HiWAY Technique Doubles Production and Improves Efficiency in Tight Wells for PPL

Flow-channel fracturing technique eliminates screenouts and reduces polymer damage that limited conventional stimulation, Pakistan

**CHALLENGE**
Maximize oil production from low-permeability wells and improve efficiency of stimulation operations.

**SOLUTION**
Design and deliver fracturing operations using the HiWAY* flow-channel fracturing technique.

**RESULTS**
- Doubled average production compared with wells treated conventionally.
- Cut stimulation operation time in half compared with conventional fracturing operations.
- Reduced proppant requirement by 45% and delivered 100% of designed volume with no screenouts.

**Screenouts and polymer damage limit fracturing effectiveness**
PPL operates 29 wells in the rich Adhi Field in Pakistan. The preferred completion method is hydraulic fracturing because of the low permeability of the targeted Khewra and Tobra formations. Remote well locations create a logistics challenge for large fracturing operations because of road conditions, heavy vehicle availability, and delivery costs.

A third-party consulting company selected several early candidates for stimulation and designed operations using hydraulic fracturing. However, frequent screenouts reduced the stimulation efficiency, leading to costly nonproductive time for these rig-supported operations followed by suboptimal treatments with low proppant volumes.

To improve operational performance without detrimental reduction in proppant pack conductivity, the consulting company redesigned treatments to increase pad volumes and fluid system polymer loadings, trying to obtain better proppant transport. This approach mitigated the screenout problem, but poor fluid recovery during flowback resulted in only marginal production gains.

**Fracture pathways improve flow and efficiency**
Schlumberger recommended stimulation designs using the HiWAY technique. The technique fundamentally changes the way proppant fractures generate conductivity, creating open pathways inside the fracture instead of a solid proppant pack. Hydrocarbons can then flow easily through the stable channels rather than through the proppant. The technique optimizes connectivity between the reservoir and the wellbore, resulting in infinite fracture conductivity.

In addition, the technique significantly reduces water and proppant consumption, simplifying logistics and reducing operational footprint.

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**CASE STUDY**
The first Adhi Field wells stimulated using the HiWAY technique produced an average of two times more oil compared with those treated with conventional hydraulic fracturing designs.
Production and operational efficiency increase
The first four Adhi Field fracturing operations using the HiWAY technique increased production an average of seven-fold, as compared with three-fold average production increases from conventional operations in comparable offset wells. In addition, the jobs reduced proppant requirements by 45% and delivered 100% of the designed volumes with no screenouts.

The reduction in proppant volume also eliminated 2 truck trips, improving safety risks.

Simplifying the rig-supported operation also reduced the total job time, from 6 to 7 days per conventional fracturing stage to just 3 days per stage with the HiWAY technique.

Since the initial wells, Schlumberger has designed and delivered stimulation treatments with proppant ramps as high as 8 ppa, with lower overall proppant and pad volumes and polymer loadings as compared with conventional fracture designs. In addition to reducing formation damage, the reduced polymer loading expedites fluid recovery in flowback compared with the long flowback period for conventional designs.

As a result of these successful operations, the HiWAY technique has become the new standard for stimulating new and mature wells in the Adhi Field.