

## CASE STUDY

## StackFRAC HD system enables high stimulation rates



UNITED STATES, MISSISSIPPIAN

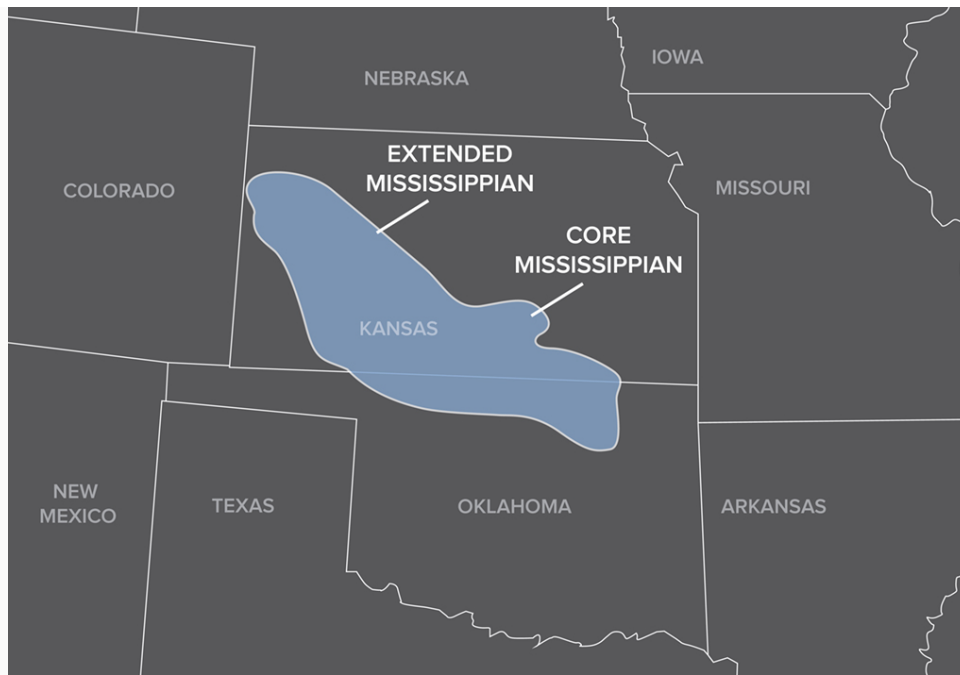


STACKFRAC HD SYSTEM

### Background

The Mississippian play is a carbonate oil trend spanning northern Oklahoma and southern Kansas for approximately 6.5 million acres. The uppermost member of this play is the “Chat,” which consists of chert, limestone and dolomite. The Mississippi Lime, found beneath the Chat can be found at depths between 2,800 and 3,500 ft in the east and between 4,500 and 6,500 ft in the west. High permeability and porosity are common in the Mississippian at approximately 1 – 2 mD and 10 – 20%, respectively, in the upper portion.

The Mississippian formation has been developed using vertical drilling for years, but the majority of development today has been focused on horizontal wells, either through new-drills or by re-entering existing vertical wells. As a shallow, liquids-rich play with low development costs relative to other formations, the Mississippian has become an increasingly attractive play.



## Challenge

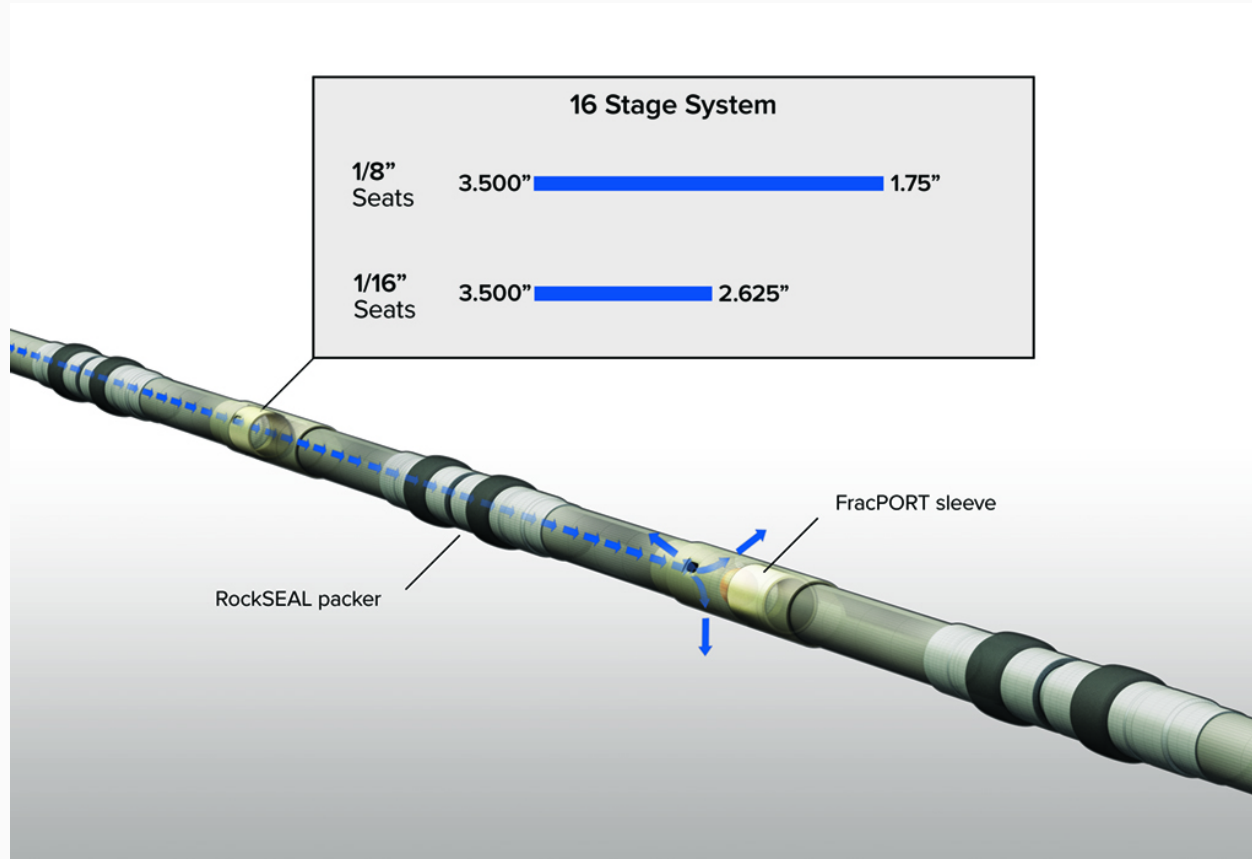
Packers Plus has been successfully completing wells in the Mississippian formation since 2007. During this time, Packers Plus has worked hand in hand with the operators to provide completion technology advancements to better exploit their reserves. Operators stimulate these wells at very high rates, up to 120 bpm. In addition to boosting their rates, operators have also been increasing the total stage count in their wells. The Mississippian is a critical area of oil and gas development for many operators and effective drilling and completion strategies must be employed to maximize production.

## Solution

The Packers Plus StackFRAC® system is an open hole, multi-stage ball-drop completion that has been used in over 180 formations worldwide. The StackFRAC system uses hydraulically set, mechanical RockSEAL® packers to isolate sections of the wellbore, and FracPORT™ sleeves to create openings in between the packers for fracture treatment. Size-specific actuation balls are injected into the system to allow for hydraulic opening of the FracPORT sleeves and create internal isolation from stage to stage.

To allow for more stages, Packers Plus introduced the StackFRAC HD system, which doubled the stage capability of the original system. To mitigate concerns regarding the effect of pumping

proppant at high rates, all Packers Plus FracPORT ball seats are made with an erosional-resistant material. The FracPORT sleeves, in combination with a field-proven suite of actuation balls, allow operators to stimulate their wells faster and more efficiently.



## Results

One operator working in the Mississippian used a 16-stage StackFRAC HD system with 1/8-in. ball seat increments to complete their open hole horizontal well. Prior to installation, a reamer was used to prepare the wellbore for the completion string, gauging the wellbore to ensure the system would reach the desired depth. The system was successfully installed with the SF Liner Hanger Packer set in the lateral at 90°, just above the intermediate shoe, to allow production equipment to be set deeper in the well.

The RockSEAL packers were spaced out on the liner with an average stage length of 250 ft. During the fracture stimulation, 15% HCl was pumped followed by a slickwater fracture treatment using 30/50 white and 16/30 resin-coated proppants. The stimulation was pumped at an average 115 bpm to a maximum of 123 bpm with an average total proppant/stage of 200,000 lb.

As of June 2013, Packers Plus has run 34 StackFRAC systems in the Mississippian throughout Oklahoma and Kansas. The wells have been completed with 12 to 20 stages. All have been successfully completed with no operational issues. Moving forward, the operator will be using 1/16-in. seat increments in their higher density wells. This allows the systems to be designed with larger ball seat sizes, reducing friction and enabling the operator to run more stages with higher treating rates (Figure 1).

The success of these wells demonstrates the benefits of using the StackFRAC HD system in the Mississippian formation. Packers Plus innovated open hole multi-stage systems in 2001 and has run more systems than all other providers combined. This provides operators with the highest level of operational experience and best practices for running open hole systems in this and other formations. Our commitment to reliable technology and tailored solutions for each well, along with operational efficiency ensure that costs remain low, while optimizing the success of the well.

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