2024 GAS LIFT WORKSHOP

Deep Water Gulf of Mexico – Challenging Hi Angle Subsea Gas Lift Valve Intervention

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Agenda

- Details of the “technical challenge”. What problem were we trying to solve?
- Details of the operation
- Technology utilized to perform the operation
- How the technology works and what it actually did
- Value to the operator

Technical Challenge

- Technical challenge - replace leaking GLV, at short notice (due to the operating window). Well shut in for 8 months
- Design and manufacture non standard “Slim” Kick Over Tool
- Deploy Kickover Tool (KOT) to pass a minimum restriction up hole of 3.313”, and open up into an SPM with an ID of 4”
- Perform this on a subsea intervention vessel, Deep Water GOM in February, in a 65 degree well at 12,000ft with an “S” shaped profile

Advanced Kickover Tool (AKT)

- Traditional Kickover Tools are well known for not reliably retrieving the Gas Lift Valve on the first run
- Customers often report that 4 to 6 mis runs is the norm
- AKT reduces operating time & cost by increasing the chance of first time Gas Lift Valve retrieval, regardless of mandrel deviation or pocket orientation
- Allows Gas Lift to be planned deeper and in more deviated wellbores (success at inclinations up to 83°)
- The Integral Valve Catcher eliminates the need for additional wireline runs (to set and retrieve a separate valve catcher)

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Advanced Kickover Tool (AKT)

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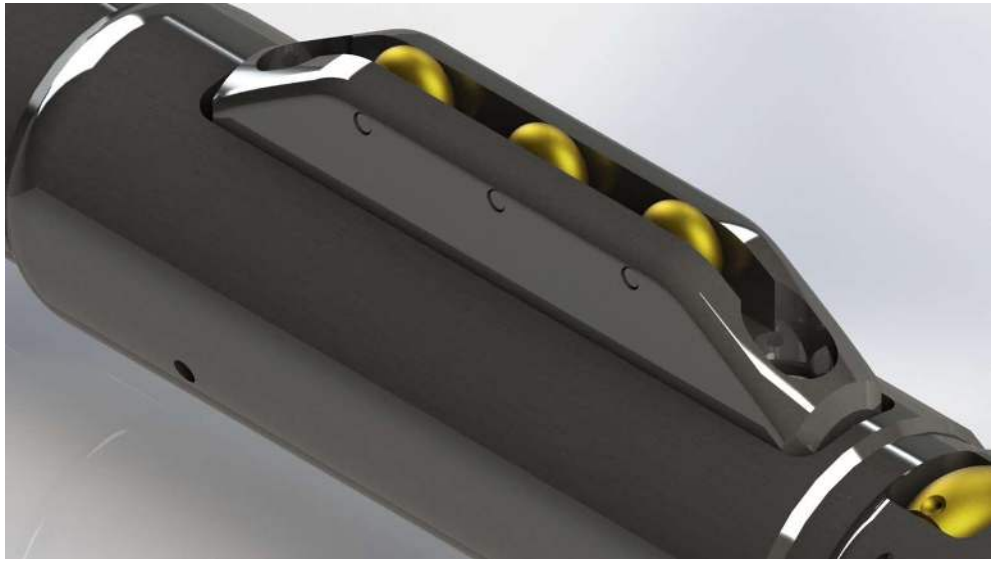
Spring Loaded – Offset Dogs

- Two sets of Offset Dogs positioned at the top & bottom of the tool.
- Spring loaded – with wheels.
- Facilitates passing through a small restriction (dogs collapse) and open out into a larger opening (dogs expand back to original position).
- (4) Coil Springs installed in the Offset Dog can be adjusted. (4) springs for maximum force to collapse, or remove springs for less force to collapse.
- Wheels / Rollers on the Offset dogs allow for smoother transition and friction reduction inside wellbore and SPM.

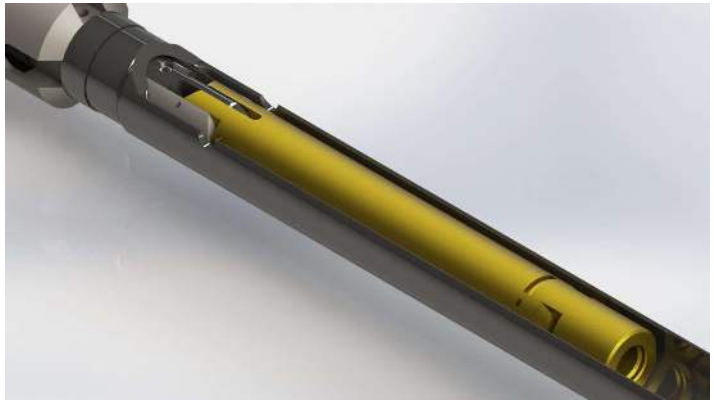


Friction Reducing Rollers

- Two sets of Rollers positioned at the top & bottom of the tool.
- Roller Housing rotates and self orients in the wellbore and SPM.
- Free spinning Rollers provide friction reduction and aide conveyance.
- Allows Gas Lift to be planned deeper and in more deviated wellbores (success at inclinations up to 83°).

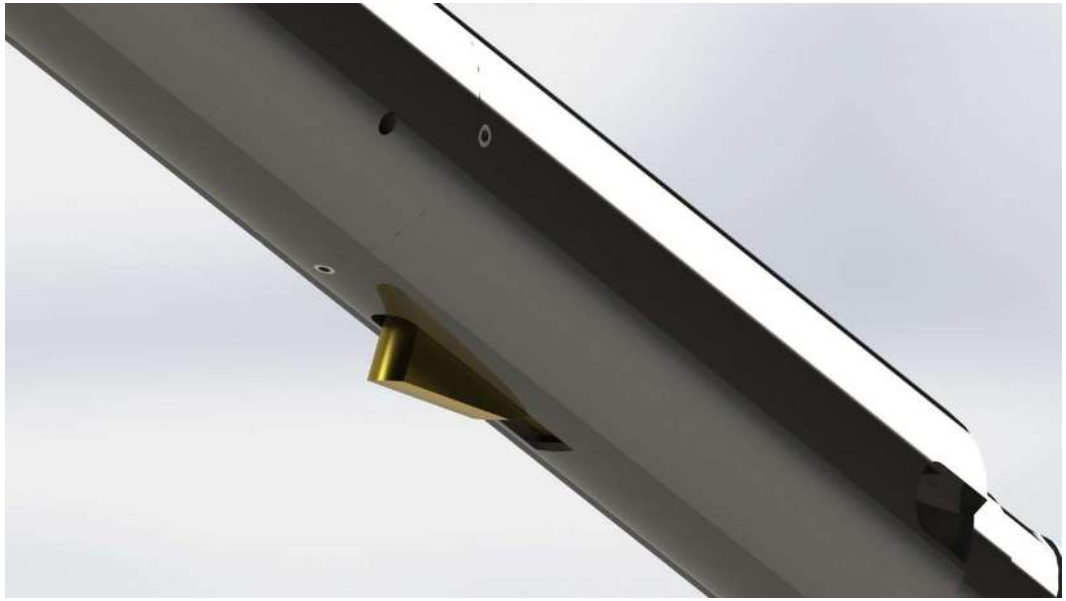
Parallel Arm

- Engineered Arm that opens out parallel to the main tool body.
- Engages GLV at the correct approach angle (straight - in line).
- Less risk of not latching first time and avoids mis runs.
- Avoids damage to the V-Packing seals when setting the GLV.



Engineered Trigger

- Precision Engineered Trigger – ultra reliable / field proven location, orientation and initiation mechanism to “kick out” the arm.
- Less risk of not latching first time and avoids mis runs.
- Kick out force is provided by a leaf spring sub assembly.
- Adjustable by adding or removing leaf spring elements as required.



Operator Value

- Reduce / eliminate miss runs = Operational Charges – Crew and equipment.
- Reduce / eliminate miss runs = Lost Time. PCE equipment rig up / down. Pressure test, tool redress etc.
- Subsea high angle intervention – well was shut in and not producing – expensive, challenging & risky operation.
- Well could be producing +/1 5,000 barrels per day. At $80.00 =/- per barrel = $400K / day lost production.

Quote from the Operator:-

The Asset in consultation with our GLV SMEs decided to go ahead and change out all the GLVs.
Conservative decision because this was a high producing well that was down for 8 months.
Very expensive to intervene on a Subsea well.
Value of information - First subsea gas lift intervention for Operator in the GOM.

Highlights of the retrieval

Slickline runs with newly designed slim kick over tool worked great. Valves retrieved and replaced with no mis runs. KOT was designed to pass through a 3.313 restriction.
Deeper Gas lift valves were successfully retrieved in a 65 deg S- shaped deviation but stroker had to be used for junk catcher and reservable plug

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Question Time

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