



Decommissioning and Restoration – Fostering Excellence through Regulations, Innovation, and Sustainable Practices

30–31 JULY 2024 | BANDAR SERI BEGAWAN, BRUNEI



Powered Intervention Services for Plug and Abandonment of a Deepwater Well at Malaysia

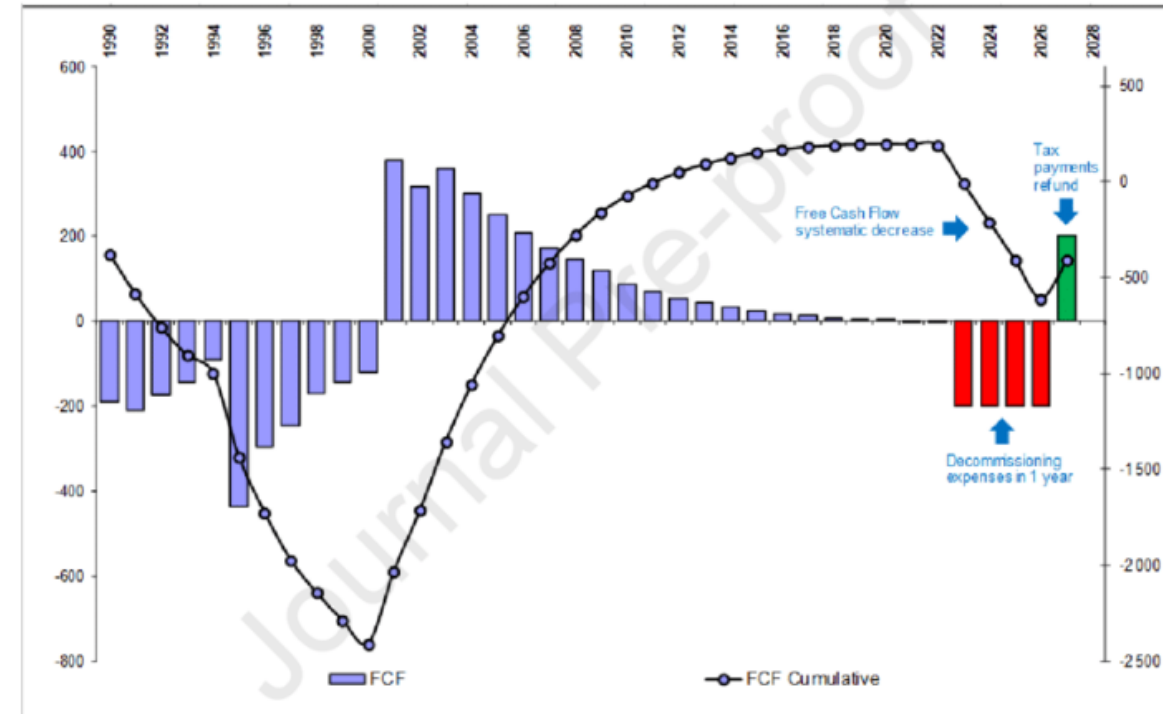
Matt Billaud

SLB



Plug and Abandonment challenges

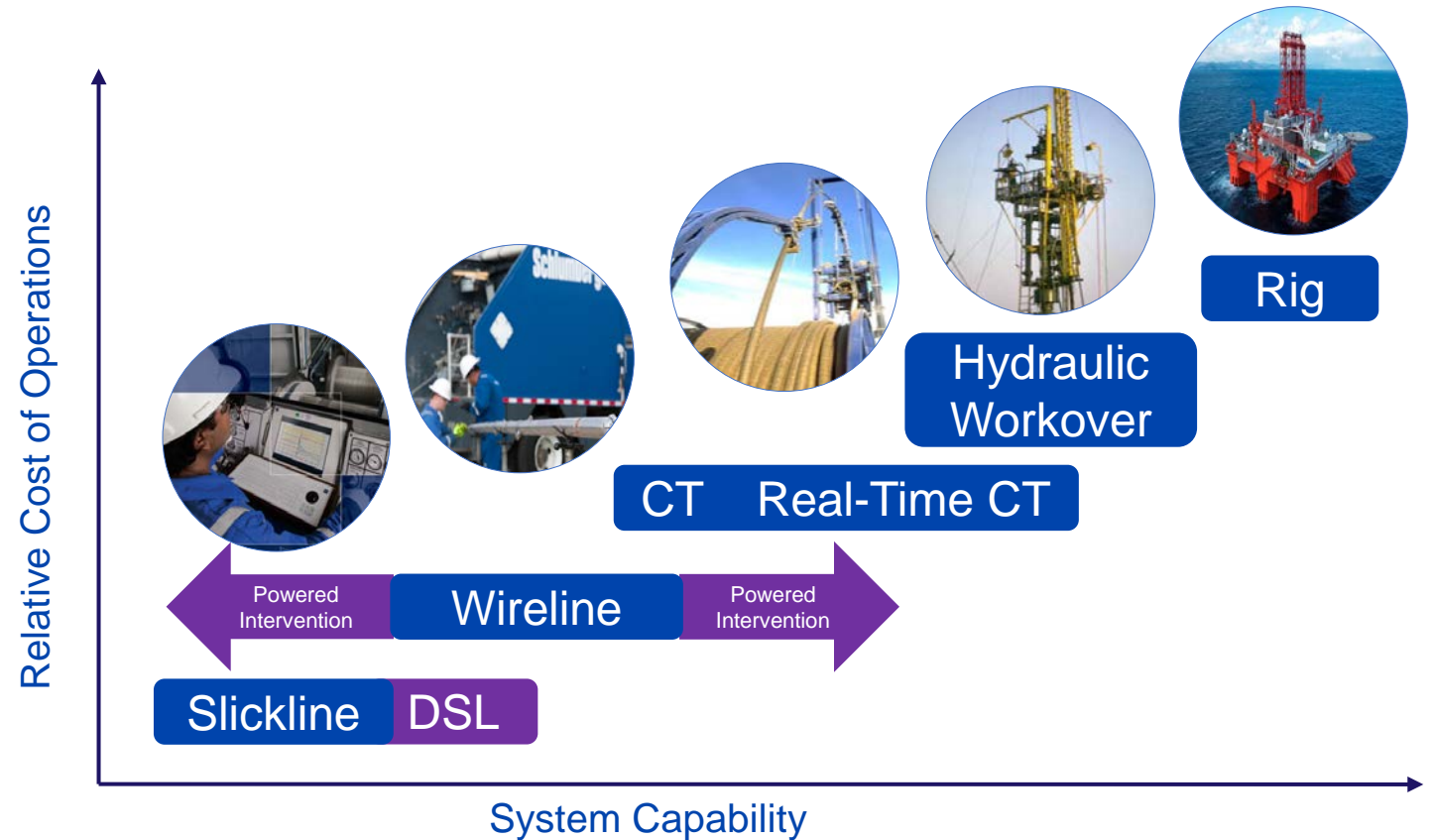
- Safe
- Quick
 - Minimize rig time
 - Offline work whenever possible
- Efficient
 - Minimize NPT
 - Minimize invisible lost time



Cash flow from an oil field in the North Sea decommissioned within 4 years (source: Oil and Gas UK, 2014).

Conventional Deepwater pre-P&A scope

- Well access
 - Crown plug retrieval
 - Fishing
 - Clean-out
- Well preparation
 - Plug
 - Punch
 - Cut
 - Circulate
- Contingencies



Malaysia P&A Powered Intervention package

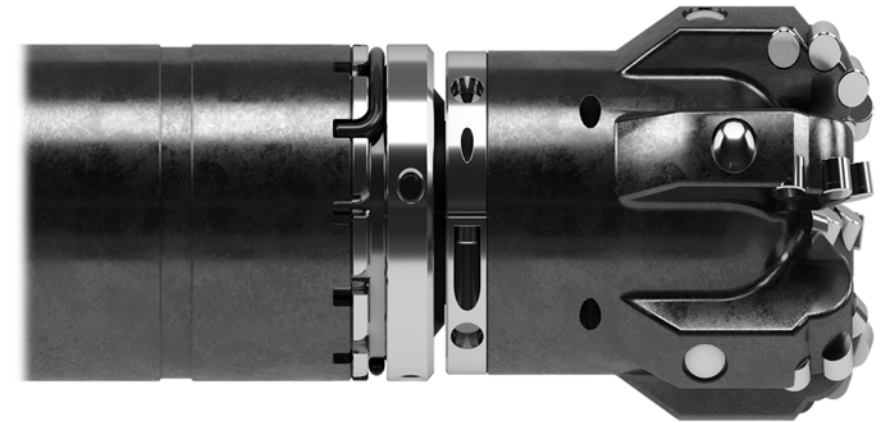
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High-Expansion Linear Actuator



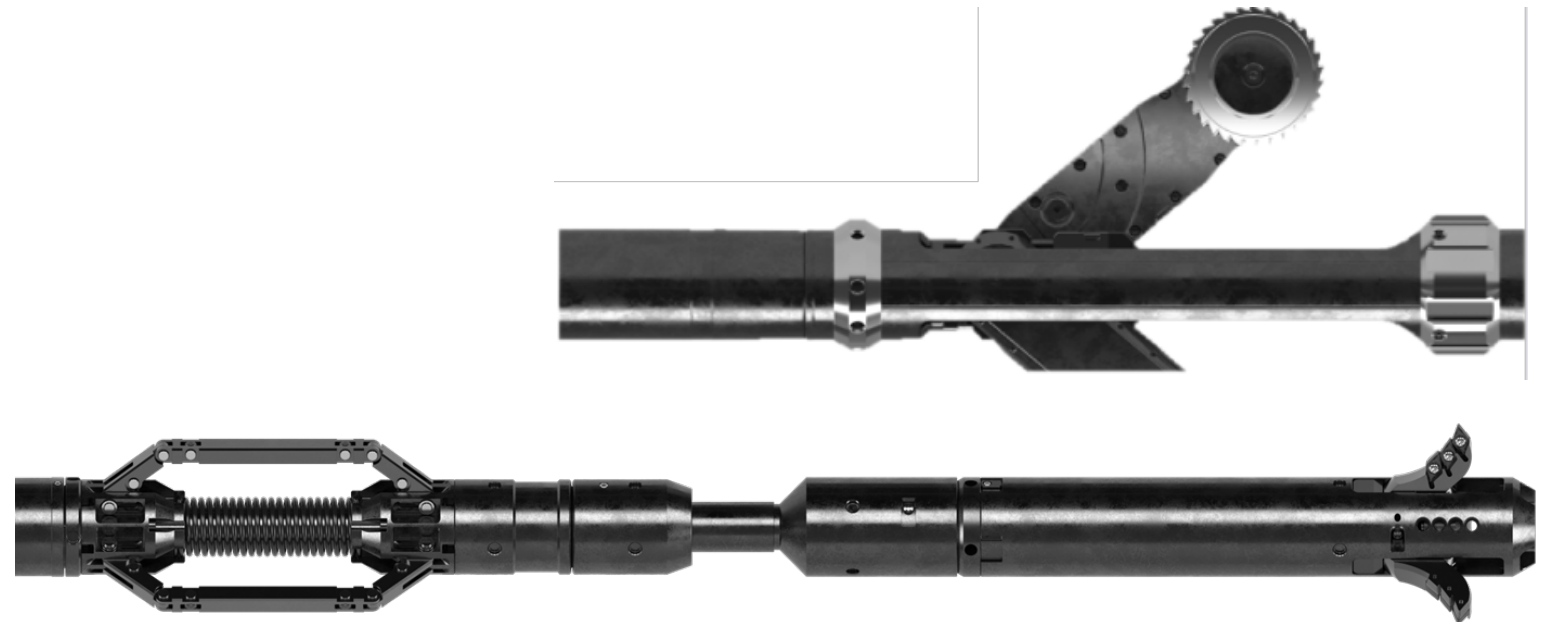
Malaysia P&A Powered Intervention package

- Well access
 - Crown plug retrieval
 - Fishing
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 - Punch
 - Cut
 - Circulate
- Tractor provided weight-on-bit (WOB) with downhole automation
- Linear actuator WOB for high-force precision milling
- Breakdown of scale and debris
- Milling out ball valves
- Retrieval of debris to surface
- Regain wellbore access



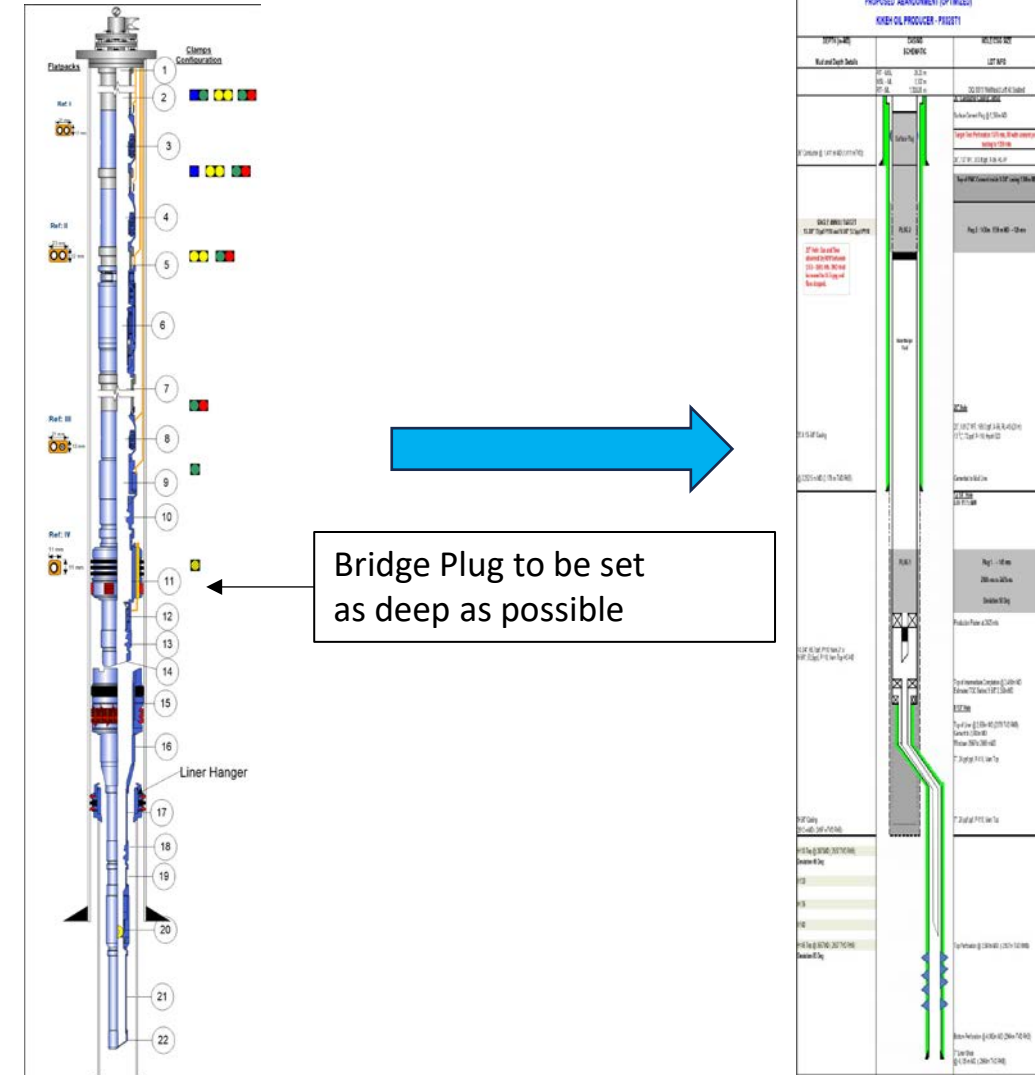
Malaysia P&A Powered Intervention package

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Case study – Malaysia mechanical cutter on deepwater well

- Bridge Plug to be set below Packer's tail pipe as deep as possible
- Explosive Cutter and Mechanical Cutter mobilized to cover alternative scenarios
- Explosive Cutter Run Criteria:
 - Run if distance between bridge plug set depth & cutting depth reached is sufficient to avoid explosive shock compromising seal
- Mechanical Cutter Run Criteria:
 - If unable to reach cut target with explosive cutter
 - If distance between achieved bridge plug set depth & cutting depth is insufficient for shock risk



Case study – Explosive vs. mechanical cutter

Applications

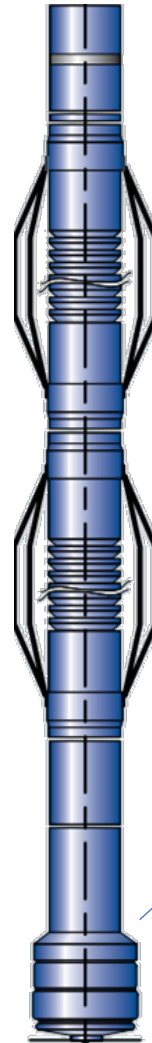
- Pipe/Tubing Cutting in complex well geometries

Benefits

- Small tool OD and wide cutting range
- Non-explosive and zero shock cutting
- Multiple cuts per run in multiple tubing sizes

Features

- Real-time monitoring of cutting progress and confirmation of tubing separation
- Downhole instrumentation for well monitoring during cutting i.e. pressure, temperature
- Automated dynamic cutting program based on pre-programmed tubing/well properties
- Anchored in place to mitigate unexpected pressure changes
- Self-centralizing for cutting at any deviation
- Fully combinable with Tractor Conveyance



Parameter	Explosive Cutter	Mechanical Cutter
Tool Maximum Diameter (in)	3.375*	2.375*
Tubing Sizes (in)	2 3/8, 2 7/8, 3.5, 4.5*, 5.5	3.5, 4.5*, 5.5
Cuts Per Descent	1	3
Hazardous Class	1.4D HMX Explosives	Non-Hazardous



Explosive Cutter



Mechanical Cutter

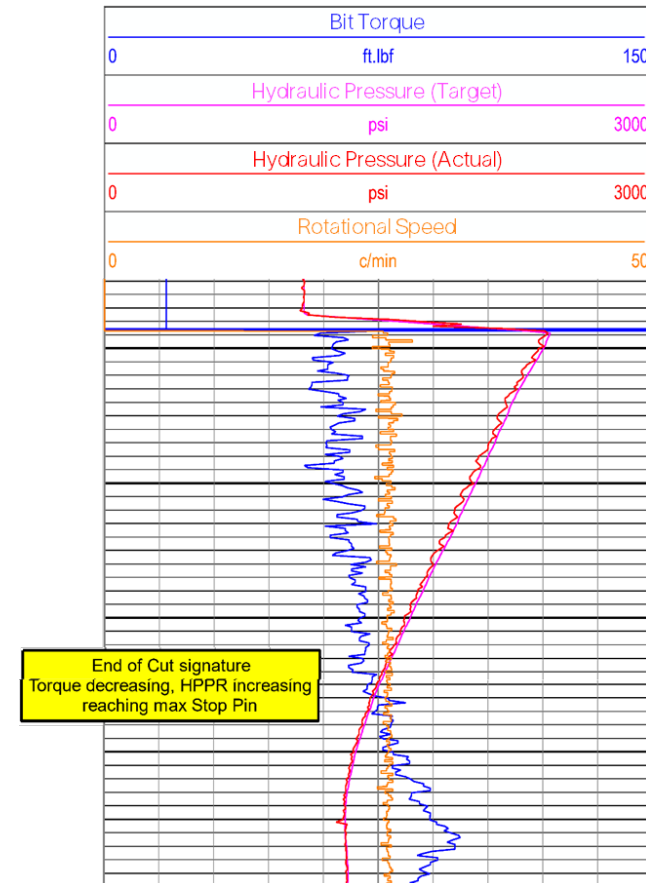
Case study – Cutting pipe under compression

Well Status Prior RIH with Mechanical Cutter

- Unable to reach target depth with explosive cutter due to hanging up on large OD
- Unknown if tubing under tension or compression
- Critical to have clean cut and no overpull
- Small overbalance pressure applied on annulus

Operational Sequence

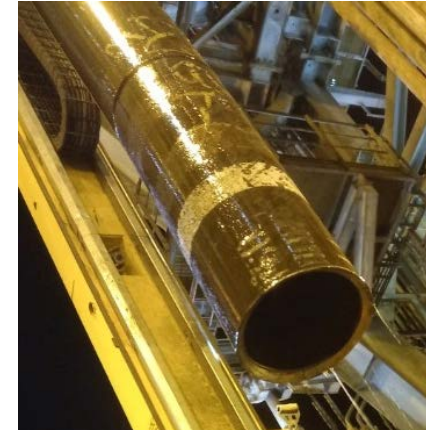
- Achieved target depth and anchored cutter
- 1.5 hours to complete first cut but no significant change observed in well pressure
- Multiple stall events encountered due to tubing compression but system automatically recovered
- Re-anchored in position for second cut, annulus pressure overbalance increased
- 1.5 hours to complete second cut, immediate pressure bleed off confirming cut
- Clear indication on downhole logging sensors of cut status and completion



Case study – Cutting pipe under compression

Cutting Operation Success

- Mechanical Cutter able to reach target depth despite challenging geometry and bend in tubing
- Avoided risk of cutting higher up with control lines and no possibility to compromise bridge plug seal
- Tubing cut with machined finish and retrieved to surface without any overpull
- Two cuts completed successfully in a single run despite tubing being under compression
- Tool instrumentation provided real-time indicators of cut progress and successful completion





QUESTIONS?