ardyne

FASTER. SIMPLER. **BETTER.**

P&A AND SLOT RECOVERY; **REDEFINED.**

Ardyne develops and supplies specialised technology services to the global energy industry, focusing on dramatically reducing rig time spent on downhole casing removal in slot recovery and plug and abandonment operations. Technology advancement lies at the core of Ardyne, combined with decades of operational experience and responsive, client-focused delivery.

Original thinking, ideas and technologies
Understanding of the original well engineering
Original (challenger) solutions for P&A

ORIGINAL INSIGHT.

Understanding of the industry
Understanding of the clients' challenges
Wisdom concerning the next era of oil & gas

THE CHALLENGE. THE OPPORTUNITY.

SLOT RECOVERY

When the production from a well is no longer profitable, an option available to operators is to recover the slot and return the well to production.

Slot recovery operations normally entails plugging the lower mother well, and casing removal, prior to sidetracking to a new reservoir target to enhance recovery from the existing well slot.

New technology from Ardyne can reduce costs in these operations and ensure that it becomes a viable option.

PLUG & ABANDONMENT

P&A demand is increasing to an unprecedented scale:

- 1,200 wells in the UK Continental Shelf forecast to be plugged and abandoned over the next decade

In a typical complex subsea well, 80% of the time / cost to P&A is taken up in casing recovery, milling and tripping operations*

Source:
Statoil Presentation, SPE Workshop Subsea Well Abandonment, 23-24 Sep 2014, Houston USA

THE EXPERTISE.

IN NUMBERS

99.2%
uptime below rotary (2012 - 2016)

120
years combined engineering experience

515
runs of DHPT

217
pulls of DHPT

25,561m
pulled with DHPT

ORIGINAL INSIGHT. **PIONEERING FUTURE.**

There have been no major advancements in plug and abandonment and slot recovery technologies over the last 30 years.

Ardyne, an ambitious, innovative oil services company, addresses this gap through its focus on developing and delivering products and services to optimize these milestone operations: safely and efficiently reducing rig time, lowering costs and unlocking value from mature assets.

The business, with formidable cumulative operational expertise, launched in 2015, with multi-million pound backing from Lime Rock Partners, and acquired rapidly-expanding Norwegian firm Wellbore AS, a leading provider of specialist downhole tools for casing cutting and pulling, as their first acquisition.

"We have the advanced technology needed to unlock the vast additional value – in a safe and cost-efficient way."

100% tools assembled, tested and deployed at 2,000m² facility in Norway

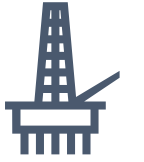
15% staff solely focused on research and development

Headquartered in Aberdeen, offices in Bergen and Tananger

Active internationally across three continents

7 Design Engineers from workforce of 40 (17.5%)

5 patent filings in previous year



10 offshore engineers

$2.2M R&D in 2016

TIMELINE

2004
Wellbore founded

2009
Wellbore refined its focus to P&A and slot recovery technologies

2013
Wellbore is awarded a major frame agreement with Statoil for slot recovery and fishing services, together with 3 other oilfield companies

2015
Extension of this contract. Wellbore now provides slot recovery and fishing services exclusively on four of Statoil's North Sea fields

2015
Ardyne launches and acquires Wellbore

TOOLS AND **TECHNOLOGIES.**

DOWNHOLE POWER TOOL (DHPT)

A superior pulling tool with a world-class track record for P&A, slot recovery and fishing operations, which delivers extraordinary rig time savings of around 35%: equating to around US$500million. It pulls any fish out of the wellbore, eliminating the need for jarring, reducing the requirement for milling, and minimising strain on equipment and the drilling rig.

AXIAL LOAD OPERATED (ALO) VALVE

An efficient drill fluid circulation valve offering considerable rig time savings by eliminating the need to drop an activation ball for the DHPT. Allows for recurring operations.

FLOW RELEASE SPEAR

The FRM spear is used to pull casing during casing retrieval operations. Enables casing cutters to be run in the same run. Eliminates broken grapples due to larger gripping area of the individual slips segments.

TRIDENT

Trident is an integrated, multi-trip saving casing cutting and pulling system. Trident's functionality includes the ability to dress a cement plug or set a bridge plug, perform and verify multiple cuts, and retrieve from 9-5/8" and 10-3/4", all in a single trip.

THE DOWN HOLE POWER TOOL (DHPT) SAFELY REMOVES 230m OF CASING: **SAVING 33 HOURS OF RIG TIME**

CHALLENGE

During a UK slot recovery operation, an attempt to remove a 230m section of 9-5/8" casing with a conventional casing spear failed.

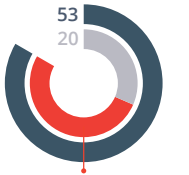
The rig's maximum pulling force was reduced at the cut point by around 32% with influencing factors including the section depth - and resultant drag - as well as its 65° angle of inclination and friction from settled mineral solids.

SOLUTION

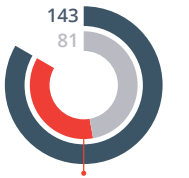
As a contingency, the customer ran the Down Hole Power Tool (DHPT) in the bottom hole assembly, and so was able to deploy it quickly.

Anchored in the 13-3/8" casing just above the cut point, and spear anchored into the 9-5/8" casing just below the cut point, the tool was jacked 18 times.

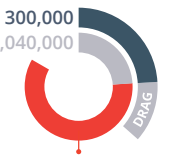
Each jack applied 1,040,000lb force directly to the casing, successfully pulling it free and eliminating the need for a much longer, more complex and riskier casing milling operation.



33
HOURS SAVED



62
CONNECTIONS AVOIDED



740,000
LBs OF ADDITIONAL FORCE

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