Welcome
Parallel One

INNOVATION & TECHNOLOGY
Ernie Lamza
COO
OGIC
Decom Offshore 2016
Innovation & Technology

Chair: Ernie Lamza, Chief Operating Officer - OGIC
Facilitator: Dr Lindsay Wilson, Project Manager - OGIC
Overview

• Opening remarks
• Presentations
  ➢ Decommissioning Geotechnics - Recovering Structures from and out of the Seabed
    Damian Morrow, Xodus
  ➢ Innovative Well Severance - The Evolution
    Mark Stephen, Proserv
• Active discussion & questions
Innovation & Technology for Decommissioning

• Scope for innovation & technology in decom?
• Why do it? Size of the prize?
  ➢ Operators (& UK Tax Payers): Reduce costs
  ➢ Supply chain: Secure profitable business
• Areas of decom that might benefit, include:
  ➢ Well P&A
  ➢ Hydrocarbon, scale etc. removal / cleaning
  ➢ Surface / subsea hardware removals
Connecting companies to world-class Scottish Academia

Nurturing innovation in Oil & Gas

Technical know-how and project management support

Part-funding projects

OGIC
Oil & Gas Innovation Centre

www.ogic.co.uk
Project criteria

- Innovative
- Benefit oil & gas industry
- Company/private sector contribution 50%
- Require Scottish university input
- OGIC funding 50% project cost

Up to 70% for micro company

www.ogic.co.uk
Innovation & Technology for Decommissioning

• Innovations / new technology deployed so far?
• Can we do more?
• Is there interest in showcasing what is:
  ➢ Available but not deployed?
  ➢ Potentially available but needs development?
• A joint DNS/OGIC showcase event in autumn?
• Business card in the bowl!
Damian Morrow
Senior Consultant – Geotechnics
Xodus Subsea
Decommissioning Geotechnics
Recovering structures from and out of the seabed
This presentation has two principal themes;

> **The high level theme is Decommissioning Geotechnics**
  - It’s important to understand the seabed conditions and behaviour when recovering structures from and, even more significantly, out of the seabed.

> **A Case Study in Geotechnical Research**
  - Examples of research techniques that can be used to investigate some more challenging geotechnical engineering problems.
  - We will draw on examples from a recently kicked off research study into recovery loads for skirted subsea structures on a clay seabed, which Xodus are undertaking with the help of OGIC and our academic partner The University of Dundee.
Context
Decommissioning Geotechnics – Recovering structures from and out of the seabed
Structures and infrastructure that may need to be recovered from the seabed:

- Piled structures and anchor piles
- Mud mat structures
- Skirted mud mat structures
- Pipelines and umbilicals
- Suction anchors
- Drag anchors
- etc, etc,

Recovery of most of these items, if not all of them, would benefit from some consideration of the seabed conditions. There is also potential for uncertainty or risk, depending on the specifics of the items being removed and the soil conditions that are present.
Recovering Skirted Structures from a Clay Seabed
Decommissioning Geotechnics – Recovering structures from and out of the seabed

Skirted Subsea Structures on a Clay Seabed
Recovery of structures from a soft clay seabed has traditionally been an area where high recovery loads have been experienced. For these conditions it’s not unusual to experience loads of 2 to 3 times the weight of the structure.

There is a sparsity of research in this area and most guidance is empirical and based on simple flat plate mud mats.

Adding skirts to a mud mat not only increases the interaction with the seabed, but also adds to the number of variables that could impact recovery loads.
Recovering Skirted Structures from a Clay Seabed
Decommissioning Geotechnics – Recovering structures from and out of the seabed

> Skirt length
> Skirt properties e.g. roughness, etc,
> The presence of intermediate skirts
> Drainage into the skirt voids
> Recovery rate
> Eccentric recovery, etc, etc,
Numerical Modelling – why is the recovery load so large
Recovering Skirted Structures from a Clay Seabed
Decommissioning Geotechnics – Recovering structures from and out of the seabed

Physical Modelling – (Model Testing)
Recovering Skirted Structures from a Clay Seabed
Decommissioning Geotechnics – Recovering structures from and out of the seabed

Physical Modelling – (Centrifuge Model Testing)
Acknowledgements

Decommissioning Geotechnics – Recovering structures from and out of the seabed
Thank you

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Xodus provides engineering and advisory services to clients in the oil and gas, LNG, renewables and utilities industries worldwide. Our clever and innovative thinking helps clients to overcome challenges and maximise their return on investment.

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Mark Stephen
Senior Technical Authority – Marine Technology Services
Proserv
Innovative Well Severance: The Evolution
Mark Stephen – Senior Technical Authority
The Market, What technology do we offer?

- Oil & gas operators mandated to fully abandon wells which have come to the end of their production life-cycle.

- It is estimated that 18% of total North Sea wells require permanent abandonment in the next decade – already around 800 wells scheduled for P&A in next 5 years.*

- The wells must be permanently abandoned, by setting the required barriers (plugs), severing all casings and conductor 10ft below mudline, then recovering the wellhead to surface for disposal.

*Source: Oil and Gas UK, 2014

Wells to be decommissioned in UKCS (2014-2022)
Well Severance and Recovery

- The Proserv Multi-string Cutting Tool (MSC) severs the well 10ft below mud-line. (BML)
- Combined with the wellhead recovery tool (WHR) recovers the wellhead to surface.
- Completes this final phase of the well abandonment process in a single trip.
- Intended for rigless abandonment campaigns of Cat 1 and Cat 2 wells.
- Where conventional mechanical cutting tools can not be utilised.
- Environmentally better option than explosive well severance.
The Multi-String Cutting Tool (MSC) tool is a down-hole tool that uses water abrasive jetting technology to sever through multi-string wells from 7” to 20” inner casing out to 36” OD inner casing out to 36” OD.
Multi-String Cutting Tool (MSC)

- Gearbox Mandrel
- Ball Lock
- Mechanical Seal
- Water Abrasive Cutting Nozzle
- Water displacement tube
How does it work?

- The MSC tool is deployed into the well, 10-15ft below mudline.
- The tool is locked and sealed into the wellbore casing.
- High pressure air is pumped down-hole through the MSC tool and exits below a seal on the tool assembly.
- This air displaces wellbore fluid (seawater) from the seal to the lowest point of the tool creating a pocket of air across the cutting nozzle.
- A high pressure (1000 bar) water/abrasive slurry is then pumped down to the MSCT nozzle.
- The tool performs multiple rotations at slow speed to complete the severance where the cut is monitored via multiple sensors in the tool and fed real-time to the tool operator.
Wellhead Retrieval Tool (WHR)

Deployed in conjunction with the MSC tool.
Modular design to allow single trip or multi-trip operation.

Latches onto 18 ¾” H4 and Camhub profile wellheads to secure MSC tool in well.

100 tonne pulling capacity for wellhead recovery to deck.
What has been achieved with the technology

- Severed and recovered over 130 surface wells from below mudline in the US Gulf of Mexico since 2009

- Severed and recovered 25 subsea wells in the North Sea utilising the Gen1 MSC and WHR tooling solution since 2014.

- Rigless to rigs in 2016 - completed 8 North Sea, single trip subsea well severance and recoveries in 9 days running off drill-string from a MODU.
MSC Timeline

2009 - Derrick barges

2010 - Platforms

2014 - LWI/MSV Vessels

2016 - Drilling Rig
Any Questions?
Active Discussion
Thanks for coming