# Maximizing Operational Efficiency by Floating One Trip Cemented and Openhole Liners

**Saving a deployment trip improves efficiency and reduces installation costs in horizontal multistage fracturing**

## Background

A major operator in Canada was conducting a competitive trial with two wells on a pad to determine the most effective practices for deployment and completion in the Falher formation in Alberta, Canada. The traditional method this operator used was to drill pipe, deploy the liner top packer systems, and plug and perf the wells. The operator used drillpipe to assist the liners in reaching TD, as they were extended-reach horizontal wells with difficult well geometries.

## Solution

Our solution included a casing-deployed liner system in combination with our ultra-reach flotation collar (URFC); this combination was designed to improve the customer's operational efficiency and limit the risk to the well. The first well was a standard plug-and-perf design where we installed the URFC, liner top packer, and i-Opener™ SO toe sleeve. The second well utilized a URFC, liner top packer, 52-stage Voyager™ OH system, i-Opener SO, and Flow Lock Sub™.

The URFC uses a glass package that is triggered at a pre-determined pressure. Once this pressure is applied, the glass shatters into small debris, which can be circulated through standard float equipment, eliminating the need for debris-catching tools downhole.

We have consistently deployed this technology in cemented environments because the debris is small enough to pass through any equipment below easily.

## Case study facts

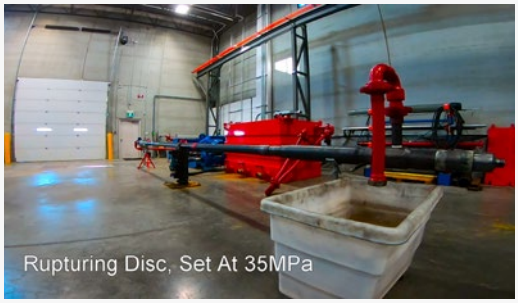
**Location:** Falher formation, Alberta, Canada

**Products**

- Ultra-reach flotation collar (URFC)
- Voyager OH system
- Liner top packer
- i-Opener SO
- Flow Lock Sub

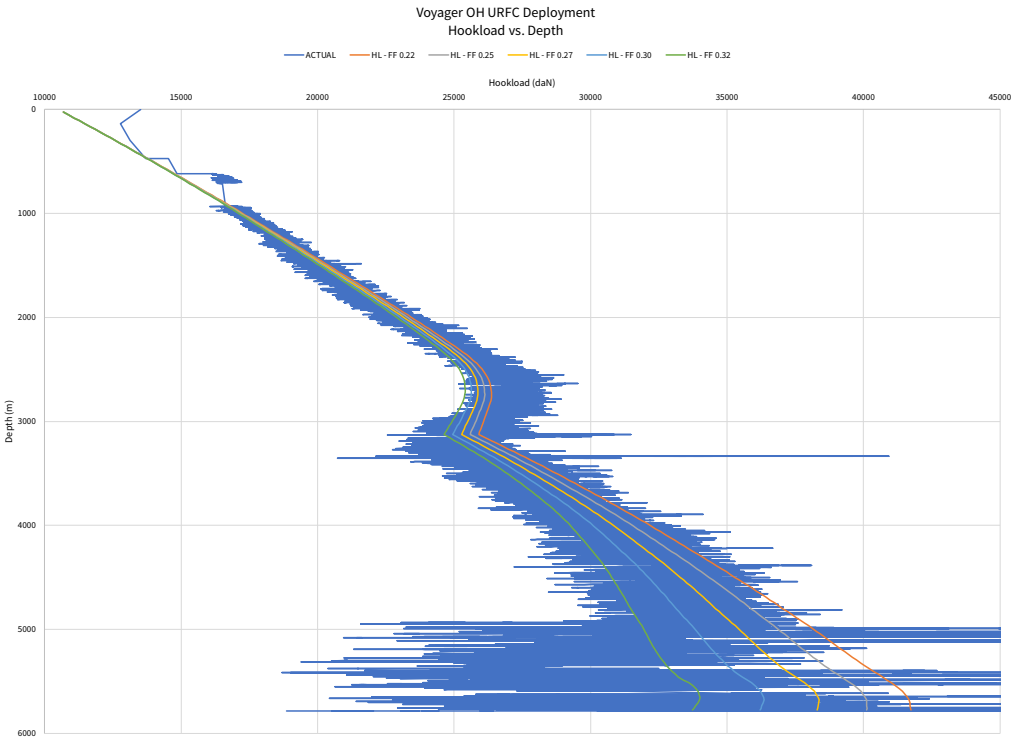
**Trial information**

- One pad, two trial wells
  - Cemented liner with URFC and i-Opener SO
  - Openhole liner with URFC, 52-stage Voyager OH system, and i-Opener SO


Rupturing Disc, Set At 35MPa


Glass Pumped Through


Remaining Glass in Flow Lock




The openhole installation presented an additional challenge. The debris, however small, did present a problem for the Flow Lock Sub activation tool. The Flow Lock Sub is an integral part of the openhole completion, as it isolates the liner so the Voyager packers and liner top packer can be set. Our original, field-proven Flow Lock Sub had a restricted flow area, and the debris could potentially close the internals before the customer could properly condition the well for completion operations.

Our NOV Completion Tools team redesigned the the Flow Lock Sub to improve its debris tolerance by increasing the flow area and creating a small sump where debris could deposit without activating the internal mechanism. A test was performed where a URFC was triggered, and the glass debris was circulated. This testing was completed successfully, proving we could safely circulate the debris through our new Flow Lock Sub design.

## Results

We completed both installations in Q1 of 2020. The modeling showed that a casing-deployed system was not possible without the use of the URFC. Both systems were installed successfully, and the glass debris did not cause any operational issues in either system. Moving forward, all liner top packers for this customer will be deployed on the casing with the help of the URFC.

The customer realized significant cost savings through:

- Reduced rig time for deployment
- Eliminating the drill pipe and frac string installation trips
- Utilizing all NOV equipment for the installation leveraged packaged system pricing and featured improved accountability from the completion tools system from design to installation

Our products and services allow us to be a full-spectrum provider of innovative well construction and completion systems.