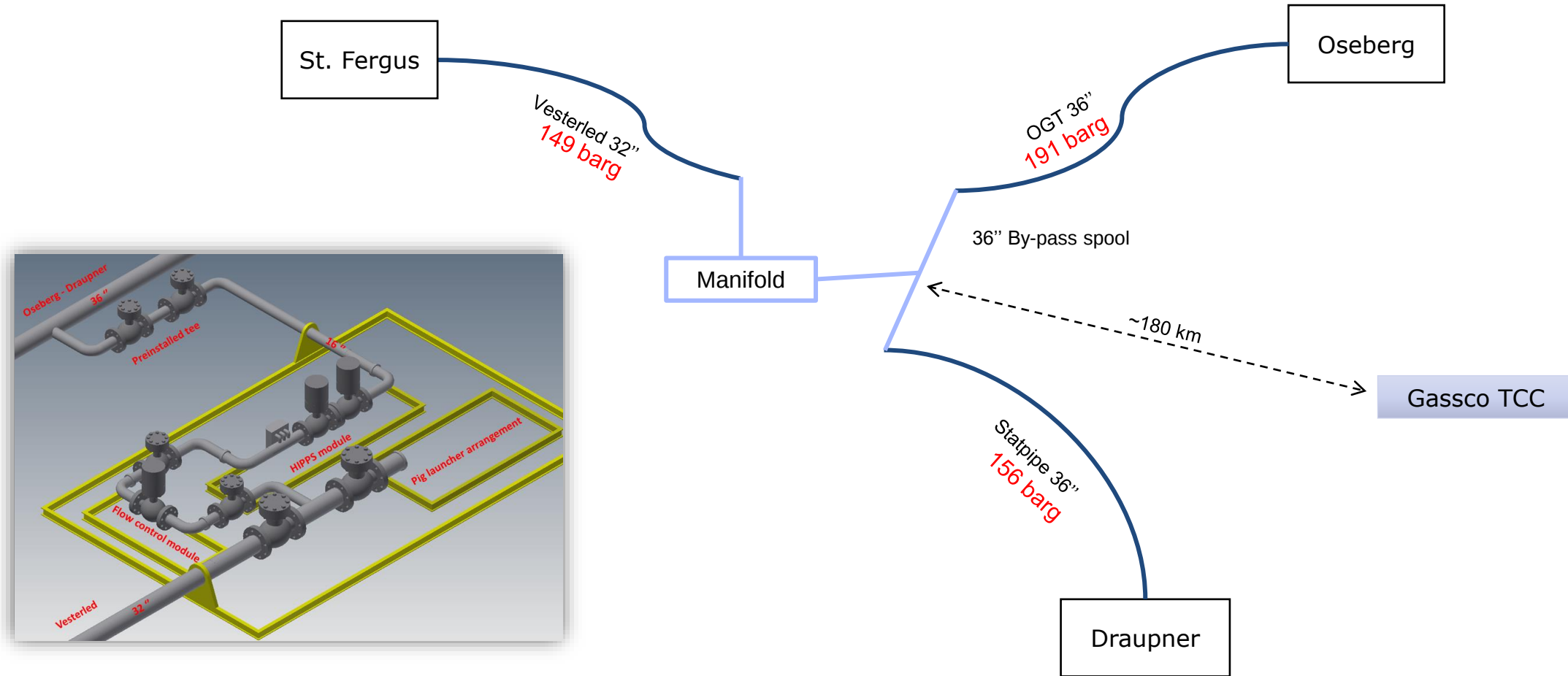
- 1972: Discovery of the Heimdal field - No gas transport solution until 1981
- 1985: Statpipe in operation to transport Heimdal, Gultaks, Statfjord gas to Kårstø and Norpipe/Emden via Draupner platform
- 2000: Heimdal processing extended by tie-in of Oseberg, Huldra, Skirne/Byggve/Atla to the new Heimdal Riser Platform and export via HRP to Grane and St. Fergus via Vesterled and the '77 vintage Frigg Norway Pipeline
- 2011: Valemon production routed to Heimdal via a tie-in to the Huldra pipeline
- 2018: Decision made by Valemon to stop processing at Heimdal from 2021 and re-route production to Kvitebjørn.
- 2019: Heimdal Riser Options architect & concept study completed. Gassled JV Investment decision for HSB project
- 2021: Valemon production via Heimdal extended to 2023. HSB to be installed, ready for tie-in at short notice
- 2022: Completion of PPS installation at Oseberg, Draupner and Jotun A. Preparations for final tie-in using diverless welding technology
- 2023: OGT, Statpipe S35, Vesterled & Grane pipelines disconnection from Heimdal facilities and connection by hyperbaric welding to the new HSB tie-in spools. Recommissioning of Statpipe and Grane Pipeline systems.
- 2025: Start removal of Heimdal Platforms after ca 700 million boe produced /260 billion nok income for owners and the state (Source: <https://www.equinor.com/en/news/20210617-heimdal-extended-2023.html>)
- 2027: Reinstatement of the Heimdal area and return of the seabed to 'legitimate users of the seas'

Heimdal – 2021 and beyond

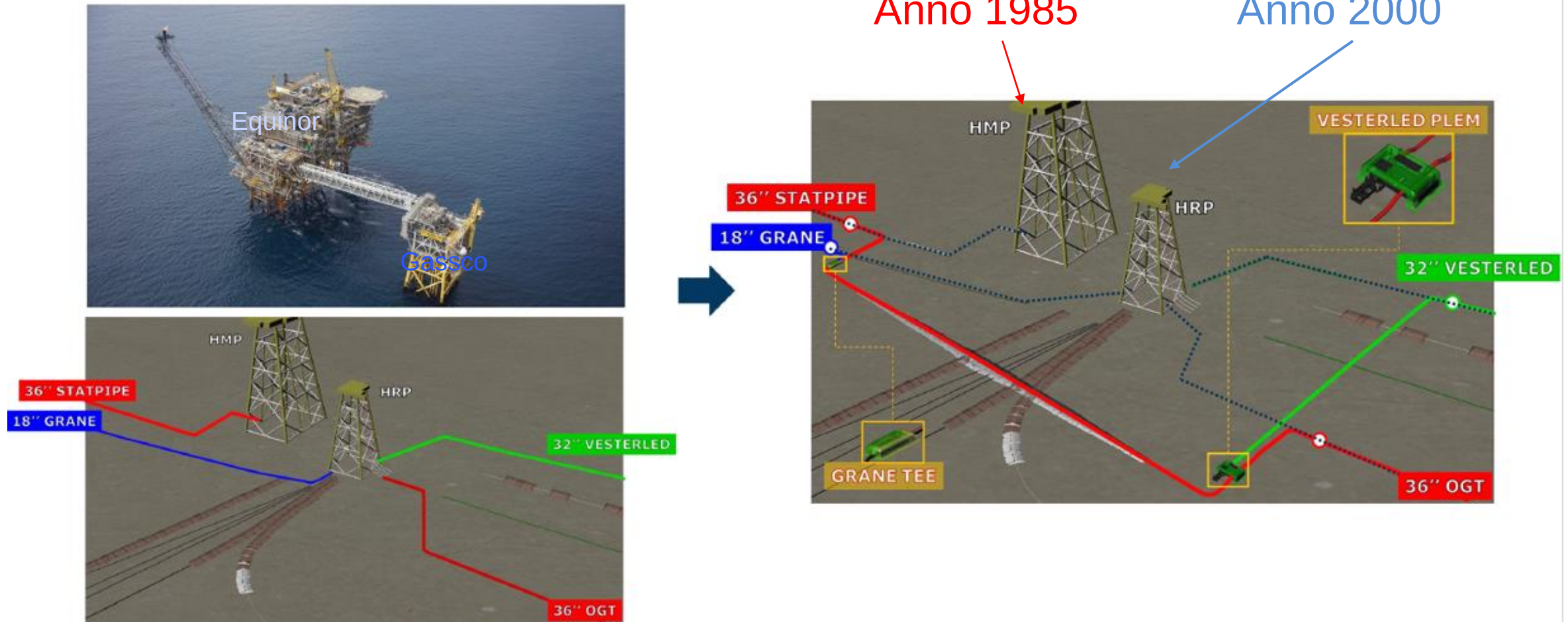
- **Architect's challenge:** Optimal gas processing solutions for the Heimdal area for all stakeholders and society in general
- **Project objective:** Maintaining a safe, sustainable and cost-efficient transport solution for dry gas in the Heimdal Area
- HSE and lifetime cost consequences for Heimdal riser platform for continued operations
- Socio-economic considerations
- Use of modern technologies & operations
- Emissions
- Major Accident risk
- Third party risk
- Climate change
- Stakeholder Management



Subsea HIPPS Manifold – unnecessarily complicated



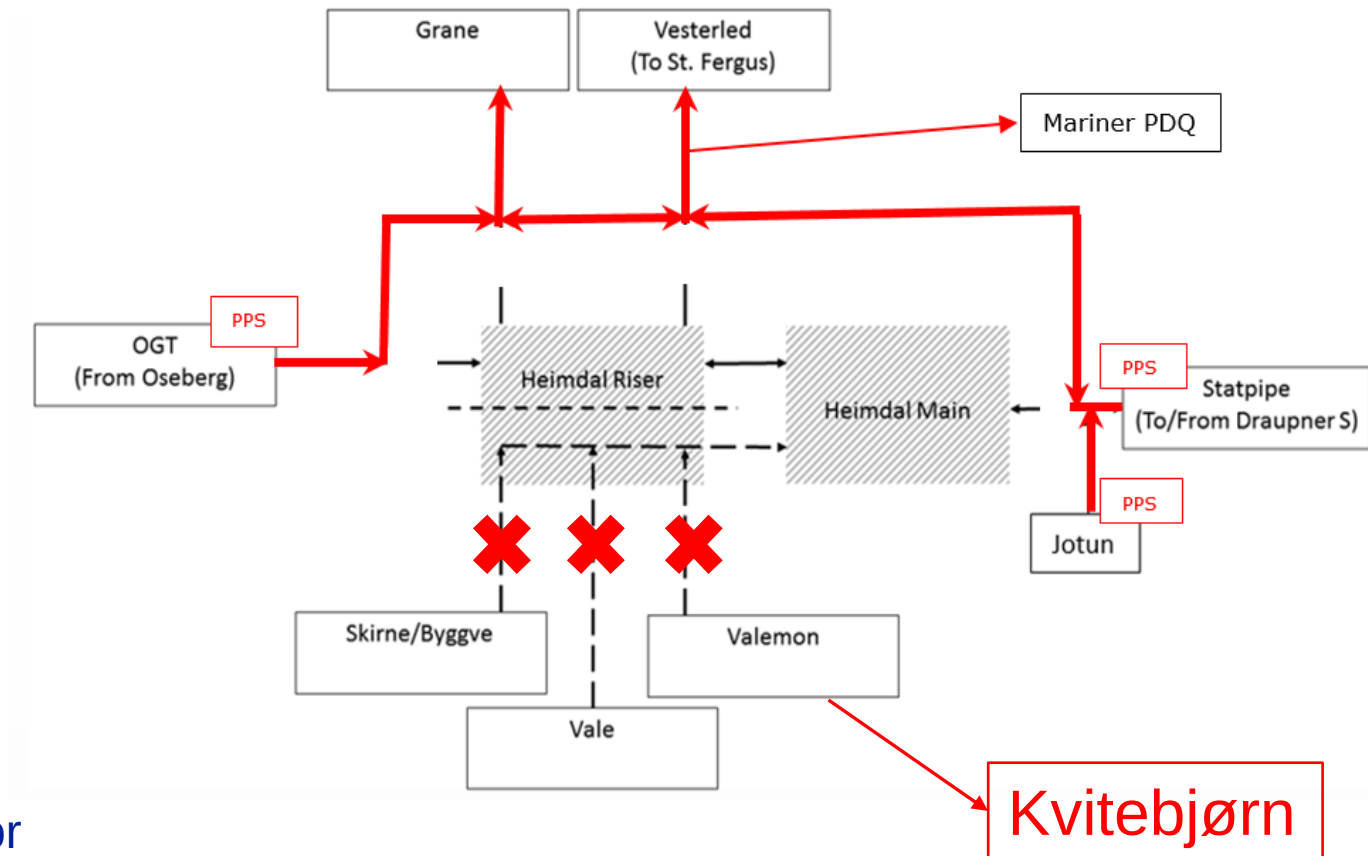
Heimdal facilities - ageing infrastructure



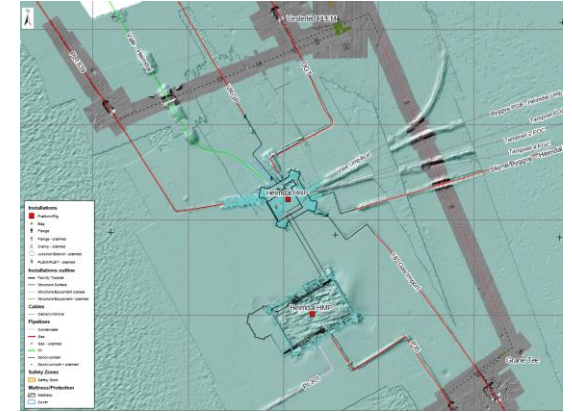
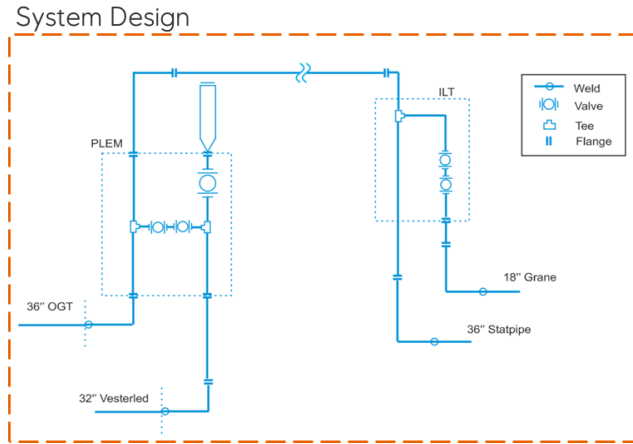
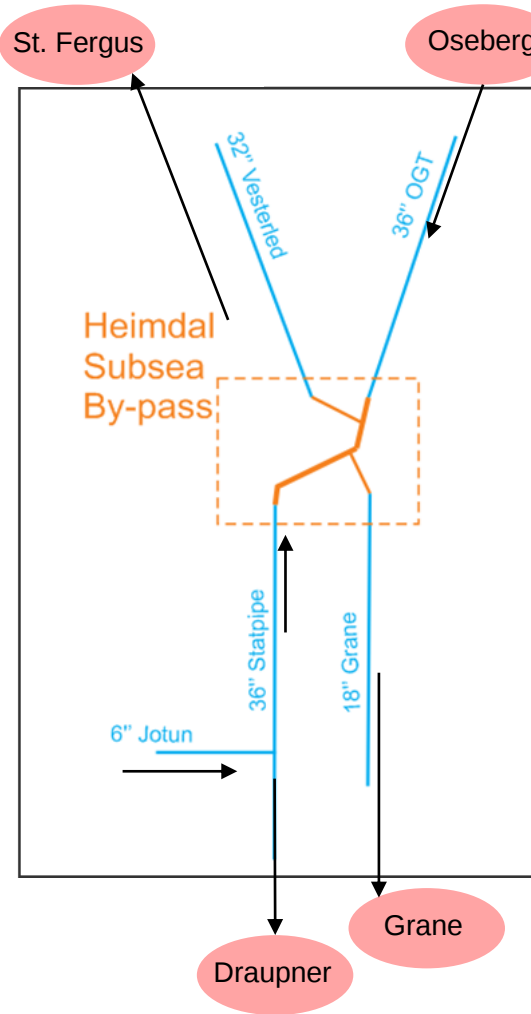
How long can we operate safely in a cost effective manner?

Heimdal functionality upstream – PPS & Product quality

- Single operating pressure 149 barg
- Instrumented Pressure Protection Systems at Oseberg, Draupner & Jotun
- WDP, Gas quality, flow, leak detection measurement at sources
- Blending at HSB into Vesterled by simulation
- Subsea pig launch for Vesterled using Tampen Link pig launcher
- OGT/Statpipe becomes one pipeline
- Spool for future Grane subsea pig launcher
- Pipeline cleaning & Intelligent pig inspections prior to disconnection



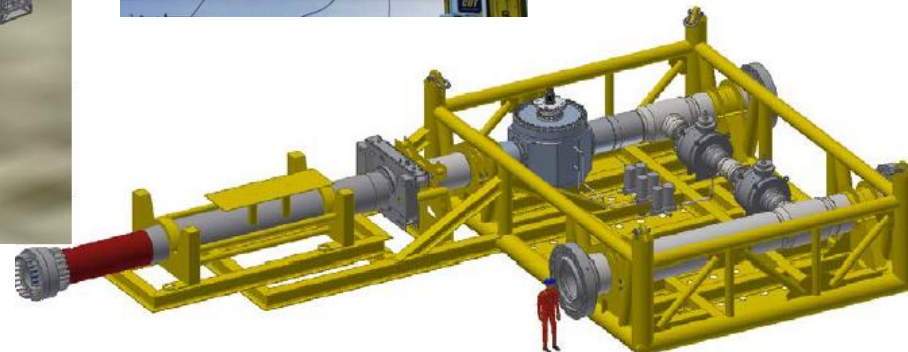
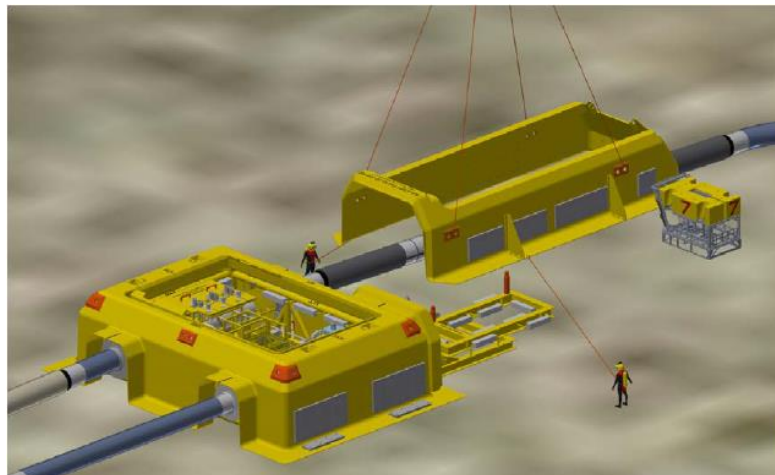
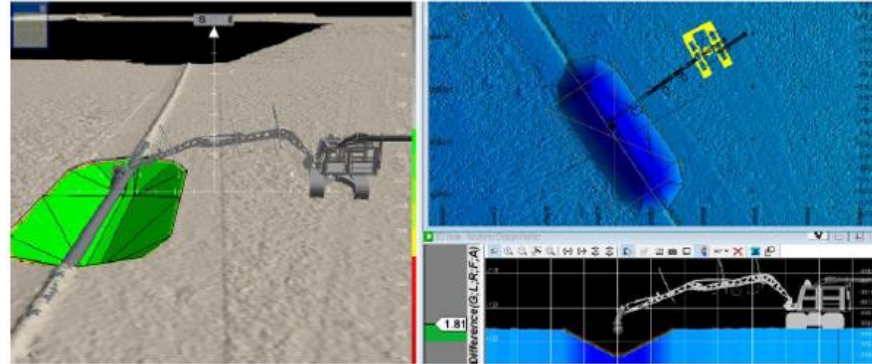
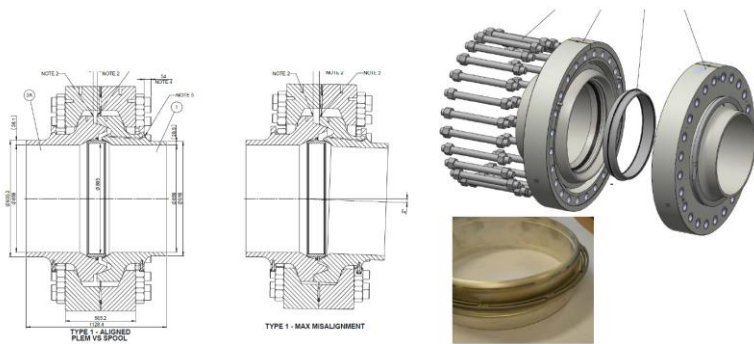
Heimdal Subsea Bypass – a robust solution



- **Design phase - Updated QRA for HSB, OGT, Statpipe, Vesterled**
 - Higher inventory
 - Higher arrival pressure at St Fergus – Plant & third party risk, pressure protection
 - Potential leak points => Flanges, anchors, fatigue, dropped objects
 - Shipping patterns
 - Leak simulations – expected leak rates & detection times, PlumePro simulations
 - Effects of climate change – currents, waves, storms
 - Review of existing integrity threats in operations DNV RP F116, boundary effects
 - Construction risks – towing, vessel impact, dropped objects, plugging
 - Interim operations & platform removal (2023- 2027)
- **Operations phase**
 - Risk Based Inspection & threat reviews during first years of operations
 - Post - COVID ship traffic, trawl patterns and impact on rock berms/GRP structures
 - Follow up of PPS Inspection, Maintenance & Testing programmes.

21st century technology for 21st century operations

SeAlign flanges



Keep it simple, keep it safe



The Heimdal Facilities – A Vision for the Future



Thank you for your attention

