EIGHT WAYS to Reduce Well Intervention Costs
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In turbulent times, optimizing the performance of existing wells is a practical choice that reduces the costs and risks associated with well intervention. Innovative coiled tubing (CT) technologies offer several key benefits, including reduced footprint, accurate measurement of bottomhole pressures and temperatures, proper depth correlation, and precise load measurements, in a unique, robust package for harsh environments and complex systems. This information enables operators to make educated decisions as the job progresses, respond immediately and adjust job parameters as conditions change, and eliminate guesswork.

**Efficient and effective technologies to lower operational costs**

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**ACTive real-time downhole coiled tubing services**

**ACTive services** provide real-time measurements, including internal and external pressure, temperature, casing collar locator (CCL) and gamma ray (GR) depth correlation, flow velocity and distributed measurements, conveyed through fiber-optic telemetry. Resistant to acid and H₂S, these real-time CT services give you the opportunity to monitor and evaluate job progress in any well, to optimize treatment results, and to intervene with one trip in hole.
Use accurate well diagnostics to make decisions

Customize designed well treatments onsite

Controlled stimulation requires accurate location and placement of downhole tools. Real-time pressure, temperature, and casing collar locator measurements improve job efficiency and subsequent well performance.

New proprietary technology enables operators to design an entire treatment based on live monitoring of pressure, temperature, and injection rates. These real-time measurements—including pressure, temperature, casing collar locator, gamma ray, and tension and compression modules—enable operators to accurately determine the depth of the tool end, whether the weight applied on surface is transmitted to bottom, the reservoir response, and whether the pressure applied is adequate.

The ACTive PTC® CT real-time pressure, temperature, and casing collar locator tool delivers measurements to surface in real time.

**FEATURES**

- Ability to convert electrical to optical
- Onboard diagnostics
- Ability to combine real-time digital telemetry–based diagnostics with other measurements
- Real-time depth correlation with completion via casing collar locator
- Real-time internal and external CT pipe pressure and temperature
- Wireless surface communications
- Fast-rate telemetry
- Plug-and-play compatibility with the majority of CT downhole tools
- Innovative proprietary system to enable job-optimization decisions in real time on a single trip

**APPLICATIONS**

- Flow contribution and production diagnostics
- Stimulation and diversion effectiveness
- Water-injection profiles
- Multiple injection evaluation treatments
- Well kickoff
- Sand cleanouts
- Accurate bottomhole pressure management

**ACTive PTC**

**BENEFITS**

- Improve decision-making with real-time downhole pressure
- Respond quickly to changes in temperature
- Achieve accurate depth correlation with casing collar locator measurements

**CASE STUDY**

ACTive PTC tool expedites well evaluation and eliminates the need for a workover rig

An operator in Ecuador needed to acquire real-time data during well production evaluations in an onshore subhydrostatic well.

With conventional downhole memory gauges, the operator would have had to evaluate the well for several days while the reservoir pressure dropped and water cut stabilized and would not have been able to confirm the source of problematic water production. Using real-time data at surface from an ACTive PTC tool, the operator identified the source and completed the well evaluation while saving several days of rig time.

Read the case study

**Crossflow behind casing identified in a matter of hours instead of days**

<table>
<thead>
<tr>
<th>Reference temperature</th>
<th>185 degF</th>
<th>25</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brine injection temperature</td>
<td>185 degF</td>
<td>25</td>
</tr>
<tr>
<td>Warmback temperature after 1 h</td>
<td>185 degF</td>
<td>25</td>
</tr>
<tr>
<td>Warmback temperature after 2 h</td>
<td>185 degF</td>
<td>25</td>
</tr>
<tr>
<td>Warmback temperature after 3 h</td>
<td>185 degF</td>
<td>25</td>
</tr>
<tr>
<td>Warmback temperature after 4 h</td>
<td>185 degF</td>
<td>25</td>
</tr>
</tbody>
</table>

Using real-time data at surface, the operator identified the crossflow behind the casing and completed the buildup test and well production evaluation in only 17 hours, saving several days of rig time.

**Specifications**

<table>
<thead>
<tr>
<th>Pressure (microelectromechanical system [MEMS] gauge)</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typical ±3 psi (±20.7 kPa)</td>
<td>Maximum ±5 psi (±34.5 kPa)</td>
</tr>
<tr>
<td>Temperature (MEMS gauge)</td>
<td>Accuracy ±1 degF (±0.55 degC)</td>
</tr>
</tbody>
</table>

Casing collar locator

Resolution at 30 fps (1.04 m/s) ±1 ft/s (±0.30 m/s)

Learn more at sib.com/active
EIGHT WAYS to Reduce Well Intervention Costs

FEATURES

■ Ruggedized version for use during perforating operations
■ Design that accommodates ball drop to enable activating tools below
■ Plug-and-play combination with other services
■ Pumpthrough capability for CT intervention and gamma ray log in same run
■ Accurate gamma ray correlation for precise identification of downhole conditions

APPLICATIONS

■ Accurate depth correlation
■ Qualitative evaluation of lithology
■ Radioactive tracer monitoring
■ Perforating or abrasive jetting in a single run

Using gamma ray data is an effective and accurate way to evaluate a formation and conditions. Gamma ray tools record naturally occurring gamma rays in the formations adjacent to the wellbore to accurately measure the radioactive content of the formations. Effective in any environment, gamma ray tools are used to correlate logs from cased and open holes. When combined with ACTive services, this technology enables correlation while maintaining pumpthrough capability for CT interventions. The measurements gathered during depth correlation can be used in conjunction with other CT services to further enhance an intervention’s effectiveness.

Specifications

Model GRSM GRNM

<table>
<thead>
<tr>
<th>Feature</th>
<th>GRSM</th>
<th>GRNM</th>
</tr>
</thead>
<tbody>
<tr>
<td>OD</td>
<td>2.500 in</td>
<td>2.375 in</td>
</tr>
<tr>
<td>Makeup length</td>
<td>39.88 in</td>
<td>37.52 in</td>
</tr>
<tr>
<td>Total weight</td>
<td>20 lbm</td>
<td>20 lbm</td>
</tr>
<tr>
<td>Max. ball drop size</td>
<td>0.438 in</td>
<td>0.625 in</td>
</tr>
<tr>
<td>Flow path diameter</td>
<td>0.500 in</td>
<td>0.688 in</td>
</tr>
<tr>
<td>Max. flow rate</td>
<td>1.5 bbl/min</td>
<td>2 bbl/min</td>
</tr>
</tbody>
</table>

The ACTive GR* CT real-time gamma ray logging tool detects gamma rays in the formation in real time while maintaining pumpthrough capabilities for CT interventions.

Real-time correlation

Provides industry-standard measurements

Pumpthrough capabilities

Enables CT intervention and gamma ray log in one run

No need for wireline unit

Reduces footprint at the wellsite

CASE STUDY

Overcoming severe drilling damage

While drilling a K-carbonate gas well in the Middle East, an operator encountered high fluid losses due to lost circulation material, which caused severe damage to the near-wellbore formation and had low solubility in acid. To accurately perform abrasive jetting to place notches that extended through the damaged area, the ACTive GR tool was used to obtain gamma ray measurements in real time and identify the precise depth to perforate in every thin interval with high gas saturation. This information enabled the operator to save time compared with existing conventional methods of depth correlations, which require two separate runs.

This successful placement identified by the ACTive GR tool brought production online quickly to achieve the field’s highest postperforating gas flow.
Effectively manipulate wellbore hardware
Detect even the smallest changes in weight downhole

When a remedial operation is necessary, efficiency is key. Reducing operational time during CT retrieval and fishing minimizes deferred production and the time and resources wasted while the operation is ongoing. With real-time downhole information, job parameters can be adjusted immediately throughout the intervention.

New tension-compression technology provides downhole load and torque measurements while also maintaining pumpthrough capability. The measurements are conveyed to surface on CT that is enabled by fiber-optic telemetry for faster evaluation and reduced errors.

The ACTive TC* CT real-time tension and compression tool provides downhole load and torque measurements in real time through fiber-optic telemetry.

**BENEFITS**

- Improved accuracy with real-time downhole measurements
- Greater efficiency and control
- Reduced risk of unsuccessful operations

**APPLICATIONS**

- CT operations in deviated and horizontal wells
- Positive indication of latching or jar activation
- Confirmation of sliding sleeve activation
- Confirmation of completion hardware manipulation
- Positive indication of inflatable packer setting
- Indication of perforating guns firing

**FEATURES**

- Downhole load and torque measurements in real time
- Robust design for use during perforating and fishing operations
- Pumpthrough capability to allow CT intervention in the same run
- Ball-drop capability through the tool for activation of tools below
- Plug-and-play combinability with enhanced ACTive services

**COMPATIBLE TOOLS**

- Setting tool
- Retrieval
- Shifting tool
- Packer
- Straddle packer

**CASE STUDY**

**ACTive TC tool enables shifting of 10 ICDs in horizontal wells within 6 hours**

An operator needed to access inflow control devices (ICDs) in horizontal wells to confirm opening of sleeves and determine the status of the sliding sleeves during the operation, and wireline was unable to reach the depth of the ICDs. Using the ACTive TC tool, the depth of the CT was correlated to the position of ICDs using the casing collar locator feature. Once the dog collars were confirmed to be open, the ACTive TC tool was moved up and latched onto the ICD sleeve. A total of 10 ICDs were shifted within 6 hours versus more than 12 hours by using conventional toolstrings, and a DTS survey evaluated the opened sleeves.

Read the case study

**LOCATION**

**Saudi Arabia**

The ACTive TC tool provided the ability to apply the exact amount of force needed to shift 10 ICDs open within 6 hours compared with more than 12 hours by using conventional methods.

**DID YOU KNOW?**

Using the ACTive TC tool, you can detect as little as a 5-lbf change in downhole forces.

**SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>OD</td>
<td>2.125 in [5.40 cm]</td>
</tr>
<tr>
<td>Total weight</td>
<td>38 lbm [17.2 kg]</td>
</tr>
<tr>
<td>Max. torque</td>
<td>800 ft.lbf [1,085 N.m]</td>
</tr>
</tbody>
</table>

**Pressure compensated measurements**

- Axial load range: 
  -10,000 to +5,000 lbf (−44,482 to +22,220 N)
- Axial load accuracy: Absolute 
  0.05% of FSO (0.05% of force)
  ±1% applied
  Localized: 2% applied
- Axial load resolution: <5 lbf (<22.2 N)

- Torque range: 0 to 800 ft.lbf (0 to 1,085 N.m)
- Torque accuracy: ±50 ft.lbf (±67.8 N.m)
- Torque resolution: <5 ft.lbf (<6.8 N.m)

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EIGHT WAYS to Reduce Well Intervention Costs

Specifications

- Max. packer element differential
  - 2:1 expansion: 2,000 psi [13.8 MPa]
  - 3:1 expansion: 5,000 psi [34.5 MPa]
- Max. hole deviation: 90°
- Max. system temperature: 300 degF [149 degC]
- Max. dogleg severity:
  - Operational: 10°/100 ft
  - Survivable: 30°/100 ft
- Max. H₂S levels†:
  - Set time:
    - <30 d at 300 degF [149 degC]: 150-psi partial pressure
    - >30 d at 250 degF [121 degC]: 50-psi partial pressure
- Min. tubing requirements for packer setting:
  - 2.88-in [7.3-cm] OD;
  - 2.32-in [5.89-cm] ID;
  - 7.9-lbm/ft casing
- Max. OD of element before expansion: 2.125 in [5.4 cm]
- Max. OD of element after expansion: 6.38-in [16.2-cm] ID;
  - 7.63-in [19.4-cm] OD;
  - 29.7-lbm/ft casing

APPLICATIONS

- Water and gas conformance shutoff
- Matrix stimulation and chemical treatment
- Perforated cased hole completions
- Cased hole completions with sliding sleeves
- Completions with ICDs
- Multistage completions
- Sand consolidation treatment

Benefits

1. Improves reliability through multiple efficient, controlled settings of inflatable elements
2. Resists aggressive chemicals and harsh downhole environments
3. Provides accurate depth control and real-time pressure monitoring

Case Study

ACTive Straddle inflatable packer cleanout doubles production in two wells

With more than 20 ICDs in each well, Kuwait Oil Company (KOC) needed to identify and selectively treat the problematic ICDs and restore production with minimal downtime.

Using ACTive Straddle packer in combination with the ACTive DTS* distributed temperature measurement and inversion analysis, KOC identified, isolated, and selectively treated the plugged ICDs in a single run in each well, saving more than one week of rig time, increasing production from Well A by 150%, increasing production from Well B by 171%, and producing 50,000 bbl of oil.

Read the case study

Features

- Live well intervention capability
- No ball drop required for inflation and deflation
- Computer-engineered job design
- High-pressure isolation seal
- Straddle length configurable from 6 to 50 ft [1.8 to 15.2 m]
- Chemical-resistant for selectively placing fluids required for treatment and stimulation

DID YOU KNOW?

The packer provides robust, high-pressure isolation seals and can be configured in lengths ranging from 6 ft to 50 ft [1.8 m to 15.2 m] and up to 6.3-in [16-cm] OD.

CASE STUDY

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Well A increased 150%

Well B increased 171%

Using the ACTive Straddle packer, KOC increased production by a total of 50,000 bbl.

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†Values are operational limits.

Learn more at sfb.com/active
Perforate more efficiently and reduce risk
Avoid deferred production and killing the well when reperforating

Properly perforating or reperforating a well can make a dramatic difference in production. A successful perforating intervention enhances production in new or existing intervals. However, conventional methods for perforating with CT often require multiple runs, experience perforating head limitations, and lack confirmation of detonation.

Schlumberger has advanced CT perforating technology to selectively perforate up to 10 zones in a single run and provide real-time confirmation of detonation downhole. These improvements enable the system to enhance intervention safety, eliminate the need to pump fluid to detonate, and reduce perforating time.

As part of the ACTive Pert® CT real-time perforating service, ACTive OptiFIRE® CT real-time selective perforating and activation system provides a safer, more economical, and more efficient method for perforating with CT.

**APPLICATIONS**
- Selective, underbalanced, and live well perforating
- Tubing punching
- Plug setting

**FEATURES**
- Ability to fire up to 10 zones in a single run
- Selective perforating capabilities
- Robust selective-firing multiple-gun system for single-run efficiency
- Capability of addressing pumping issues in subhydrostatic wells
- Improved safety from addressing each gun with advanced switches
- Reduced footprint
- Real-time pressure and temperature for optimized fluid placement and hydrostatic pressure control
- Fast-acquisition accelerometer for detonation confirmation

**BENEFITS**
- Greater Safety and Certainty
  - Confirms detonation in real time
  - Enables detonation without fluids or balls
- Accuracy
  - Correlates depth with casing collar locator and gamma ray
- Flexibility
  - Performs selective perforating of multiple guns
- Efficiency
  - Reduces weight as compared with conventional CT electric line reels, with better extended reach and ability to pump acid

**CASE STUDY**
Underbalanced perforating technology reduces deferred production and intervention time
To prevent deferred production and remove formation damage, Pemex needed to perforate two new intervals and reperforate a critical zone on a live well in underbalanced conditions. Schlumberger deployed the ACTive OptiFIRE system, a first-of-its-kind coiled tubing technology that eliminates the need for a ball-drop or pressure-pulse system to activate shaped charges. Using advanced fiber-optic technology, Schlumberger accurately placed the perforating guns, activated the charges without a ball-drop or pressure-pulse system, and confirmed downhole detonation in real time.

**DID YOU KNOW?**
The ACTive OptiFIRE system provides all the advantages of perforating with CT and electric line without the need for a wireline unit.

**PERFORATING time reduction**
The ACTive OptiFIRE system successfully perforated all three intervals, increased production 18%, and reduced perforating gun detonation time by 75%.

**SPECIFICATIONS**
- Operating temperature range: –40 to 102 degF [–40 to 150 degC]
- Pressure rating: 12,500 psi [86 MPa]
- Flow rate: 2.2 bbl/min [0.31 m³/min]
- Max. gun size: 3.375-in HSD* high-shot density perforating gun system
- Gun compatibility: Carrier guns only with addressable switches and Secure2® RF-safe electronic detonators
- Max. number of selective zones: 10
- Outside diameter: 2.125 in [5.40 cm]

*Pumping rate above the firing head limitation

Learn more at sfib.com/active

**LOCATION**
Mexico

**IMPROVED SAFETY FROM ADDRESSING EACH GUN WITH ADVANCED SWITCHES**

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**IMPROVED SAFETY FROM ADDRESSING EACH GUN WITH ADVANCED SWITCHES**
Enable efficient multistage fracturing
Improve efficiency and safety of multistage completions

ACTiVe Plug & Perf system operations are streamlined by deploying CT equipped with fiber-optic telemetry. Designed for use in high- or low-pressure wells, underbalanced perforating conditions, or unconsolidated reservoirs, the ACTiVe Plug & Perf™ CT real-time plug setting and perforating system enables multistage fracturing in a single run. As compared with conventional plug and perforation methods, the system improves efficiency by eliminating the need for ball drop, pressure pulse, and dependence on pumping fluid for gun detonation.

The ACTiVe Plug & Perf system increases operational efficiency and safety with real-time downhole feedback.

**FEATURES**
- Electronic safety key and pin reduce risk during perforating
- Advanced addressable switches on guns and Secure2 RF-safe electronic detonator improve safety and detonation reliability with immunity from radio frequency (RF) interference
- Can be used with ACTiVe PTC CT real-time pressure, temperature, and casing collar locator tool for improved job efficiency or ACTiVe Xtreme™ CT real-time rugged downhole measurement tool to assist with drag force measurements

**APPLICATIONS**
- Multistage fracturing with plug setting and selective perforating in a single run
- Live-well interventions

**CASE STUDY**
New technology sets Copperhead plugs and fires perforating guns with just one coiled tubing run, saving USD 600,000 in rig time, Congo

The ACTiVe OptiFIRE system can perforate up to 10 zones in a single run and provide real-time downhole detonation confirmation.

Because the ENI well design did not use the system’s full 10-zone capability for selective perforating, Schlumberger instead used the ACTiVe Plug & Perf system, which enabled the system to set the versatile Copperhead plugs electrically using a conventional wireline plug setting tool.

Read the case study

**DID YOU KNOW?**
ACTiVe Plug & Perf system selectively activates and sets a plug with a subsequent perforation and pressure and temperature evaluation of the new open zone.

**SPECIFICATIONS**
- Operating temperature range: -40 to 362 degF (-40 to 150 degC)
- Pressure rating: 12,500 psi [86 MPa]
- Flow rate†: 2 bbl/min (0.31 m³/min)
- Max. gun size: 3.375 in (8.57 cm)
- HSD™ high shot density perforating gun system
- Gun compatibility: Carrier guns only
- Max. number of selective zones: 10
- Max. OD (without guns or plug): 2.125 in (5.40 cm)
- Tensile strength: 40,000 lb (177,400 N)
- Compressive strength: 10,000 lb (44,480 N)
- Max. number of guns: Depends on tensile strength
- Number of plugs per run: 1
- Detonator type: Secure2 RF-safe electronic detonator

† Max. pumping rate above the firing head
‡ Max. length of 500 ft (152 m)

**SAVINGS**
- USD 600,000 in rig time

Learn more at [sfb.com/active]
Integrate wireline production logging capabilities with CT
Improve logistics with less equipment

The ACTive PS* CT real-time production logging service couples real-time fiber-optic telemetry with existing wireline production logging tools to acquire data in real time.

**FEATURES**
- Real-time fiber-optic telemetry
- Wireless data conveyance
- Self-contained technology
- Faster, higher-quality data
- Real-time data evaluation
- Simplified logistics
- Compatibility with PS Platform platform and DTS

**APPLICATIONS**
- CT and extended-reach logging
- Wireline production logging operations using PS Platform* production services platform, Flow Scanner* horizontal and deviated well production logging system, and RSTPro* reservoir saturation tool
- Nitrogen kickoff
- Well stimulation
- Onsite evaluation
- Wellbores inaccessible by wireline

**CASE STUDY**
**ACTive PS service reduces rig operational time by 10 days during plug setting and well cleanup**

An operator needed to perform production logs and matrix stimulation operations, as well as shut off H₂S and water-producing zones in extended-reach wells with major logistical constraints. The operations required a single piece of equipment to fit on the small platform and preventing swapping out units during the operation.

Using the ACTive PS service, the operator was able to perform production logging operations using PS Platform production services platform and Flow Scanner horizontal and deviated well production logging system. Alternating the use of ACTive PS service and ACTive PTC tool saved the operator multiple runs and equipment changes, including a total of 10 days in rig operations with a total of 16 runs performed in 7 wells within 2 months.

Read the case study

**DID YOU KNOW?**
Operators can run ACTive PS service with a wireline reservoir saturation tool such as the RSTPro tool.

**Specifications**
- **Surface**
  - Optical acquisition module mounted inside the CT reel
  - Temperature rating: –13 to 131 degF (–25 to 55 degC)
  - Power requirement: 12 V DC
  - Data communication: Wireless
- **Downhole**
  - Total tool length: 12.5 ft (3.81 m)
  - Flange diameter: 1 11⁄16 in (4.3 cm)
  - Pressure rating: 15,000 psi (103.4 MPa)
  - Temperature rating: –13 to 300 degF (–25 to 150 degC)
  - Flow rate at CT head ports: 1 bbl/min (0.16 m³/min)
- **Material**: NACE compliant

The ACTive services intervention saved 25% in total calculated hours when compared with a conventional intervention using wireline and CT.

**Locations**
- West Africa

Learn more at sbf.com/active
ACTive DFLO tool readings enhance the effectiveness of other ACTive services. The combined monitoring of critical downhole parameters improves understanding of the treatment as it progresses, enabling changes to improve performance.

**APPLICATIONS**

- Fluid injection profiling
- Fluid placement control
- Leak detection
- Treatment effectiveness monitoring
- Diversion confirmation

**BENEFITS**

- Enables accurate, efficient fluid placement by providing downhole flow monitoring data in real time
- Evaluates treatment effectiveness quickly, so adjustments can be made without delay
- Reduces operational time by enabling a wide range of CT services to be used in the same run

**FEATURES**

- Real-time fluid direction detection and flow velocity measurement
- Accurate depth control with integrated casing collar locator
- Optional gamma ray measurements
- Pressure and temperature sensors to monitor treatment
- Fast-rate telemetry
- Compatibility with distributed temperature sensing (DTS)

**MEASURE DOWNHOLE FLOW RATES ACCURATELY FOR ENHANCED REMEDIAL TREATMENTS**

Evaluate treatments in real time for prompt adjustments

**CASE STUDY**

**ACTive Q service improves injection rates in openhole laterals**

A Middle East operator had drilled and completed a dual-lateral water injector well to provide pressure support and enhance reservoir sweep efficiency. The well had two openhole laterals of more than 4,000 ft (1,219 m) each. After a natural injectivity decline, the operator decided to acidize the two laterals with the aim of restoring the well to its initial injection rate.

During the stimulation operation, the ACTive DFLO tool was used to profile flow along the entire sections of interest to identify damaged zones and to ensure treatment fluid was effectively placed to stimulate them.

The well's injection rate increased to 14,000 bbl/d, 600% above the prestimulation level and almost three times the initial injection rate.

**Read the case study**

**Specifications**

**Equipment Specifications**

- OD 2.125 in [5.4 cm]
- Make up length 161.94 in [411.3 cm]
- Total weight 115 lbm [52.2 kg]
- Flow path diameter 11/16 in [1.75 cm]
- Max. ball drop size 7/16 in [1.1 cm]

**Operational Specifications**

- Operating temperature 300 degF [149 degC]
- Pressure rating 12,000 psi [82.7 MPa] (at max. tensile rating)
- Max. torque 800 ft.lbf [1,085 N.m]
- Max. internal flow rate 2 bbl/min [0.31 m³/min]
- Fluid compatibility All common treating fluids including acid; H₂S compatible
- Max. proppant concentration 1 ppa

**Location**

Middle East

**Dual-lateral injectivity increased by 600%**

**ACTive DFLO**

CT real-time flow measurement tool provides downhole fluid velocity measurement and direction detection while maintaining pumpthrough capability. Effective in a wide range of downhole environments, the ACTive DFLO tool delivers additional feedback on the effectiveness of the intervention. In particular, the tool helps track the direction that the fluid takes due to the reservoir’s response to the treatment. Intervention parameters such as pumping rates, injection depth, and fluid volumes can be adjusted with increased confidence because they are based on the real-time downhole information.

**ACTive DFLO**

CASE STUDY

ACTive Q service improves injection rates in openhole laterals

A Middle East operator had drilled and completed a dual-lateral water injector well to provide pressure support and enhance reservoir sweep efficiency. The well had two openhole laterals of more than 4,000 ft (1,219 m) each. After a natural injectivity decline, the operator decided to acidize the two laterals with the aim of restoring the well to its initial injection rate.

During the stimulation operation, the ACTive DFLO tool was used to profile flow along the entire sections of interest to identify damaged zones and to ensure treatment fluid was effectively placed to stimulate them.

The well's injection rate increased to 14,000 bbl/d, 600% above the prestimulation level and almost three times the initial injection rate.

**Read the case study**

**Specifications**

**Equipment Specifications**

- OD 2.125 in [5.4 cm]
- Makeup length 161.94 in [411.3 cm]
- Total weight 115 lbm [52.2 kg]
- Flow path diameter 11/16 in [1.75 cm]
- Max. ball drop size 7/16 in [1.1 cm]

**Operational Specifications**

- Operating temperature 300 degF [149 degC]
- Pressure rating 12,000 psi [82.7 MPa] (at max. tensile rating)
- Max. torque 800 ft.lbf [1,085 N.m]
- Max. internal flow rate 2 bbl/min [0.31 m³/min]
- Fluid compatibility All common treating fluids including acid; H₂S compatible
- Max. proppant concentration 1 ppa

**DID YOU KNOW?**

ACTive DFLO tool can quantify flow profiles in real time, helping customers visualize zones that require improvement.

Robust design with:
- high compressive load
- no centralizers or arms
- no spinners or protruding elements
- resistance to H₂S, solvent, and acid
- flow-through capability
- ball-drop compatibility

Learn more at sbd.com/active
### ACTive PTC Tool Specifications

<table>
<thead>
<tr>
<th>Equipment specifications</th>
<th>OD</th>
<th>2 OD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure</td>
<td>12,500 psi [86.84 MPa]</td>
<td>12,500 psi [86.84 MPa]</td>
</tr>
<tr>
<td>Temperature</td>
<td>300 °F [149 °C]</td>
<td>300 °F [149 °C]</td>
</tr>
<tr>
<td>Outside diameter</td>
<td>2.125 in [5.4 cm]</td>
<td>2.125 in [5.4 cm]</td>
</tr>
<tr>
<td>Makeup length</td>
<td>2 ft [0.6 m]</td>
<td>2 ft [0.6 m]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pressure (microelectromechanical system [MEMS] gauge)</th>
<th>Accuracy</th>
<th>Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typical</td>
<td>±3 psi [±20.7 kPa]</td>
<td>±0.075 psi [±517 Pa]</td>
</tr>
<tr>
<td>Maximum</td>
<td>±5 psi [±34.5 kPa]</td>
<td>±0.1 psi [±690 Pa]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Temperature (MEMS gauge)</th>
<th>Accuracy</th>
<th>Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typical</td>
<td>±1 °F [±0.55 °C]</td>
<td>±0.03 °F [±0.55 °C]</td>
</tr>
</tbody>
</table>

| Casing collar locator | Resolution at 30 fps [9.14 m/s] | ±1 ft/s [±0.30 m/s] |

### ACTive GR Tool Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>OD</th>
<th>2 OD</th>
</tr>
</thead>
<tbody>
<tr>
<td>2D</td>
<td>2.500 in [6.35 cm]</td>
<td>2.275 in [5.82 cm]</td>
</tr>
<tr>
<td>Make-up length</td>
<td>39.88 in [1.01 m]</td>
<td>37.52 in [0.95 m]</td>
</tr>
<tr>
<td>Total weight</td>
<td>24.8 lbm [11.2 kg]</td>
<td>24.8 lbm [11.2 kg]</td>
</tr>
<tr>
<td>Max. ball drop size</td>
<td>0.438 in [11.11 mm]</td>
<td>0.625 in [15.87 mm]</td>
</tr>
<tr>
<td>Flow path diameter</td>
<td>0.500 in [12.7 mm]</td>
<td>0.600 in [15.24 mm]</td>
</tr>
<tr>
<td>Shimline</td>
<td>NACE compliant</td>
<td>NACE compliant</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Operating temperature</th>
<th>500 °F [260 °C]</th>
<th>500 °F [260 °C]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure rating</td>
<td>12,500 psi [86.84 MPa] (at max. tensile rating)</td>
<td>12,500 psi [86.84 MPa] (at max. tensile rating)</td>
</tr>
<tr>
<td>Tensile strength</td>
<td>45,000 lbf [200,170 N] (at max. pressure rating)</td>
<td>45,000 lbf [200,170 N] (at max. pressure rating)</td>
</tr>
<tr>
<td>Max. flow rate</td>
<td>110 bbl/min [170 l/min]</td>
<td>110 bbl/min [170 l/min]</td>
</tr>
<tr>
<td>Fluid compatibility</td>
<td>All common treating fluids including acid H₂S compatible</td>
<td>All common treating fluids including acid H₂S compatible</td>
</tr>
<tr>
<td>Max. proppant concentration</td>
<td>1 gpa</td>
<td>1 gpa</td>
</tr>
</tbody>
</table>

### ACTive TC Tool Specifications

<table>
<thead>
<tr>
<th>Equipment specifications</th>
<th>OD</th>
<th>2 OD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Make-up length</td>
<td>47.80 in [1.21 m]</td>
<td>47.80 in [1.21 m]</td>
</tr>
<tr>
<td>Total weight</td>
<td>39.88 lbm [17.9 kg]</td>
<td>39.88 lbm [17.9 kg]</td>
</tr>
<tr>
<td>Flow path diameter</td>
<td>0.688 in [1.74 mm]</td>
<td>0.688 in [1.74 mm]</td>
</tr>
<tr>
<td>Max. ball drop size</td>
<td>0.625 in [15.87 mm]</td>
<td>0.625 in [15.87 mm]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Operating temperature</th>
<th>300 °F [149 °C]</th>
<th>300 °F [149 °C]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure rating</td>
<td>12,500 psi [86.84 MPa]</td>
<td>12,500 psi [86.84 MPa]</td>
</tr>
<tr>
<td>Tensile strength</td>
<td>45,000 lbf [200,170 N] (at max. pressure rating)</td>
<td>45,000 lbf [200,170 N] (at max. pressure rating)</td>
</tr>
<tr>
<td>Max. flow rate</td>
<td>2 bbl/min [0.31 m³/min]</td>
<td>2 bbl/min [0.31 m³/min]</td>
</tr>
<tr>
<td>Fluid compatibility</td>
<td>All common treating fluids</td>
<td>All common treating fluids</td>
</tr>
<tr>
<td>Max. proppant concentration</td>
<td>1 gpa</td>
<td>1 gpa</td>
</tr>
</tbody>
</table>

### ACTive Straddle Tool Specifications

<table>
<thead>
<tr>
<th>Max. packer element differential</th>
<th>2:1 expansion</th>
<th>3:1 expansion</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 OD</td>
<td>5,000 psi [34.5 MPa]</td>
<td>5,000 psi [34.5 MPa]</td>
</tr>
<tr>
<td>Max. hole deviation</td>
<td>10°/100 ft</td>
<td>10°/100 ft</td>
</tr>
<tr>
<td>Max. system temperature</td>
<td>300 °F [149 °C]</td>
<td>300 °F [149 °C]</td>
</tr>
<tr>
<td>Max. dogleg severity</td>
<td>10°/100 ft</td>
<td>10°/100 ft</td>
</tr>
<tr>
<td>Max. H₂S levels</td>
<td>150 psi partial pressure</td>
<td>50 psi partial pressure</td>
</tr>
<tr>
<td>Fluids</td>
<td>Stimulation fluids: HCl, mud acid Chemical treatments: solvents Water/gas shut-off: MARKASEAL® sealing agents</td>
<td></td>
</tr>
<tr>
<td>Rated for perforation jobs</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

### ACTive Straddle Packer Specifications

<table>
<thead>
<tr>
<th>Max. packer element differential</th>
<th>2:1 expansion</th>
<th>3:1 expansion</th>
</tr>
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<tbody>
<tr>
<td>2 OD</td>
<td>5,000 psi [34.5 MPa]</td>
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<td>Max. hole deviation</td>
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<td>10°/100 ft</td>
</tr>
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<td>Max. system temperature</td>
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<td>Yes</td>
<td>No</td>
</tr>
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</table>
### ACTive OptiFIRE Specifications

**ACTive OptiFIRE System Specifications**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating temperature range</td>
<td>–40 to 302 degF</td>
</tr>
<tr>
<td>Pressure rating</td>
<td>12,500 psi (86 MPa)</td>
</tr>
<tr>
<td>Flow rate†</td>
<td>2 bbl/min (0.31 m³/min)</td>
</tr>
<tr>
<td>Max. gun size</td>
<td>3.375-in HSD® high-shot-density perforating gun system</td>
</tr>
<tr>
<td>Gun compatibility</td>
<td>Carrier guns only</td>
</tr>
<tr>
<td>Max. number of selective zones</td>
<td>10</td>
</tr>
<tr>
<td>Max. OD of element before expansion</td>
<td>2.125 in [5.4 cm]</td>
</tr>
<tr>
<td>Tensile strength</td>
<td>10,000 lbf [44,480 N]</td>
</tr>
<tr>
<td>Compressive strength</td>
<td>10,000 lbf [44,480 N]</td>
</tr>
<tr>
<td>Number of total guns</td>
<td>Depends on tensile strength</td>
</tr>
<tr>
<td>Detonator type</td>
<td>Secure2® RF-safe electronic detonator</td>
</tr>
</tbody>
</table>

**ACTive Plug & Perf Specifications**

<table>
<thead>
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<th>Specification</th>
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</tr>
<tr>
<td>Max. gun size</td>
<td>3.375-in HSD system</td>
</tr>
<tr>
<td>Gun compatibility</td>
<td>Carrier guns only</td>
</tr>
<tr>
<td>Max. number of selective zones</td>
<td>10</td>
</tr>
<tr>
<td>Max. OD (without guns or plug)</td>
<td>2.125 in [5.4 cm]</td>
</tr>
<tr>
<td>Tensile strength</td>
<td>40,000 lbf [177,900 N]</td>
</tr>
<tr>
<td>Compressive strength</td>
<td>10,000 lbf [44,480 N]</td>
</tr>
<tr>
<td>Number of plugs per run</td>
<td>1</td>
</tr>
<tr>
<td>Detonator type</td>
<td>Secure2 detonator</td>
</tr>
</tbody>
</table>

**ACTive DFLO Tool Specifications**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
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<tbody>
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</table>

**Operational Specifications**

<table>
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<tr>
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<td>Fluid compatibility</td>
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</tr>
</tbody>
</table>

**Measurement Specifications**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluid type</td>
<td>Single-phase fluids</td>
</tr>
<tr>
<td>Velocity measurement range</td>
<td>2 to 1,500 ft/min (0.01 to 7.62 m/s)</td>
</tr>
<tr>
<td>Velocity measurement accuracy</td>
<td>5%</td>
</tr>
</tbody>
</table>