
Rigless Well Stimulation of Subsea Wells

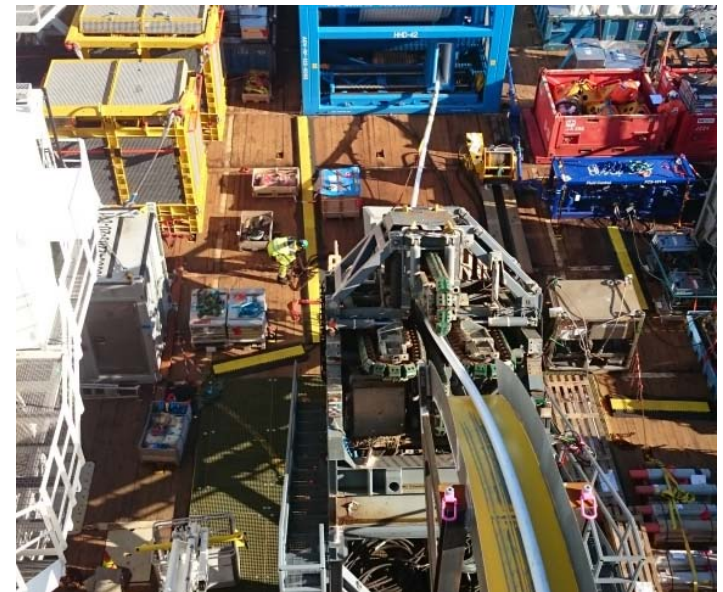
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i-Tech Services



What is Rigless Well Stimulation?

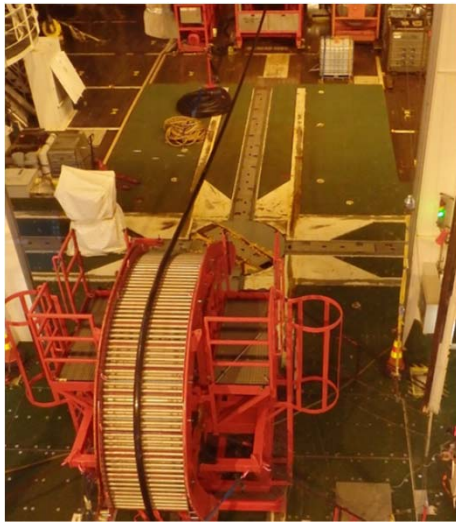
- Production enhancement with a track record
- Low cost
- Tangible economic benefit
- Simple concept
- MSV based



Courtesy of: Airborne Oil and Gas

Uses

- Acid stimulation
- Scale Squeeze
- Asphaltene treatment
- Well commissioning/clean-up



Single Vessel-Operations

- Requirements
- Advantages
 - Cost benefit
 - No Need to access Crown Plugs
 - Emergency Disconnect Isolation in case of black-out or vessel run off.
 - Portable tankage / Pump systems
 - Configurable to accommodate various deck layouts to vessels of opportunity / regional limitations
- Considerations

Courtesy of: Subsea7



Dual Vessel-Operations

- Advantages
 - Large volumes
 - Redundancy
 - Power
- Considerations
 - Cost tradeoffs
 - Two vessels
 - Mobilization
 - Capacity



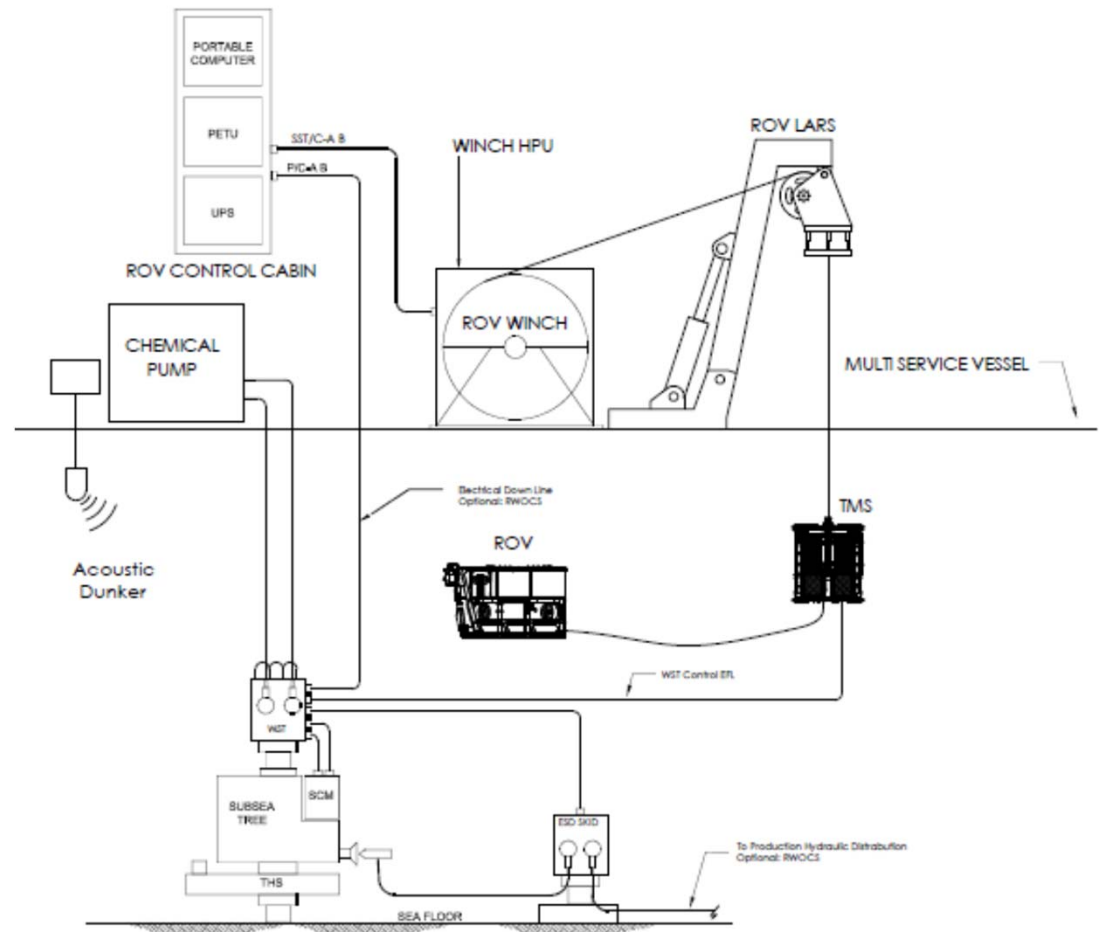
Courtesy of: BOA Marine Services

Access

- Vertical Trees
- Horizontal Trees
- Bespoke Access Points
 - @ Tree
 - @ Manifold/Plet
 - @ Jumper

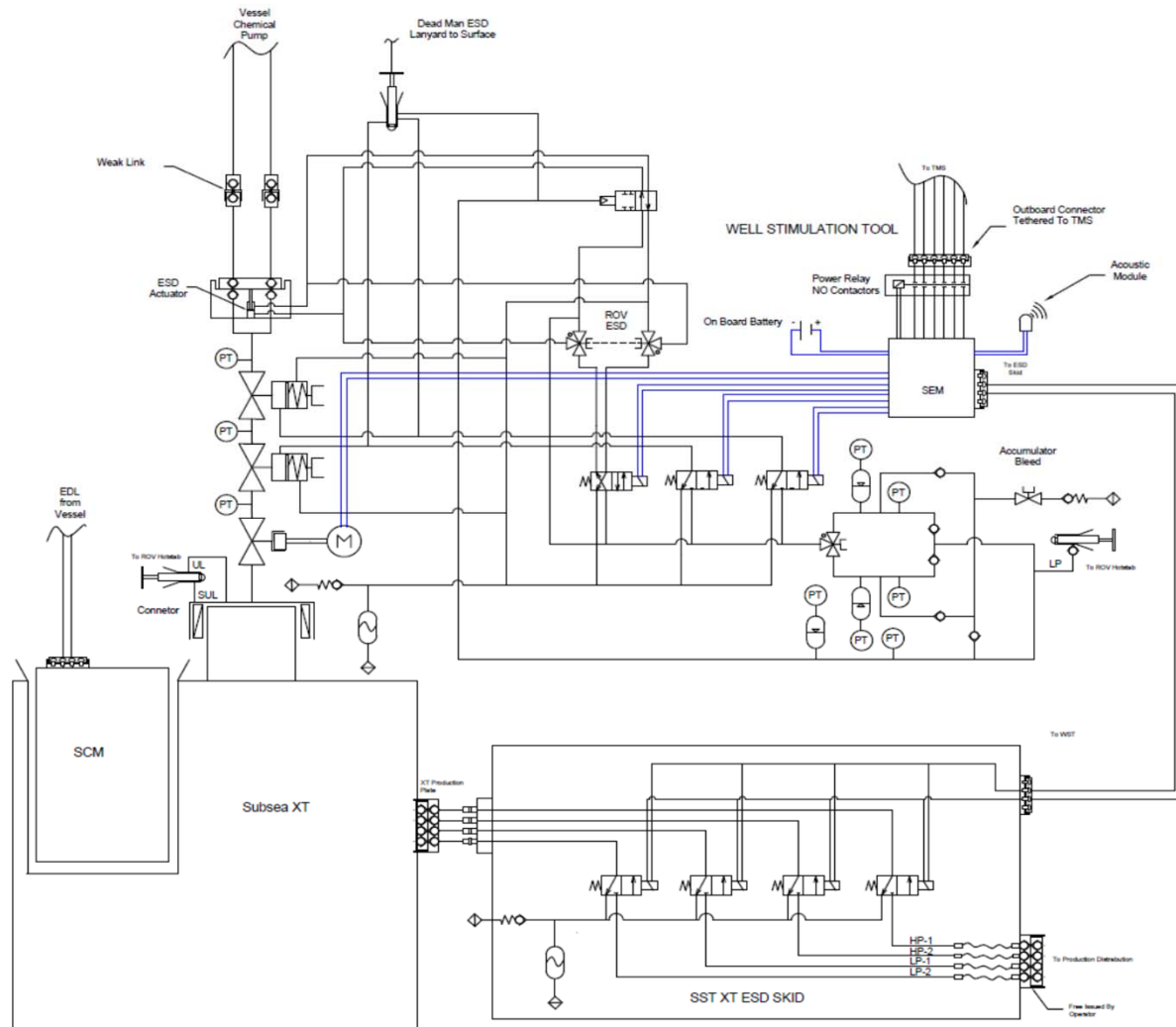


- Well access device
- Riser
 - Open Water:
 - Coiled Tubing
 - Hose
 - Thermoplastic Composite Pipe (TCP)
- UTA



Safety Systems

- Reliability
- Redundancy
- ESD
- Tree Barrier Control



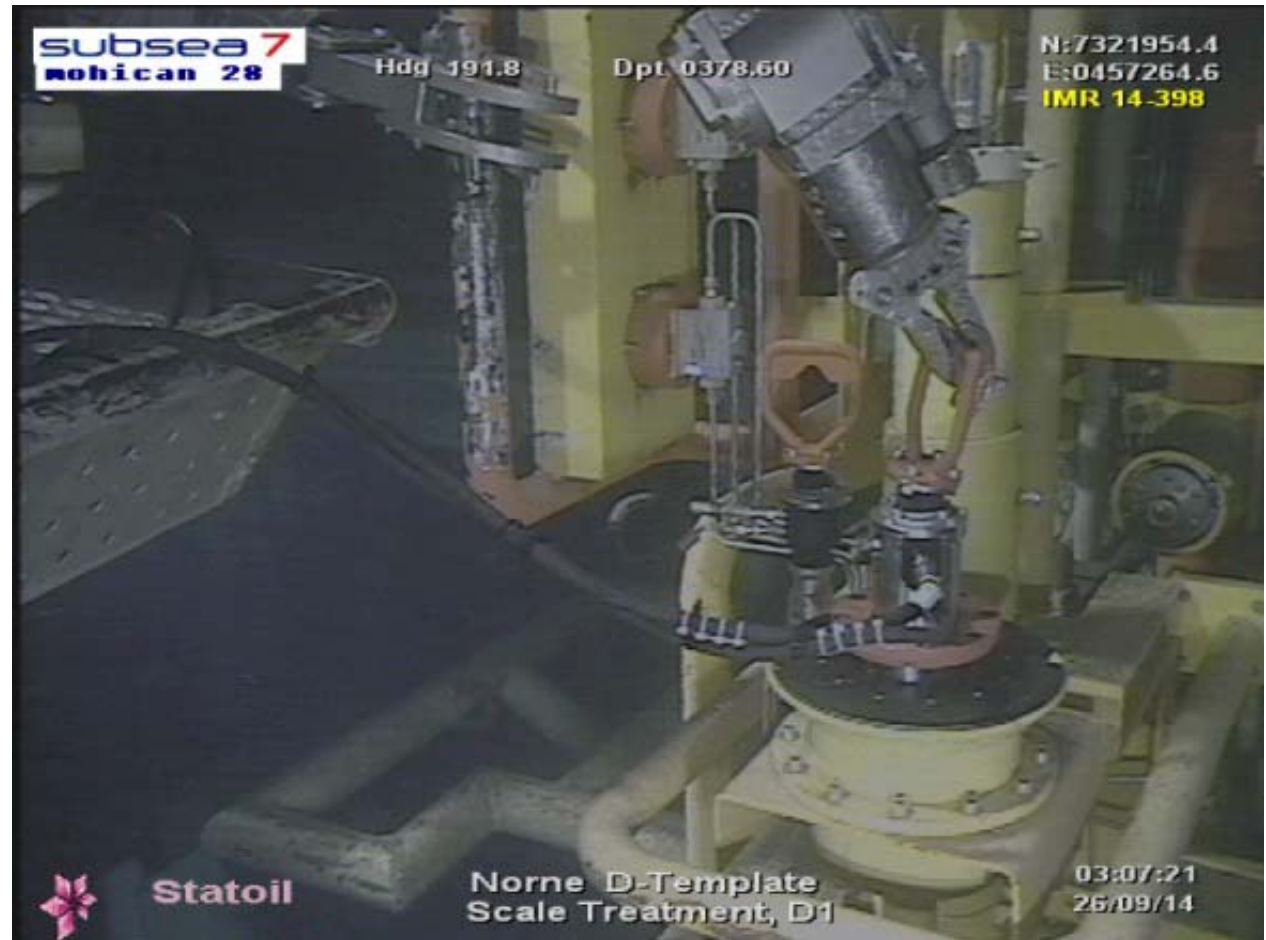
ESD/EQD Overview

- Well Barriers:
- Well Access Device two well barrier valves
 - These are tested on deck prior to deployment and subsea prior to commencement of pumping operations
- Tree PWV and PMV are also well isolation valves
- Tree valves controlled from vessel
- Closure triggered directly from MSV controls for EQD
- Five stages for emergency shutdown (ESD)

Factors For Performance

- Pore Pressure
- Fracture Gradient
- Fluids
 - Density
 - Viscosity
- Injectivity Index
- Downline
 - Diameter
 - Length
- Production Tubing
 - Diameter
 - Length

Power



Deep Water History

- GOM 2007 –1 Well –1600m
- GOM 2009 –2 Wells –1000m
- GOM 2011 –2 Wells –1000-1300m
- GOM 2012 –2 Wells –1600m
- GOM 2013 –1 Well –1700m
- West Africa 2013 –5 Wells –1380m
- N-Sea 2014-3 Wells
- N-Sea 2015-20 Wells
- GOM 2015-5 Wells – 1380m
- N-Sea 2016-14 Wells
- 2017 – 9 Wells >1300m

Economics

Cost for acid stimulation assuming a typical project

☐ Gulf Of Mexico

☐ 90m MPSV / Single Vessel

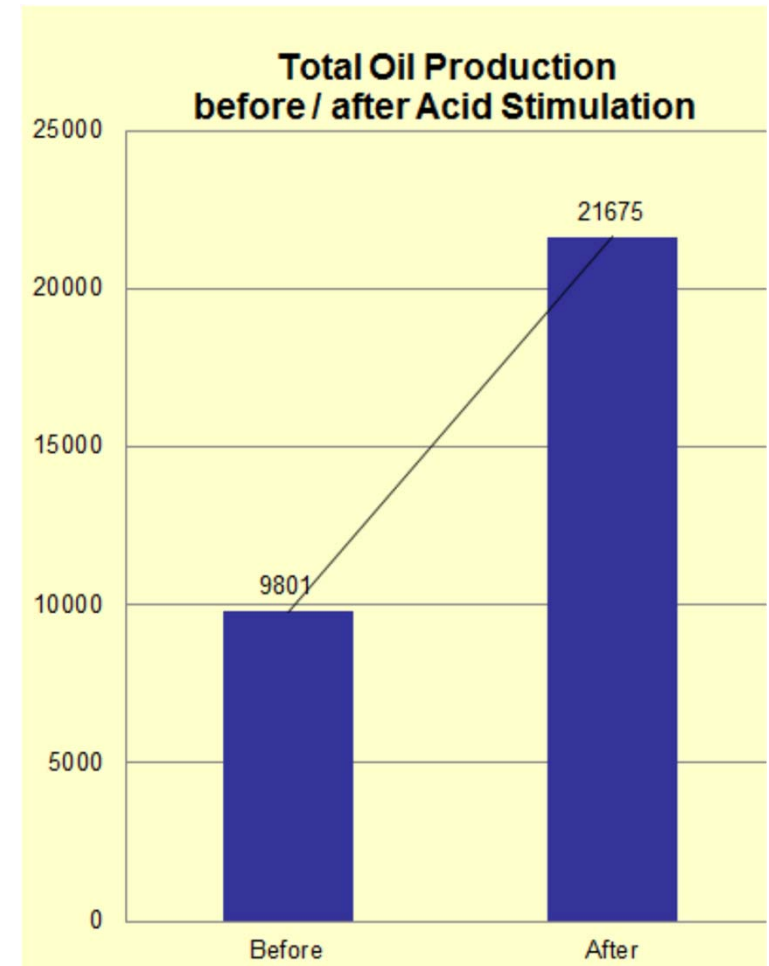
☐ Dual ROVs

☐ Client issued chemical / pump vendor

1X Well Treatment	Multiple Well Treatments
4 Days Mobilization Includes chemical bunkering	Additional Transit to Dock Tankage Reconfiguration if needed Reloading of chemical Transit to Site
1.5 Day Transit to Site	
3 Days Onsite Treatment	
1.5 Day Transit to Dock	Average budget per additional well \$1.5mm
3 Days Demobilization	
Average Budget over multiple campaigns \$4mm	

Reflection on Results

- Baseline economics from Rig, single well \$24mm
- Rigless Stimulation AFE 5 well campaign \$23mm
- Actual \$18mm
- \$3.7mm/well



Economic Tailwinds

- Globalizing services
- Standardization
 - Harmonizing regulations
 - Equipment
 - Interfaces
 - Processes
 - Procedures



Thank you!

i-Tech⁷

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