Case study: Permian Basin, United States

Stage cementing system shattered hole records, saved 6 hours of drillout time, recovering $75,000 over 3 wells

An operator in the Permian Wolfcamp A-basin in Texas faced multiple challenges during installation of a differential valve (DV) and annulus casing packer (ACP) tools. The operator was using a competitor's DV and ACP, but experienced low reliability opening and/or closing the DV tool during cementing operations of the second stage cement job. The issues occasionally required the customer to perforate and perform a remedial cement job and/or a longer liner string than planned in order to cover the DV tool when not closed properly. The customer required a threefold solution:

- Improved reliability with opening and closing of the DV tool
- Increase operational efficiency of installation by reducing install time
- Improved drillout times which, in turn, also improved bit wear for higher performance and average rate of penetration (ROP)

The solution recommended by Baker Hughes was to utilize the field-proven pressure-actuated cementing (**PAC**) **valve**, the **ISOZONE™ external casing packer (ECP),** and Baker Hughes's proprietary millable technology (PMT) plugs for higher reliability, quicker drill times and improved health, safety and environmental (HSE) risk.

The ISOZONE packer features a valve inflation system to ensure the packer element inflates at the proper time, with the proper pressure, and the pressure is permanently sealed in the element. The PAC valve, with a dual opening feature, provides circulating ports between the inside of the casing or liner and the annulus. The valve enables an operator to hydraulically function tools below the PAC valve and then isolate the completion tools below the valve during the cementing process.

Built completely out of a robust, engineered alloy material that is less than 25% of the density of conventional plug material, the PMT drills out smoothly and flows out easily to cut costs and get customers to first oil faster.

Field personnel deployed the PAC valves, ISOZONE packer, and the PMT plugs over a three-well pad to complete the planned two-stage cement operations. The system had a flawless operation during installation, cementing operations, and drillouts, experiencing zero failures.

Following the drillout, the PMT plugs caused minimal bit wear on the operator's PDC bit which facilitated record hole section times. The HSE risks were reduced due to the PAC being a hydraulic operating DV and not having to drop mechanical plugs used in the competitor's DV tools.

Challenges

- Low reliability from competitor DV tools (both opening and closing of the tool)
- Extended drillout times on competitor DV tool and plugs
- Wear on PDC bit while drilling the lateral due to extended drillout times of competitor DV tools and plugs

Results

- Deployed PAC valves, ISOZONE ECP, and PMT plugs with 100% efficiency on three wells
- Reduced drillout times by as much as 77%
- Increased average ROP by 100% breaking all previous records set by the operator
- Saved operator approximately $25,000 per well over three wells with improved efficiency
- Experienced zero failures
- Reduced HSE risk going with a hydraulic tool vs mechanical, as well as improved operational time to shift the tool