

# Operator Enhances Multistage Frac Operation Efficiency For HP/HT Wells

## ENGINEERED ILLUSION® DISSOLVABLE FRAC PLUG DESIGN HELPS IMPROVE PRESSURE RATING AND DISSOLUTION TIME

MIDDLE EAST

### CHALLENGES

- » Increase efficiencies during multistage frac stimulations using the plug-and-perf method
- » Frac plug capable of withstanding harsh conditions in high fracture gradient/high-temperature formation

### SOLUTIONS

Halliburton adapted the existing dissolvable frac plug design to meet specific customer needs:

- » Illusion® (HT-100) frac plug

### RESULTS

- » Differential pressure rating enhanced by 11%
- » Ability to perform in wells with up to 295°F BHST
- » 30% Quicker dissolution times
- » Zonal isolation achieved in 100% of the stages

### OVERVIEW

Drilling, stimulating, and completing high-pressure/high-temperature (HP/HT) reservoirs is crucial to helping operators increase production rates per well and reduce cost per barrel of oil equivalent (BOE). Dissolvable materials technology is an important element when striving to increase efficiencies, specifically when multistage fracturing is performed using the plug-and-perf method. Understanding the need for continuous improvement and in collaboration with the operator, Halliburton engineered the design of the high-temperature Illusion® dissolvable frac plugs to increase plug capabilities and operational efficiencies.

**Increased Illusion® frac plug pressure differential rating through design customization. Post-stimulation cleanout runs accomplished with no plugs tagged, thus increasing operational efficiencies.**

### CHALLENGES

A major operator in the Middle East required a dissolvable frac plug solution that would help reduce the time invested in performing cleanout runs in horizontal wells. The first-generation Illusion dissolvable frac plug required minor adjustments to the deployment procedures and stimulation operations were necessary to mitigate the risks associated with HP/HT wells.

### SOLUTIONS

To help improve performance, Halliburton listened to the operator's needs and responded with an expanded Illusion frac plug design based on downhole conditions, operational efficiencies and challenges observed in gas wells in the Middle East. Through a detailed revision of the dissolvable frac plug components and re-engineered material selection, the plug capabilities were enhanced. Extensive testing was conducted to verify the new components could help boost performance. The pressure rating of the new Illusion (HT-100) frac plug improved by more than 11% compared to the initial Illusion plug design. Field trials demonstrated the new Illusion frac plug can be effectively deployed in wells with up to 295°F bottomhole static temperatures (BHSTs).

**RESULTS**

Illusion (HT-100) frac plugs were deployed in selected trial wells. Zonal isolation was achieved in 100% of the stages deployed while pushing the operational limits of the plugs. In addition, the new Illusion frac plugs dissolved 30% faster compared to previous iterations under the aforementioned downhole conditions. The improved dissolution time allowed the operator to perform cost-effective, faster and safer post-stimulation cleanout intervention, thus maximizing asset value. Total dissolution of the plugs and full wellbore access was confirmed by post-stimulation cleanout runs with coiled tubing. None of the plugs deployed were tagged.

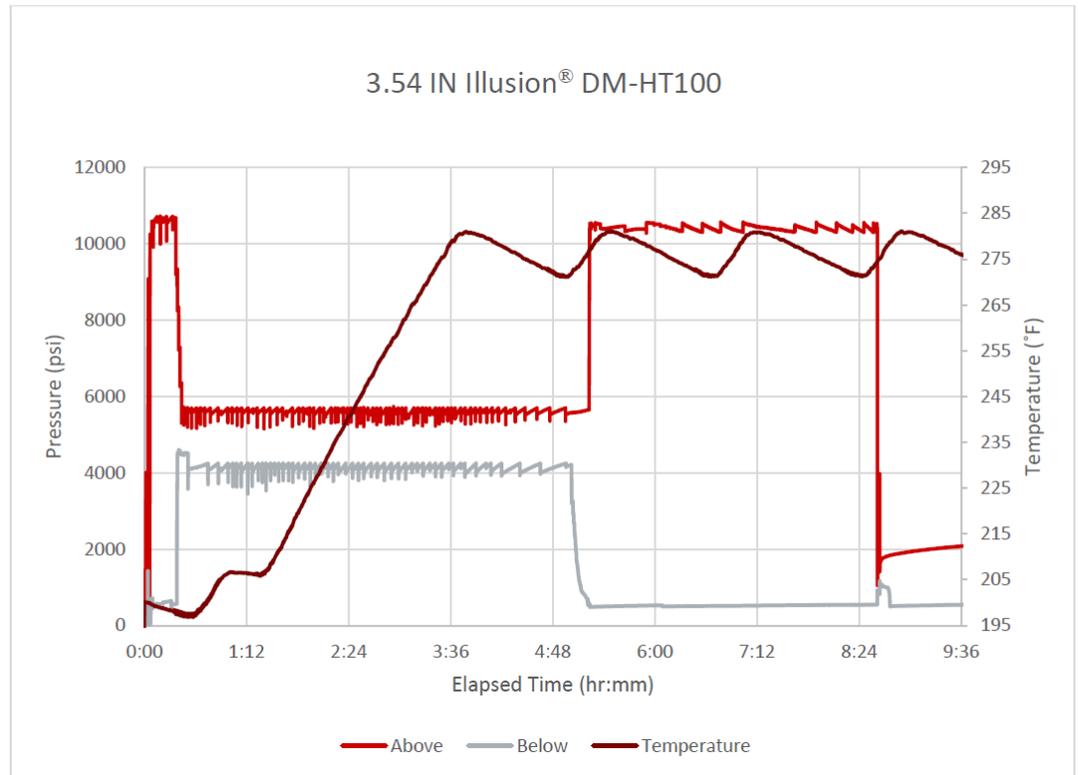
During the field trial, the Illusion (HT-100) frac plug provided competent stage isolation at 7% higher downhole temperatures and 20% longer exposure times than laboratory tests.

An 11% pressure-rating enhancement of the Illusion frac plug proved crucial to successfully break down formations and stimulate horizontal wellbores utilizing dissolvable frac plug technology.

**11%** Increase in differential pressure

**30%** Quicker dissolution times

**100%** Zonal isolation achieved in all stages



Temperature/pressure hold and test after setting

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