

Quadrant system enables operator to selectively stimulate different zones multiple times to maximize reservoir coverage

Egypt



Packers Plus worked with an Operator in Egypt to successfully re-complete a vertical cased well with a single perforation into a 5-stage well. By deploying the Quadrant Coiled Tubing Completion Sleeves in conjunction with cased hole mechanical packers, the Operator was able to: isolate the five perforations, open and close the sliding sleeves multiple times, perform multiple pressure tests on the wellbore throughout the completion operations, and stimulate the zones in non-sequential order. The Quadrant system provided the Operator with the ultimate flexibility and reliability to successfully maximize the reservoir stimulation.

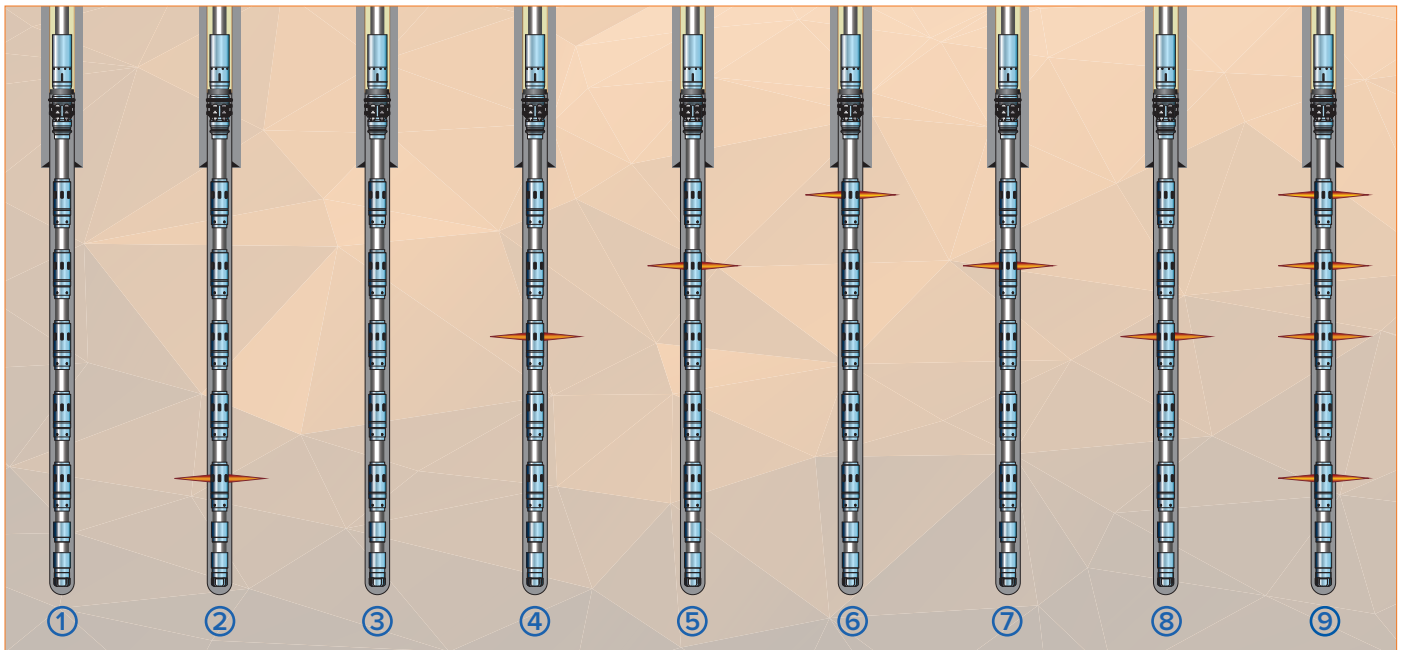
CHALLENGE

Production from a single perforation in a 7-in. cased and cemented vertical well was sub-optimal. The Operator wanted to perforate four additional zones and stimulate them without pumping any fluid in the existing and producing perforation. An additional perforation was done below the existing perforation and three more were done above for a total of five perforations zones. Additionally, to maximize the reservoir stimulation and conduct an effective treatment of each zone, the Operator required a multi-stage system that could be stimulated in non-sequential order. This was essential as the decision of which zone to stimulate next would be determined on site after a zone was treated. The Operator also required a pressure test after a zone was stimulated and the corresponding sliding sleeve in the completion system was closed to ensure well integrity.

SOLUTION

The lower completion system designed for the cased hole vertical well was made up of Quadrant sleeves and TuffSEAL packers deployed on

continued on reverse



1 - Initial status – all sleeves are closed. / 2 - Stage 1 Quadrant sleeve is open. / 3 - All sleeves are closed. The well is pressure tested.
4 - Stage 2 is skipped. Stage 3 sleeve is open. / 5 - Injectivity test in formation. Formation injectivity is insignificant. / 6 - Stage 5 sleeve is open.
7 - Stage 5 is closed. Stage 4 sleeve is open. / 8 - Stage 4 is closed. Stage 3 sleeve is open. / 9 - Stage 2 is closed. Sleeves 1, 4, 5 are open.

Some or all of the systems, methods or products discussed herein may be covered by one or more patents, or patents pending.
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SOLUTION *(CONTINUED)*

4.5-in. liner to isolate the perforations inside the 7-in. liner. The Quadrant Shifting Tool run on coiled tubing was selected to operate the sliding sleeves during stimulation operations.

Quadrant sliding sleeves are mechanically activated with coiled tubing and allow targeted stimulation of specific zones along the wellbore.

Each Quadrant sleeve can be closed after a stage is stimulated to prevent crossflow. The combination of the Quadrant sleeve and the Quadrant bottomhole assembly (BHA) allows for an unlimited number of stages to be installed and activated (within reach of the coiled tubing).

The Quadrant Shifting Tool shifts the Quadrant Sleeves without using a packer. The unique BHA configuration reduces coil cycling and operational time, and the self-cleaning design of the hydraulic jet sub mitigates debris build-up and facilitates wellbore cleanup.

The TuffSEAL packer is a hydraulically set, mechanical single-element packer and is designed for ease of installation through its very short length and minimum outside diameter.

RESULTS

The cased hole 7-in. vertical well with a measured depth of more than 5,800 ft was perforated with 5 stages before the Quadrant system was installed.

After a successful pressure test to ensure well integrity, the stage one sliding sleeve was opened and the stimulation treatment was delivered into the zone. The Operator then conducted injectivity tests on stages three and four, before stimulating stage five. After successfully stimulating stage five, the Operator returned to stage four to stimulate that zone and then stimulated stage three.

By being able to move up and down the well to selectively stimulate each zone, the Operator was able to treat zones up to three times during operations. After the sliding sleeve was closed following a treatment, a pressure test confirmed the well integrity and the quality of the Quadrant system to withstand the challenging stimulation program.

Packers Plus is a leading supplier of multi-stage fracturing systems, providing field-proven stimulation technology for completing horizontal and vertical wells with superior production results in numerous formations around the world. For more information about Retina and other completion solutions, visit packersplus.com.