

The World's First Installation of a TCO TDP-NonEx deployed and opened successfully in the UAE

The first TDP-NonEx was installed and remotely opened by a client in the UAE in September 2017. The plug was a development project initiated by the end user. Based on the global run record of more than 1 000 glass plug installations, the TDP-NonEx was developed to meet the market needs of Middle East clients by developing tools independent of well bore parameters and eliminating any requirement for specialist intervention by TCO prior to running in the well.

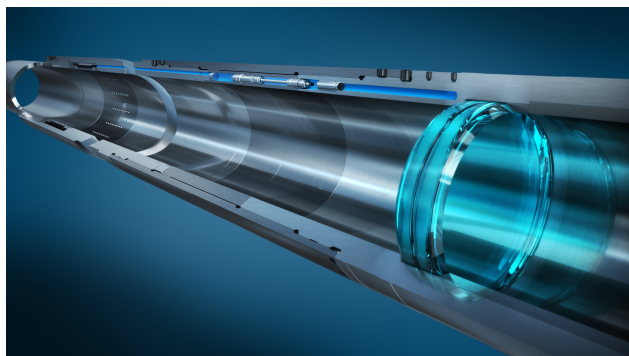
Product: TCO Remotely Operated Completion Barrier Plug, TDP-NonExplosive

Location: UAE, Middle East

Challenge

Notwithstanding an excellent track record with TCO's preceding generation Model TDP-3 remotely operated barrier devices, a new version was required to make the plug 100% independent of any TCO intervention prior to RIH. Previous models of the glass plug required well specific configuration on the counter mechanism. Reconfiguring of the counter mechanism for different well applications requires both resources and a higher focus from a inventory point of view. The use of explosives as the opening mechanism has been a great success with previous model glass plugs, but requires trained service personnel on rig site for handling.

The main challenge was to design a remotely actuated barrier device with a hydrostatic pressure balanced counter mechanism and also to remove the explosives from the barrier opening mechanism. These new product features would allow the client to take advantage of an intervention free completion installation whilst removing any requirements for TCO's service engineer throughout the life cycle of the tool.



Solution

In cooperation with the client a development program of the TDP-NonEx was initiated. A prototype plug was designed based around the lessons learned from more than 1 000 glass plug field installations world wide. Experience from the "non explosive" crushing mechanism was applied from more than 300 non-explosive plug installations.

An extensive qualification program was defined with input from the client to achieve an operational envelope suitable for the applications.

As the primary function of the plug is the barrier function, the same patented laminated glass structure technology was selected, due to it being fundamental to the flawless track record of TCO barrier performance. The laminated glass barrier material provides a secure, non-corrodible seal under high temperatures and axial loads, and is capable of withstanding high levels of differential pressure from both sides. The laminated glass disintegrates into minor particles upon removal.

A secondary function of the plug, to have intervention free field operations, is provided by the remote

counter mechanism. This includes features to save the client rig time and reduced well exposure. The counter mechanism is isolated from any well fluid or debris contamination, the plug design includes features which eliminate the need for pressure communication all the way down to the actual barrier plate mechanism to remote open. A debris extension with a rubber bellow will allow pressure to communicate with the hydrostatically balanced counter mechanism several meters away from the glass. This will allow debris to settle on top of the barrier with no impact on the functionality of the remote opening mechanism.

In the unlikely event of the remote opening mechanism not working, the material of the barrier plate mechanism guarantees full opening of the plug with contingency operations. Several contingency opening solutions are available including milling on coiled tubing, spear and jar on slickline and Mill and Tractor on E-line.

Result

The plug was developed and tested to fulfill all of the clients requirements. Two full scale tests were performed to comply with ISO 14998 Annex A.8 V0 with axial loads and ISO28781 V3.

A candidate well for a field trial was selected. The TDP-NonEx was installed in an intermediate completion to act as a barrier while installing the upper completion. The plug was successfully cycled open off line, making the completion phase 100% intervention free. The installation was performed by a 3rd party company and the completion was run with no TCO service personnel at the rig site.

