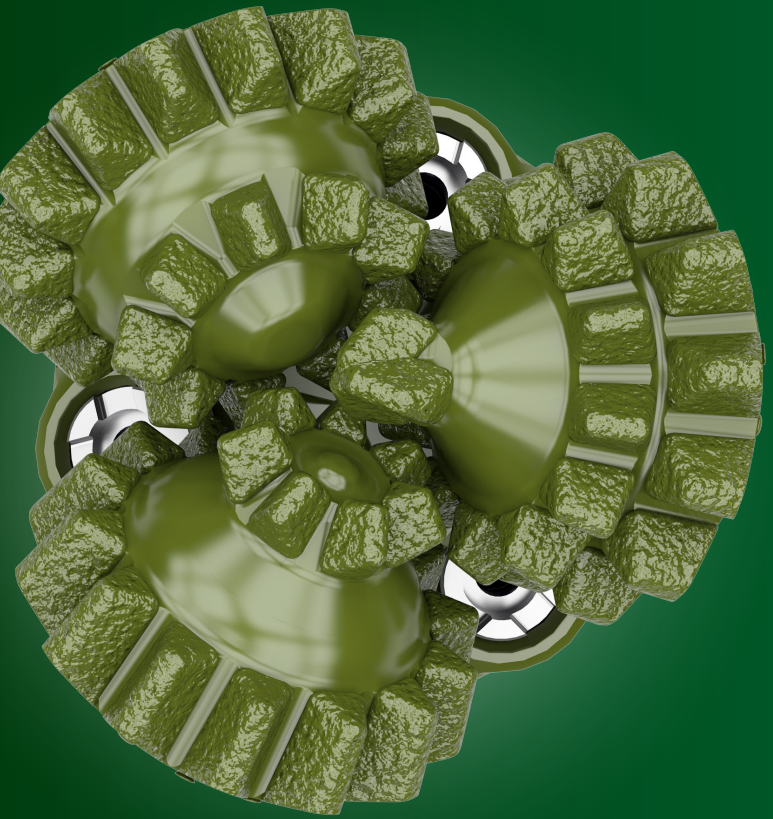
CT Plus

Coiled tubing bits for plug milling

SMITH BITS

A Schlumberger Company

Designed specifically to optimize performance in plug milling including coiled tubing and workover operations, small-diameter CT Plus* coiled tubing bit from Smith Bits, enable operators to reduce milling time and drill all required plugs in one run.



CT Plus roller cone bits incorporate the latest Smith Bits technology to perform with greater reliability while drilling composite plugs. The bits are engineered for extended-reach milling operations in various applications and include premium design features.

Roller Cone Friction Bearings

Premium bearings ensure maximum wear resistance and reduced vibration.

V-Ramp Seal

V-Ramp seal distributes contact pressure over a large area to enable longer bit life.

Leg Protection

Semiround top carbide inserts maximize leg protection to reduce bit wear.

Premium Hardfacing

Hardfacing reduces wear and increases durability to maximize the number of plugs drilled.

Advanced Milled-Tooth Cutting Structure

The cutting structure of CT Plus roller cone bits provides maximum possible gouging and scraping in milling applications. The bits are available in a range of sizes for your specific application needs.

Extended Bit Life

Each bit is coated with a premium tungsten carbide hardfacing material that was developed over several generations of proven hardmetal materials. This coating provides

- full coverage on teeth
- increased wear resistance and toughness
- better dull condition.

Enhanced Seal Performance

To enhance performance in coiled tubing (CT) applications, the bits feature seals with a circular cross section that forms to take the shape of the V-Ramp gland design. Made of highly saturated nitrile (HSN) material, the seal offers a balance of wear resistance and resilience.

Customized Lubrication System

CT Plus roller cone bits incorporate high-tolerance bearings that withstand extreme load forces over longer periods of time for maximum wear resistance. The bearings have a low coefficient of friction and are lubricated with a proprietary grease that can be customized based on the application.

Reduced Wear

To prevent the grooving of leg backs, the bits include a tight, overlapping pattern of strategically placed tungsten carbide inserts for enhanced leg protection and reduced wear in rough environments.

PDC Cutters for High Temperatures

CT Plus PDC bits are available for efficient and durable milling performance in demanding high-temperature environments. When operators face high plug counts, our bits are not limited by heat-sensitive internal parts or maximum rotating speed.

Our bits withstand temperatures above 300 degF [149 degC] and are compatible with the rotating speeds used most often in CT applications—as high as 550 rpm. With the ability to overcome reservoir temperatures and internal heat generation challenges, our bits mitigate the risk of seal failure for longer run durations.

Efficient Cuttings Evacuation

By fitting a CT Plus bit with PDC cutters, we generate smaller cuttings that help operators avoid damaging the BHA and coiled tubing. Easier cuttings evacuation means CT drilling operations can proceed as planned with less NPT related to stuck pipe issues.

Improved Bit Design

To develop CT Plus PDC bits that would provide both high ROP and durability, engineers from Smith Bits used the IDEAS* integrated dynamic design and analysis platform. Often, when conventional PDC bits are deployed in CT applications, they are damaged beyond reuse due to ring out and other terminal dull conditions.

With maximum cutter durability and optimal blade counts based on IDEAS analysis platform, our bits are engineered to combat such damage for more reliable performance downhole. CT Plus PDC bits yield faster milling times, generate smaller cuttings, and provide higher reliability in harsh environments.

CT Plus PDC bits can drill through plugs of different materials.

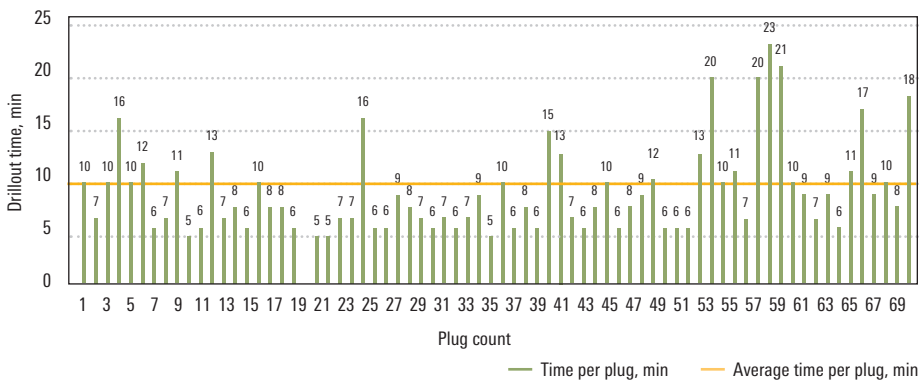
Technical Report

Milled-Tooth Bit Removes 123 Composite Plugs in the Utica Shale

Operator achieves average time per plug of 9.4 min

When drilling an 18,544-ft [5,652-m] lateral section in the Utica Shale, the operator ran two 4½-in CT Plus roller cone bits to remove 123 third-party plugs. By using these bits, the operator was able to achieve an average time per plug of 9.4 min.

Location	Utica Shale
Type of plug milled	Composite
Number of plugs milled	123
Average time per plug, min	9.4
Maximum rotary speed, rpm	257



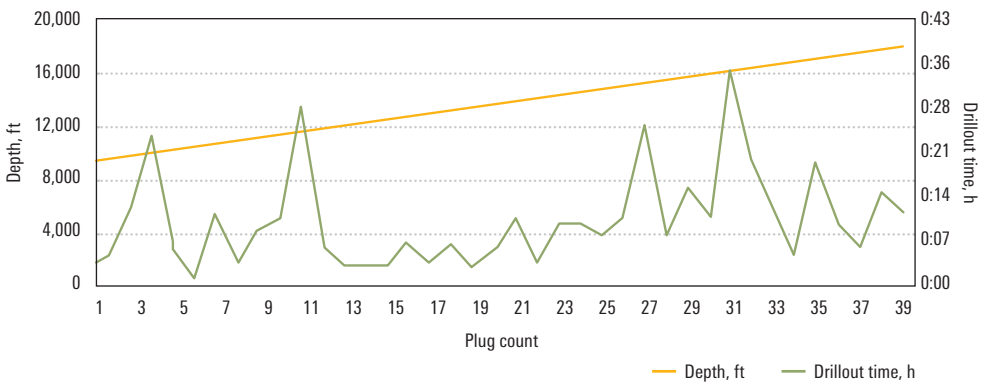
Technical Report

Operator Mills 39 Composite Plugs in the Marcellus Shale

Bits designed for CT applications provide improved milling performance

When milling all 39 composite frac plugs in a well in the Marcellus Shale, the CT Plus roller cone bit enhanced speed performance with no motor stalls. After the run, the bit was evaluated and had tight bearings on all three cones.

Location	Marcellus Shale
Number of plugs milled	39
Average time per plug, min	10
Median time per plug, min	8
Plug-to-plug time, min	15–23



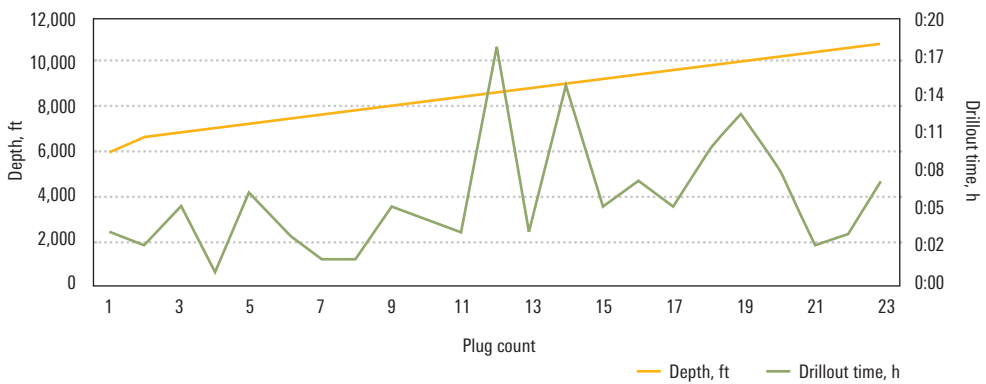
Technical Report

Bits Optimized for CT Applications Increase Milling Speed

Operator mills 23 composite plugs in Marcellus Shale

An operator in the Marcellus Shale deployed a CT Plus roller cone bit to decrease milling time. The bit produced smaller cuttings and, when returned to surface, exhibited no damage to the seals or bearings.

Location	Marcellus Shale
Type of plug milled	Composite
Number of plugs milled	23
Average time per plug, min	6.13
Median time per plug, min	6
Plug-to-plug time, min	15–20



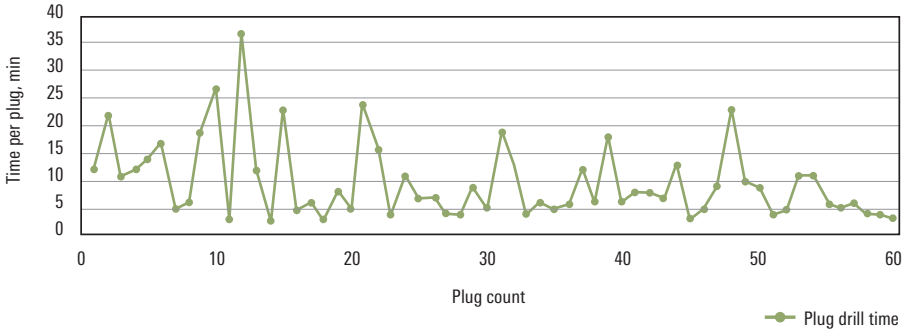
Technical Report

CT Plus Bits Enable Operator to Mill 60 Plugs in Permian Basin Operation

More than doubles average for single-run milling in area

In the Permian basin of West Texas, an operator milled a total of 60 composite plugs in one run using a CT Plus roller cone bit specifically designed for the application.

Location	Permian basin
Type of plugs milled	Composite
Number of plugs milled	60
Average time per plug, min	9.8
Average approximate rotary speed, rpm	409



"The bit was in excellent shape. It has been noted that the bearings are just as tight after the job as they were when they were run in. We refuse to run anything else."

—Marcellus Shale operator

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Our widest selection of bits combined with our advanced design technology enables Smith Bits to optimize the best bit to fit your specific plug milling needs.

slb.com/bits

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