

TCO's Pump-Open plug Used as Well Barrier and Packer Setting Device in the Middle East

On July 17th 2017, TCO successfully installed the first Tubing Disappearing Plug in the UAE. The plug had been through several qualification programs prior to the installation to confirm its reliability and functionality in challenging environments.

Product: Completion Barrier Plug, TDP-Pump Open

Location: UAE, Middle East

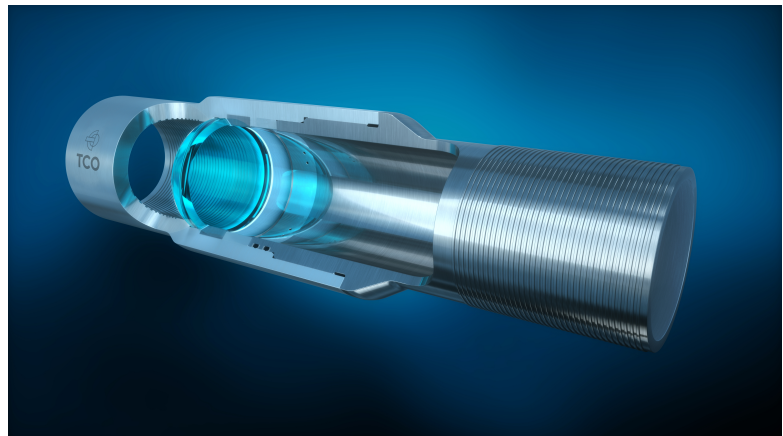
Challenge

Due to highly depleted reservoir pressure, a client in the UAE has used a gas lift to start production in wells. Traditionally, CT has been run to inject the gas prior to milling/knocking through a fragile barrier device in an intermediate completion. The purpose of this device has been to act as a barrier while installing the upper completion and injecting gas for initial start up.

The main challenge for this device is the size of the debris generated by the frangible barrier devices. Incidents of the debris clogging the production choke has been reported.

Solution

The TDP-PO (Tubing Disappearing Plug - Pump Open) is a glass plug originally designed to offer interventionless remote opening of completion strings. It is designed with an integrated pump-open actuation system which enables the glass package to be shattered open by applying pressure. Traditionally the plug has been used as a floatation device for long horizontal wells and as a result, a ISO14998 V0 qualification has never been required.



For this application, the TDP-PO acting as the mechanical barrier against the reservoir required extensive testing to comply with the clients standards for isolation devices. For another client in the Middle East, the plugs remote operation functionality had just been proven by opening the plug with an 8 feet debris/brine column settled on top of the barrier. A third-party barrier test was conducted externally according to ISO14998:2013 Annex A8, Grade V0 (Gas test, axial loads, temperature cycling with zero bubble acceptance criterion). A full-scale test was also designed to verify the functionality of the plug mounted in a production tubing.

Using glass as the material in a remotely operated barrier device guarantees full opening of the plug with a predictable size distribution of particles being produced out of the well after opening.

Result

The TDP-PO was installed as a part of the intermediate completion with the well suspended while running the upper completion. Several pressure cycles were applied during packer setting, tubing testing and inflow testing of the safety valve. After circulating in gas with coiled tubing, the plug was successfully milled open. No reports of residuals clogging up the choke were reported.