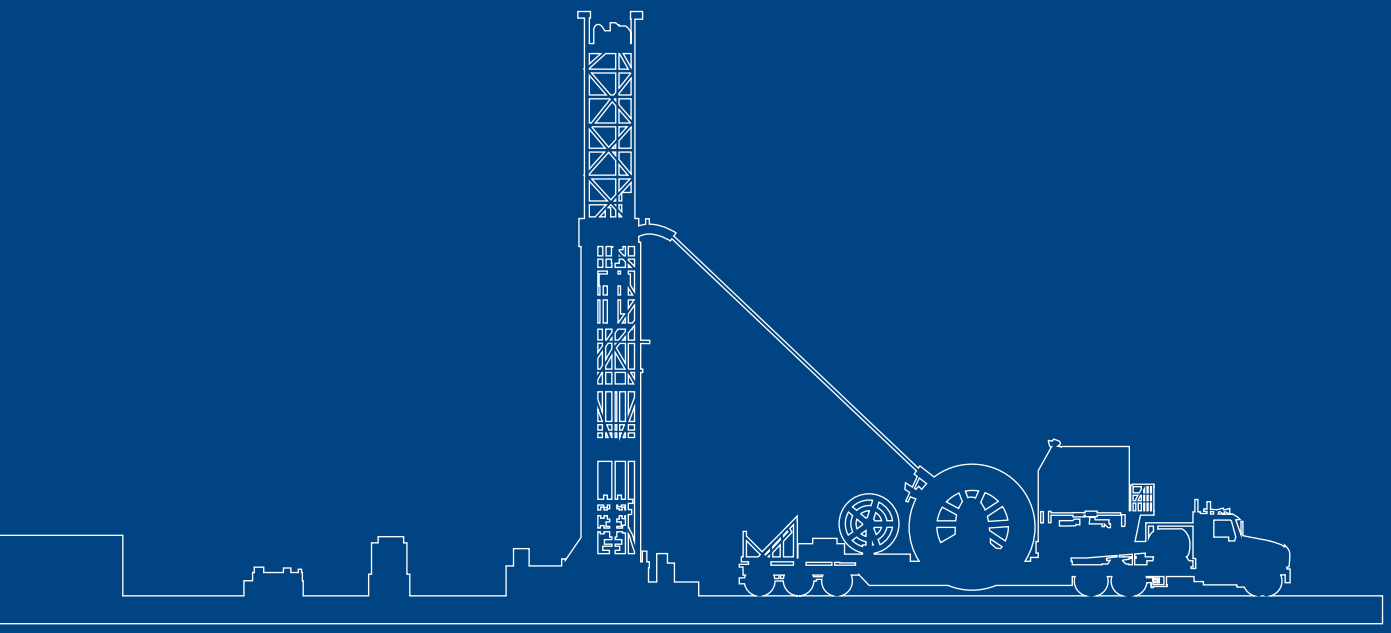
Schlumberger



EIGHT WAYS to Reduce **Well Intervention Costs**

Efficient and effective technologies to lower operational costs

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.

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 H_2S, 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.

Learn more at
slb.com/active

01

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.

ACTive PTC

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

BENEFITS

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

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

22hrs
▼
Average savings
based on
real-time diagnostics

Location
Ecuador

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

CASE STUDY

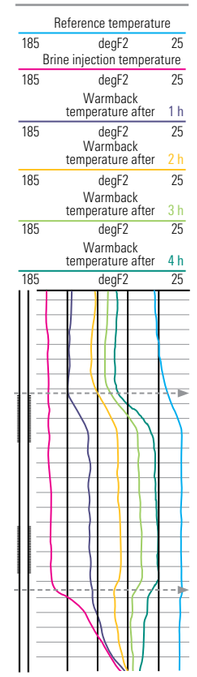
ACTive PTC tool expedites well evaluation and eliminates the need for a workover rig

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

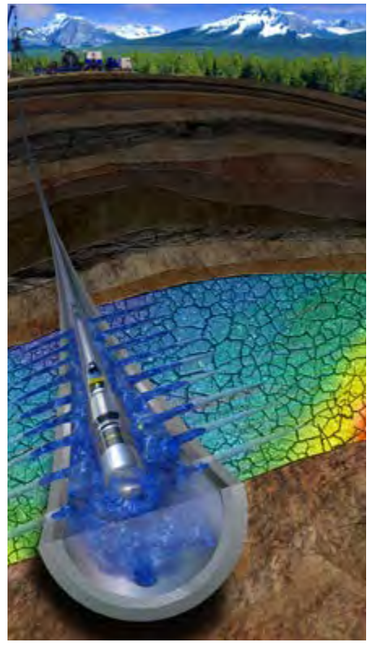
With conventional downhole memory gauges, the operator would have had to evaluate the well for several days while the reservoir pressure dropped and water cut stabilized and would not have been able to confirm the source of problematic water production. Using real-time data at surface from an ACTive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



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

Pressure	12,500 psi [86,184 kPa]
Temperature	300 degF [149 degC]
Outside diameter	2.125 in [5.40 cm]
Makeup length	7.2 ft [2.19 m]

Pressure (microelectromechanical system [MEMS] gauge)	
Accuracy	
Typical	±3 psi [±20.7 KPa]
Maximum	±5 psi [±34.5 KPa]
Resolution	0.075 psi [517 Pa]

Temperature (MEMS gauge)	
Accuracy	±1 degF [±0.55 degC]
Resolution	0.03 degF [0.55 degC]

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

Learn more at
slb.com/active

02

Correlate against the formation

Retain pumpthrough capabilities while logging

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.

ACTive GR

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.

BENEFITS

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

APPLICATIONS

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

Location
Middle East

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

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.

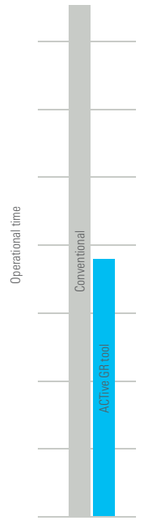
This successful placement identified by the ACTive GR tool brought production online quickly to achieve the field's highest postperforating gas flow.

Read the case study

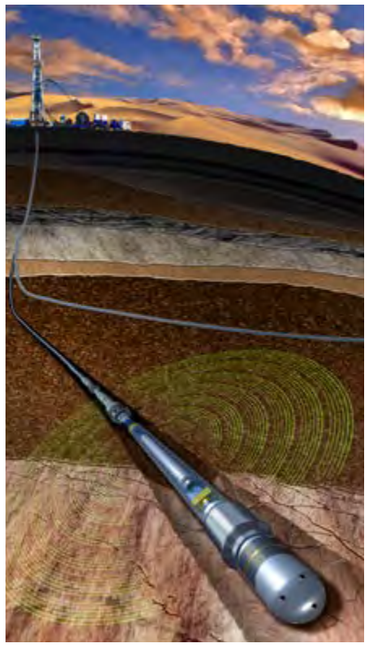
DID YOU KNOW?

The ACTive GR tool is similar to the wireline gamma ray tool but does not require additional components.

2⇒1
Runs needed to perform the job



The ACTive GR tool reduced operating time by 50% during abrasive perforating by requiring only one run to collect data and perform the abrasive perforating.



Specifications

Model	GRSM	GRNM
OD	2.500 in [6.35 cm]	2.375 in [6.03 cm]
Makeup length	39.88 in [1.01 m]	37.52 in [0.95 m]
Total weight	20 lbm [9.07 kg]	20 lbm [9.07 kg]
Max. ball drop size	0.438 in [11.11 mm]	0.625 in [15.875 mm]
Flow path diameter	0.500 in [12.7 mm]	0.688 in [17.48 mm]
Max. flow rate	1.5 bbl/min [0.24 m^3/min]	2 bbl/min [0.31 m^3/min]
Rated for perforation jobs	Yes	No

Learn more at
slb.com/active

03

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.

ACTive TC

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

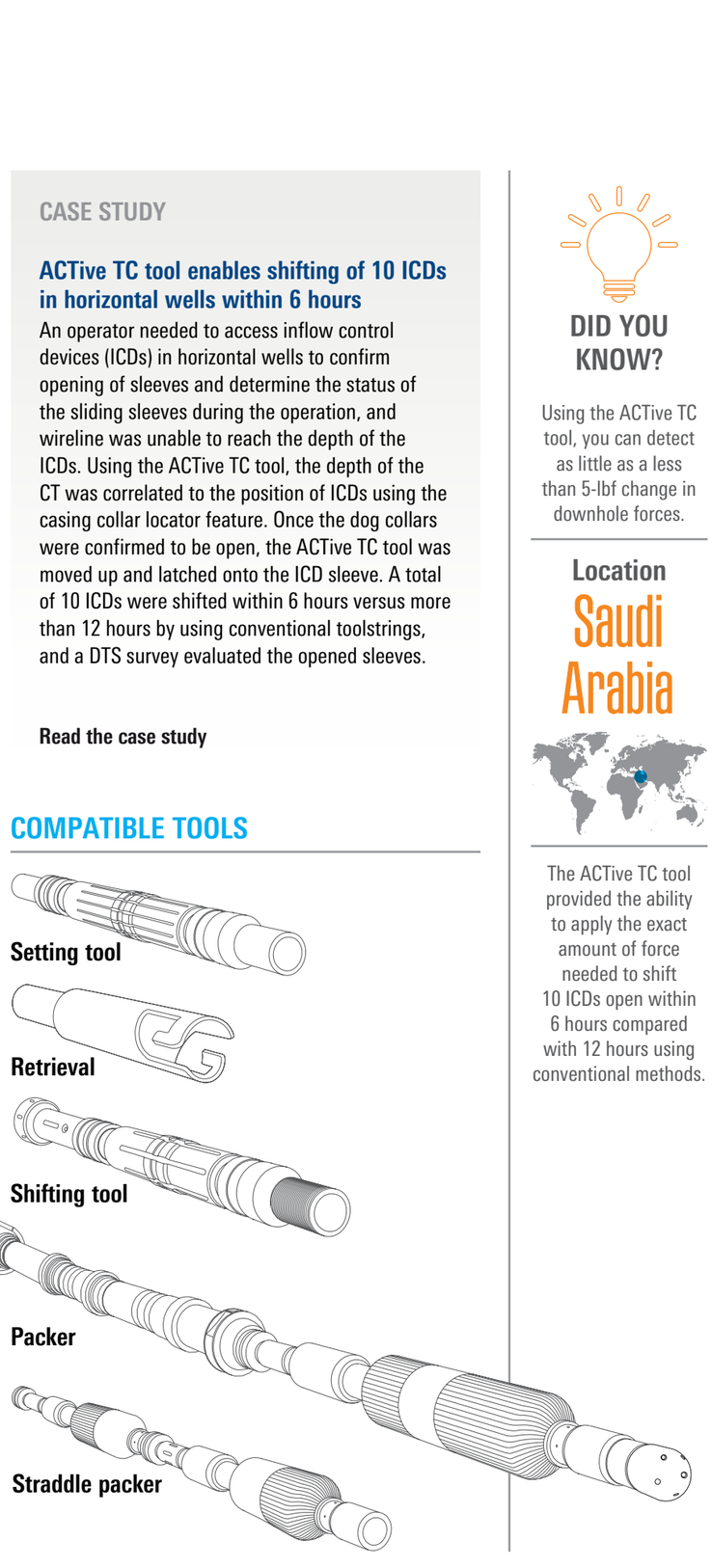
CASE STUDY

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

COMPATIBLE TOOLS

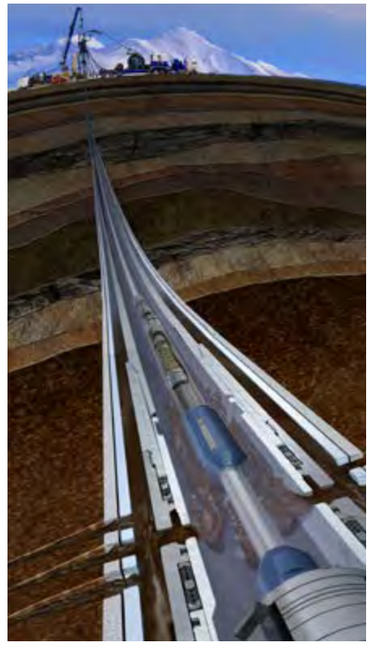


DID YOU KNOW?

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

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 12 hours using conventional methods.



Specifications	
OD	2.125 in [5.40 cm]
Total weight	38 lbm [17.2 kg]
Max. torque	800 ft.lbf [1,085 N.m]
Measurement specifications	
Pressure compensated measurements	Yes
Axial load range	–10,000–45,000 lbf [–44,482–200,169 N]
Axial load accuracy	Absolute: 500 lbf [2,224 N] +1% applied Localized: 2% applied
Axial load resolution	<5 lbf [<22.2 N]
Torque range	0–800 ft.lbf [0–1,085 N.m]
Torque accuracy	<50 ft.lbf [<67.8 N.m]
Torque resolution	<5 ft.lbf [<6.8 N.m]

Learn more at
slb.com/active

04

Extend zonal isolation with robust multisetting

Overcome well and environmental challenges in real time

Difficult-to-access, chemically harsh, and high-temperature environments can still benefit from effective zonal isolation.
Accurately placing treating fluids for acid stimulation, water control, gas shutoff, and chemical treatment in harsh environments is difficult and requires rugged, reliable technology.

With a robust multiset mechanism, these packers can perform repeated remedial operations without killing the well. The latest packers are also resistant to chemicals, enabling treatment in previously inaccessible wells.

ACTive Straddle

Deployed with the ACTive Isolation* CT real-time zonal isolation service, ACTive Straddle* CT real-time multiset inflatable packer extends critical through-tubing zonal isolation to previously inaccessible environments with a reliable multiset mechanism.

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**

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

Location
Kuwait

Saved more than 1 week of intervention time compared with conventional intervention treatments.

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

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

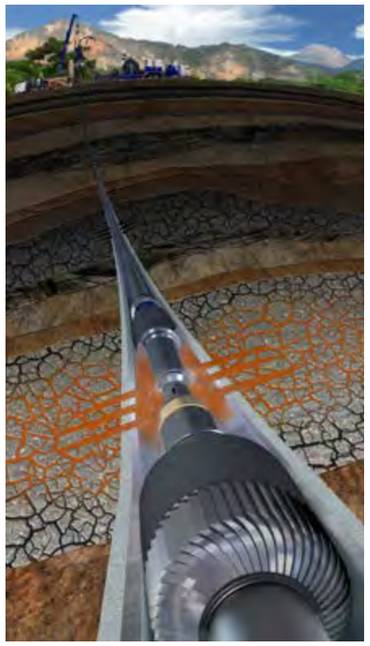
DID YOU KNOW?

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.

Well A increased 150%▲

Well B increased 171%▲

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



Specifications

Max. packer element differential	
2:1 expansion	5,000 psi [34.5 MPa]
3:1 expansion	2,000 psi [13.8 MPa]
Max. hole deviation	90°
Max. system temperature	300 degF [149 degC]
Max. dogleg severity	
Operational	10°/100 ft
Survivable	30°/100 ft
Max. H_2S levels†	
Set time <30 d at 300 degF [149 degC]	150-psi partial pressure
Set time >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

†Values are operational limits.

Learn more at
slb.com/active

05

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.

ACTive OptiFIRE

As part of the ACTive Perf* 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.

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

APPLICATIONS

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

Location
Mexico

75% ▼
Perforating time reduction

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

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

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.

Read the case study

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.

Save detonation time
compared with conventional fluid or ball methods.

18% ▲
Increased production for Pemex

Specifications	
Operating temperature range	–40 to 302 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 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
slb.com/active

06

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 perf methods, the system improves efficiency by eliminating the need for ball drop, pressure pulse, and dependence on pumping fluid for gun detonation.

ACTive Plug & Perf

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

BENEFITS

- **Increases efficiency with selective activation of plug setting tool and subsequent perforation**
- **Reduces surface equipment and personnel requirements**
- **Decreases the risk of overdisplaced fractures because of real-time downhole activation, measurements, and feedback**

APPLICATIONS

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

Location

Congo

36-hour savings
Eliminated two coiled tubing runs into the well.

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

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.

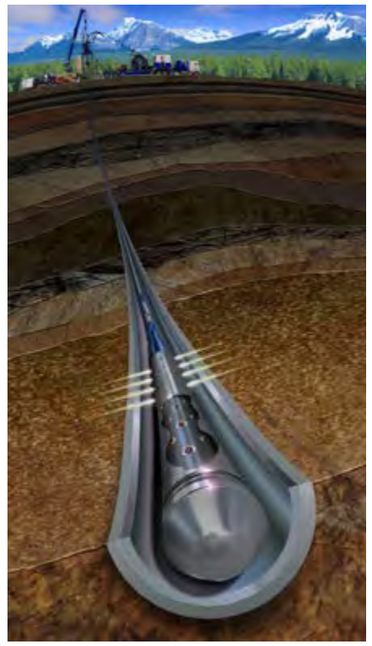
Read the case study

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.

Plug setting and perforating in one single run while maintaining flowthru capabilities

Savings of
USD 600,000
in rig time



Specifications

Operating temperature range	–40 to 302 degF [–40 to 150 degC]
Pressure rating	12,500 psi [86 MPa]
Flow rate†	2 bbl/min [0.31 m^3/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 lbf [177,900 N]
Compressive strength	10,000 lbf [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]

Learn more at
slb.com/active

07

Integrate wireline production logging capabilities with CT

Improve logistics with less equipment

Acquire evaluation, design, diagnostics, and optimization data in just one trip to the wellsite.
Traditional CT production logging operations require a logging cable–equipped CT string and a standard logging unit, which typically accounts for an additional conventional CT reel for intervention operations before and after the logging is performed.

The use of fiber-optic telemetry enables any kind of workover intervention to be performed. Data is sent wirelessly from the working reel to the acquisition and interpretation computer on the surface, so no surface logging unit is needed on location. Production logging can be acquired in real time, so reservoir and production measurements can be interpreted for subsequent interventions—where they matter most.

ACTive PS

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.

BENEFITS

1. **Real-time fiber-optic telemetry coupled with existing wireline production logging tools for the best live CT production logging service**
2. **Fully self-contained technology with no wireline unit to reduce footprint**
3. **Fewer crew members required due to minimal equipment use**
4. **High-quality onsite evaluation, well stimulation design, real-time treatment diagnostics, and well production optimization in just one trip to the wellsite**

Location
West Africa

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

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

CASE STUDY

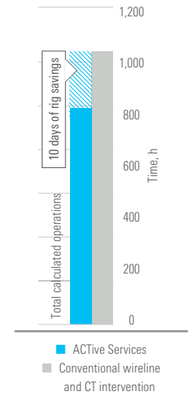
ACTive PS service reduces rig operational time by 10 days during plug setting and well cleanout
An operator needed to perform production logs and matrix stimulation operations, as well as shut off H_2S and water-producing zones in extended-reach wells with major logistical constraints. The operations 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.

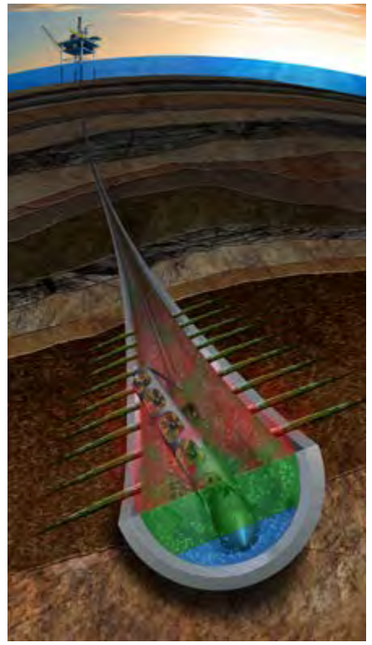
Read the case study

DID YOU KNOW?

Operators can run ACTive PS service with a wireline reservoir saturation tool such as the RSTPro tool.



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



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]
Outside 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 m^3/min]
Material	NACE compliant

Learn more at
slb.com/active

08

Measure downhole flowrates accurately for enhanced remedial treatments

Evaluate treatments in real time for prompt adjustments

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

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.

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

APPLICATIONS

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

Location

Middle East

Dual-lateral injectivity increased by 600%

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)

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 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.

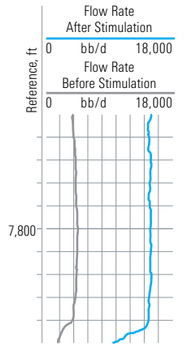
Read the case study

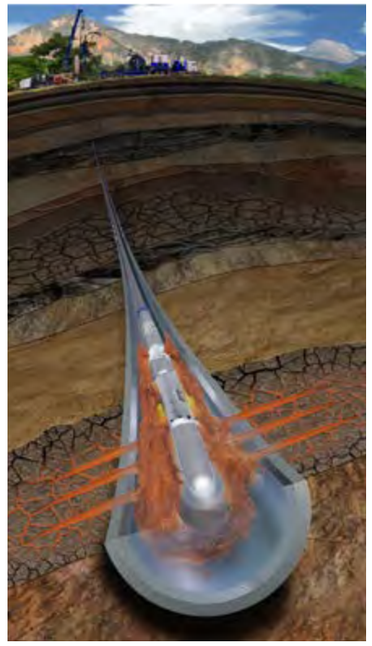
DID YOU KNOW?

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 H_2S, solvent, and acid
- flow-through capability
- ball-drop compatibility





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	1 1/16 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)
Tensile strength	45,000 lbf [200,170 N] (at max. pressure rating)
Max. torque	800 ft.lbf [1,085 N.m]
Max. internal flow rate	2 bbl/min [0.31 m^3/min]
Fluid compatibility	All common treating fluids including acid; H_2S compatible
Max. proppant concentration	1 ppa

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Specifications

01 ACTive PTC

ACTive PTC Tool Specifications	
Pressure	12,500 psi [86,184 kPa]
Temperature	300 degF [149 degC]
Outside diameter	2.125 in [5.40 cm]
Makeup length	7.2 ft [2.19 m]
Pressure (microelectromechanical system [MEMS] gauge)	
Accuracy	
Typical	±3 psi [±20.7 KPa]
Maximum	±5 psi [±34.5 KPa]
Resolution	0.075 psi [517 Pa]
Temperature (MEMS gauge)	
Accuracy	±1 degF [±0.55 degC]
Resolution	0.03 degF [0.55 degC]
Casing collar locator	
Resolution at 30 fps [9.14 m/s]	±1 ft/s [±0.30m/s]

02 ACTive GR

ACTive GR Tool Specifications

Model		GRSM	GRNM
Equipment Specifications	OD	2.500 in [6.35 cm]	2.375 in [6.03 cm]
	Makeup length	39.88 in [1.01 m]	37.52 in [0.95 m]
	Total weight	20 lbm [9.07 kg]	20 lbm [9.07 kg]
	Max ball drop size	0.438 in [11.11 mm]	0.625 in [15.875 mm]
	Flow path diameter	0.500 in [12.7 mm]	0.688 in [17.48 mm]
	Material	NACE compliant	NACE compliant
Operational Specifications	Operating temperature	300 degF [149 degC]	300 degF [149 degC]
	Pressure rating	12,500 psi [86 MPa] (at max. tensile rating)	12,500 psi [86 MPa] (at max. tensile rating)
	Tensile strength	45,000 lbf [200,170 N] (at max. pressure rating)	45,000 lbf [200,170 N] (at max. pressure rating)
	Max torque	800 ft.lbf [1,085 N.m]	800 ft.lbf [1,085 N.m]
	Max flow rate	1.5 bbl/min [0.24 m^3/min]	2 bbl/min [0.31 m^3/min]
	Fluid compatibility	All common treating fluids including acid and H_2S	All common treating fluids including acid and H_2S
	Shock rating	12,000 shocks at 250 gn/ms 40 shocks at 3,800 gn/0.3ms	12,000 shocks at 250 gn/ms
	Rated for perforation jobs	Yes	No

GRSM: Gamma ray shock model
GRNM: Gamma ray nonshock model

03 ACTive TC

ACTive TC Tool Specifications

Equipment specifications	OD	2.125 in [5.40 cm]
	Makeup length	47.80 in [121.41 cm]
	Total weight	38 lbm [17.2 kg]
	Flow path diameter	0.688 in [1.74 cm]
	Max. ball drop size	5/8 in [1.58 cm]
Operational specifications	Operating temperature	300 degF [149 degC]
	Pressure rating,	12,000 psi [82.74 Mpa] (at max. tensile rating)
	Tensile strength	45,000 lbf [200,170 N] (at max. pressure rating)
	Max. torque	800 ft.lbf [1,085 N.m]
	Max. flow rate	2 bbl/min [0.31 m^3/min]
	Min. flow rate	1.5 bbl/min [0.24 m^3/min]
	Fluid compatibility	All common treating fluids including acid H_2S compatible
	Max. proppant concentration	1 ppa
Measurement specifications	Pressure compensated measurements	Yes
	Axial load range	–10,000–45,000 lbf [–44,482–200,169 N]
	Axial load accuracy	Absolute: 500 lbf + 1% Applied Localized: 2% Applied
	Axial load resolution	<5 lbf [<22.2 N]
	Torque range	0–800 ft.lbf [0–1,085 N.m]
	Torque accuracy	<50 ft.lbf [<67.8 N.m]
	Torque resolution	<5 ft.lbf [<6.8 N.m]

04 ACTive Straddle

ACTive Straddle Packer Specifications

Max. packer element differential	
2:1 expansion	5,000 psi [34.5 MPa]
3:1 expansion	2,000 psi [13.8 MPa]
Max. hole deviation	90°
Max. system temperature	300 degF [149 degC]
Max. dogleg severity	
Operational	10°/100 ft
Survivable	30°/100 ft
Max. H_2S levels†	
Set time < 30 d at 300 degF [148.9 degC]	150 psi partial pressure
Set time > 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
Fluids	Stimulation fluids: HCL, mud acid Chemical treatments: solvents Water/gas shutoff: MARA-SEAL℠, gelling agents

†Values in the table above are operational limits.

Specifications

05 ACTive OptiFIRE

ACTive OptiFIRE System Specifications		
Operating temperature range	–40 to 302 degF [–40 to 150 degC]	
Pressure rating	12,500 psi [86 MPa]	
Flow rate,†	2 bbl/min [0.31 m^3/min]	
Max. gun size	3.375-in HSD* high-shot density perforating gun system	
Gun compatibility	Carrier guns only	
Max. number of selective zones	10	
Max. OD of element before expansion	2.125 in [5.40 cm]	
Tensile strength	40,000 lbf [177,900 N]	
Compressive strength	10,000 lbf [44,480 N]	
Number of total guns	Depends on tensile strength	
Detonator type	Secure2* RF-safe electronic detonator	
	2.125-in OD Tool with 1.69-in Adapter	**2.125-in OD Tool with 3.38-in Adapter**
Diameter	2.125 to 1.69 in [5.40 to 4.30 cm]	2.125 to 3.38 in [5.40 to 8.60 cm]
Makeup length	114.9 in [291.8 cm]	120.2 in [305.3 cm]
Total weight	86.4 lbm [39.2 kg]	102.4 lbm [46.4 kg]

†Pumping rate above the firing head limitation

06 ACTive Plug & Perf

ACTive Plug & Perf Specifications		
Operating temperature range	–40 to 302 degF [–40 to 150 degC]	
Pressure rating	12,500 psi [86 MPa]	
Flow rate†	2 bbl/min [0.31 m^3/min]	
Max. gun size	3.375-in [8.57 cm] HSD 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 lbf [177,900 N]	
Compressive strength	10,000 lbf [44,480 N]	
Max. number of guns	Depends on tensile strength‡	
Number of plugs per run	1	
Detonator type	Secure2 detonator	
	2.123 in-OD Tool with 1.69-in Adapter	**2.125 in-OD Tool with 3.38-in Adapter**
Diameter	2.123 to 1.69 in [5.40 to 4.30 cm]	2.125 to 3.38 in [5.40 to 8.60 cm]
Total weight	86.4 lbm [39.2 kg]	102.4 in [46.4 cm]

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

07 ACTive PS

ACTive PS Service 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]†
Outside diameter	1 1/16 in [4.3 cm]
Pressure rating	15,000 psi [103.4 MPa]
Temperature rating	–13 to 300 degF [–25 to 149 degC]
Operating time	At least 36 hours of logging time‡
Flow rate at CT head ports	1 bbl/min [0.16 m^3/min]
Material	NACE compliant
Compatible logging tools	Any battery-operated PS Platform platform, Flow Scanner system, or RSTPro tool

† An additional 18 ft [5.5 m] are added to the tool length with the three-battery extended power module, and an additional 30 ft [9.1 m] are added to the tool with the six-battery extended power module. ‡ Over 100 hours of additional operating time are added for the Flow Scanner system, or 26 hours of running the RSTPro tool with the extended power module.

08 ACTive DFLO

ACTive DFLO Tool Specifications	
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Tensile strength	45,000 lbf [200,170 N] (at max. pressure rating)
Max. torque	800 ft.lbf [1,085 N.m]
Max. internal flow rate	2 bbl/min [0.31 m^3/min]
Fluid compatibility	All common treating fluids including acid; H_2S compatible
Max. proppant concentration	1 ppa
Measurement Specifications	
Fluid type	Single-phase fluids
Velocity measurement range	2 to 1,500 ft/min [0.01 to 7.62 m/s]
Velocity measurement accuracy	5%

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