Benefits of Coiled-Tubing Multicycle Frac Sleeves
Traditional completions limit options during completion and production
Completion limitations

- Compromised completion designs
- Limited contingency options
- Limited and expensive options for proppant flowback
- Toe-to-heel sequence requirement
Production limitations

• Wellbore restrictions
• Limited options to manage problem zones
• Limited refrac options
For wellbore management, we need flexible completion strategies and simple, selective entry-point management
MultiCycle® Sleeve Technology

MultiCycle sleeves provide flexibility during the initial completion and enable wellbore-management options during production

• Sleeves can be opened and closed multiple times during the life of a well
• Sleeves may be utilized for DFIT testing and initial production testing
• Shift / Frac / Close process utilized to reduce proppant flowback
• Proppant stays in the formation, enhancing conductivity, reducing or eliminating clean-outs
MultiCycle® Sleeve Technology

- MultiCycle sleeves open life-of-well production options
- New refrac strategies
- Selectively close intervals for economic reasons
- Secondary recovery options
- Close sleeves to defend against frac hits from offsets
- Out of sequence fracturing (shuttle frac)
MultiCycle frac sleeve

A closable version of the proven NCS GripShift casing sleeve
MultiCycle frac sleeve

Frac ports closed

Sliding barrel

Locator profile

Frac ports open
Shared features

• Full drift
• Match properties and connections of host casing
• Handle and make up like casing joints
• Can be installed in any order
GripShift sleeve introduced in 2010
• More than 112,000 sleeves installed
• 99+% shift success rate

MultiCycle sleeve introduced in 2013
• More than 30,000 sleeves installed
• 99+% shift success rate
Shift-Frac-Close downhole assembly

- Flow sub
- EQ valve
- Bridge plug
- Sleeve locator

Open sleeves

Close sleeves
MultiCycle - Shift-Frac-Close Sequence
MultiCycle - Shift - Frac - Close Sequence
New completion options
MultiCycle sleeves plus Shift-Frac-Close sequence solves problems and opens possibilities
Proppant flowback issues

- Loss of fracture width and conductivity
- Tubular and surface equipment damage
- Excessive well cleanout costs
- Delayed production
- Costly traditional solutions
  - Resin coated proppant
  - Planned overflush
Shift-Frac-Close sequence: frac healing to minimize proppant flowback

- Frac healing process
- Major operator estimates $25,000+ savings per well from initial cleanout avoidance, lower long-term operating costs through reduced surface equipment maintenance, and subsequent cleanout avoidance
- Promotes high-conductivity completion strategies
Shift-Frac-Close sequence opens completion and early production options

- Phased completion and production strategies
- Out-of-sequence fracturing
New production and refracturing options

Simple, selective entry point management
An asset that facilitates production management

• Selective production management
• Refracturing
• Floods for enhanced oil recovery
  • Easily convert producers to injectors
  • Selective injection along the lateral
Selective production management
Refracturing

- Restore full wellbore pressure integrity
- Selectively refrac stages with focused pressure and rates
- Option to add entry points in blank casing between sleeves
Flooding for enhanced oil recovery

- Easily convert producers to injectors
- Selective injection along the lateral
NCS Multicycle Sleeves

Complete your well today.... With the future in mind!
## General specifications

<table>
<thead>
<tr>
<th>Sleeve size</th>
<th>4.5-in.</th>
<th>5.5-in.</th>
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</thead>
<tbody>
<tr>
<td>Force to shift open:</td>
<td>23,400 lb</td>
<td>35,100 lb</td>
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<tr>
<td>Force to close:</td>
<td>6,000 lb</td>
<td>6,000 lb</td>
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<tr>
<td>Force to reopen:</td>
<td>6,000 lb</td>
<td>6,000 lb</td>
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