

CASE STUDY

SMITH Services

A Schlumberger Company

Trackmaster Cementing Whipstock Reduces Rig Time for Sidetracking on Land-Based US Wells

Enables kickoff at optimum depth and with known deflection using a mechanical platform; saves time and maximizes probability of successful sidetracking on the first attempt

CHALLENGE

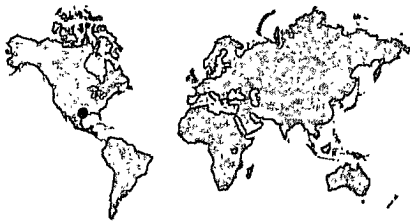
To minimize rig time associated with kicking off a directional well/sidetracking.

SOLUTION

Run a Trackmaster* cementing whipstock wellbore departure system, avoiding the need to wait for the cement to harden and eliminating the non-productive drilling time. Maximize the probability of a successful sidetrack on the first attempt as well as isolate the pilot hole in the same trip.

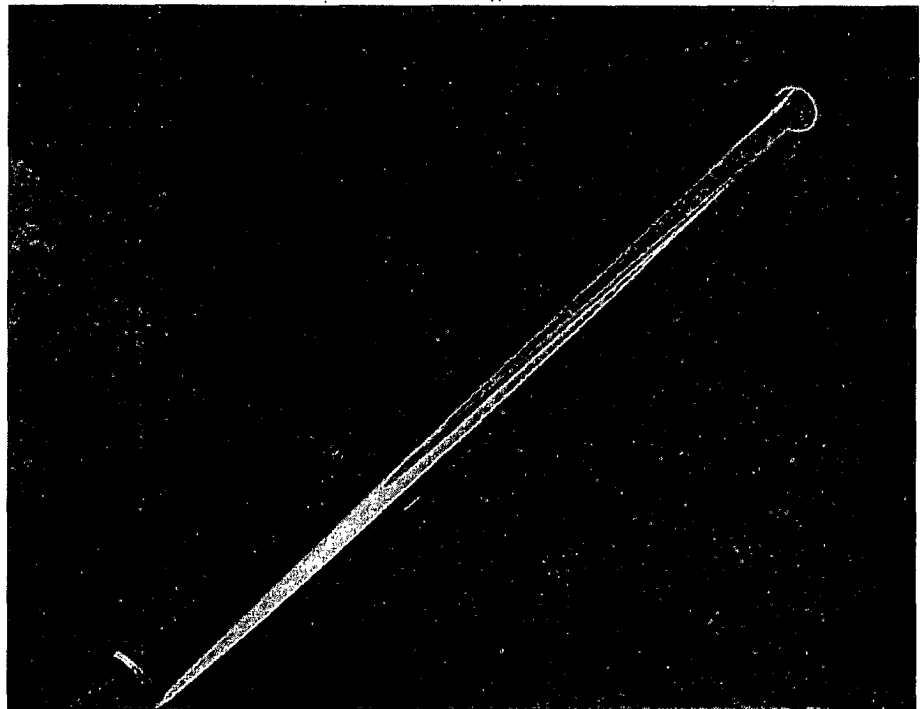
RESULTS

Saved up to 24 hours of kickoff time on over 30 land wells in multiple US basins.

**Traditional sidetracking with cement plug can be slow and problematic**

Traditional cement plug sidetracking involves running in hole with drillpipe, pumping the kickoff cement plug, pulling out of hole, waiting on cement (approximately 24 hours), running in hole with the directional drilling assembly, time drilling to achieve departure, and then drilling new formation.

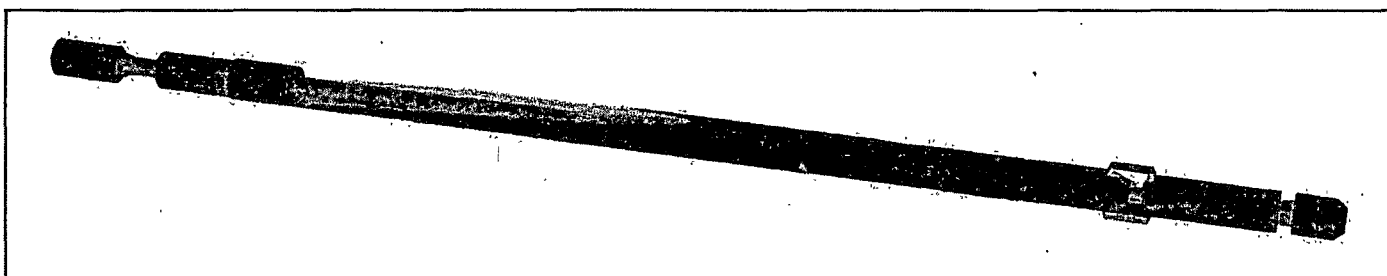
In addition to the rig time spent waiting for the cement to cure and then drilling through the cement, this method is problematic when formation compressive strength is higher than cement strength, causing failure of the plug. Temperature issues, mud additives and wet formations contaminating the cement are other obstacles to a successful plug, leading to expensive re-attempts.



Cementing Whipstock System

Wellbore Departure

CASE STUDY: Cementing Whipstock System



Cementing Whipstock System

Trackmaster cementing whipstock facilitates a successful sidetrack, with improved efficiency and placement

The Trackmaster cementing whipstock circumvents all the obstacles encountered with conventional cement plug sidetracking. The process involves

- Running in hole with the whipstock and expandable anchor
- Orienting the whipstock and hydraulically setting the anchor
- Rupturing the burst barrel and shearing off the running tool
- Pumping cement and pulling out of hole
- Running in with the directional drilling BHA without delay, establishing the desired borehole trajectory and continuing to drill ahead. Deflection is provided by the simple three degree ramp design of the whipstock. This enables a lower bend motor to be used if sidetracking with a downhole motor, compared to drilling off a cement plug.

The probability of successfully sidetracking on the first attempt is very high.

No waiting for cement to harden or time drilling through cement

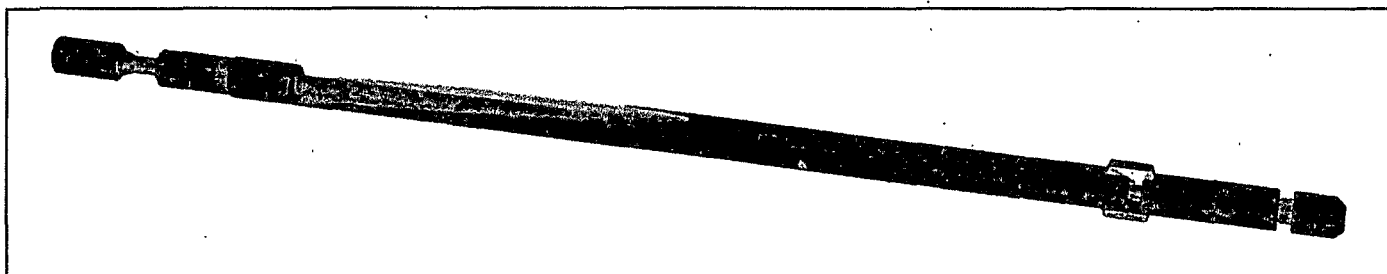
Over 30 jobs have been successfully completed in multiple US basins. The expandable anchor technology has proven to be a reliable choice for openhole sidetracking. Since there was no need to wait for the cement to cure or time drill, rig time was saved by utilizing the cementing whipstock. Both PDC and roller cone bits were used to successfully sidetrack and drill ahead.

Additional benefits

As an added benefit, the anchor slip design allows flow around the anchor, which helps to establish a good cement seal and avoid bullheading cement.

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CASE STUDY: Cementing Whipstock System



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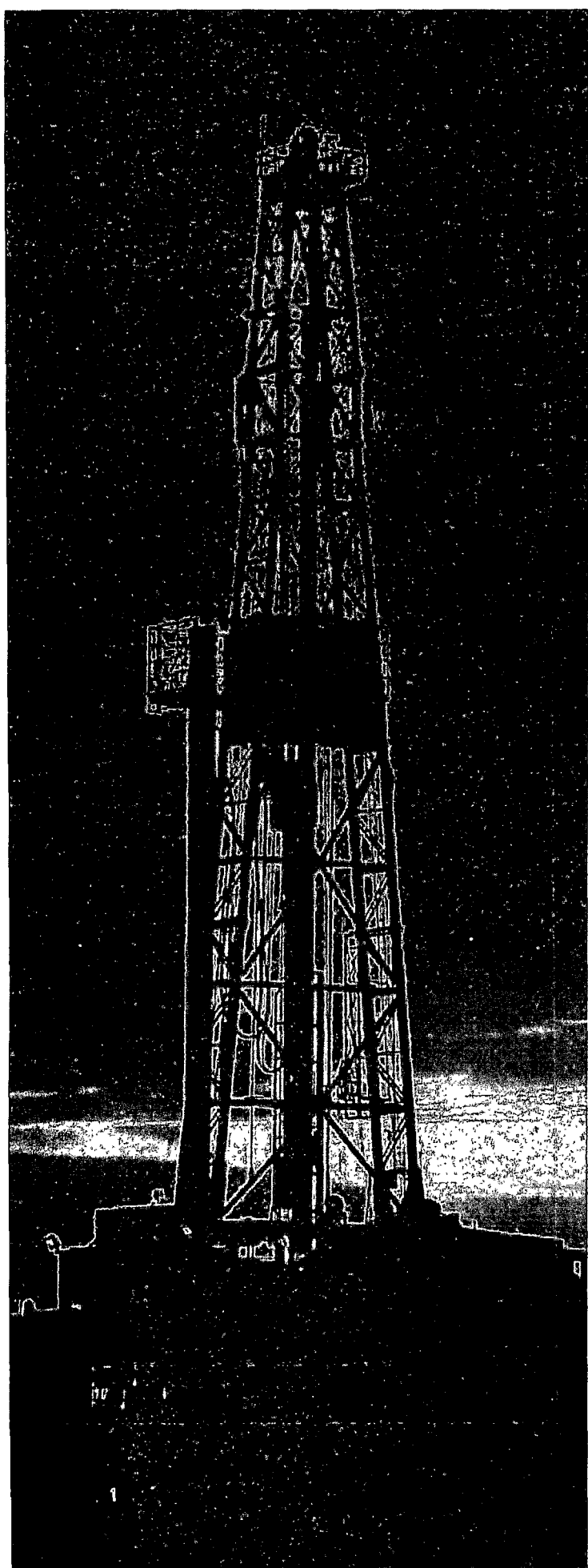
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Trackmaster OH

Openhole whipstock and
cementing system



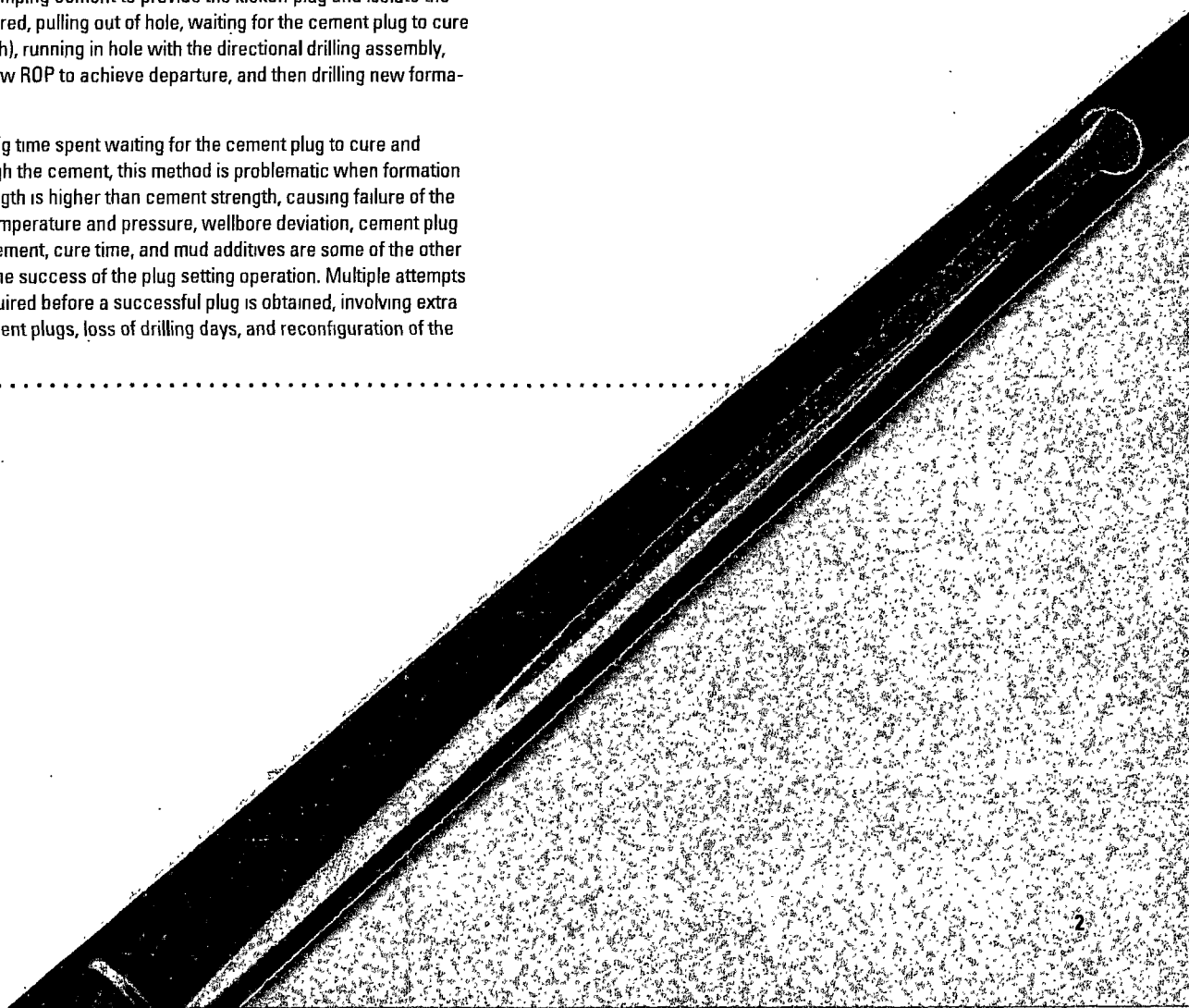
Trackmaster OH openhole whipstock and cementing system delivers faster, higher-quality sidetracks, matching specific technologies to borehole properties and your objectives in order to achieve high success rates. The system provides a precise kickoff point, together with isolation of the pilot hole if required. Setting the whipstock and the cementing operation are accomplished in a single trip.



Unreliability of cement plug sidetracking

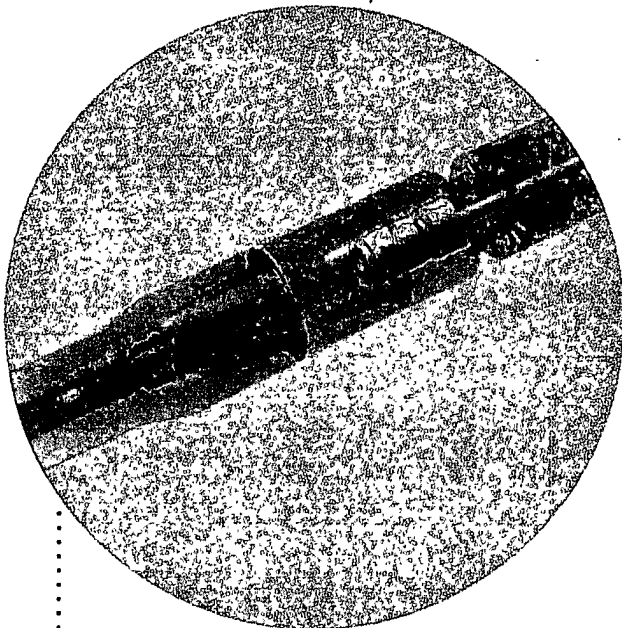
Traditional cement plug sidetracking involves running in hole with open-ended drillpipe, pumping cement to provide the kickoff plug and isolate the lower zone if required, pulling out of hole, waiting for the cement plug to cure (approximately 24 h), running in hole with the directional drilling assembly, time-drilling at a low ROP to achieve departure, and then drilling new formation.

In addition to the rig time spent waiting for the cement plug to cure and then drilling through the cement, this method is problematic when formation compressive strength is higher than cement strength, causing failure of the plug. Downhole temperature and pressure, wellbore deviation, cement plug depth, quality of cement, cure time, and mud additives are some of the other factors affecting the success of the plug setting operation. Multiple attempts are frequently required before a successful plug is obtained, involving extra trip time, new cement plugs, loss of drilling days, and reconfiguration of the drilling trajectory.



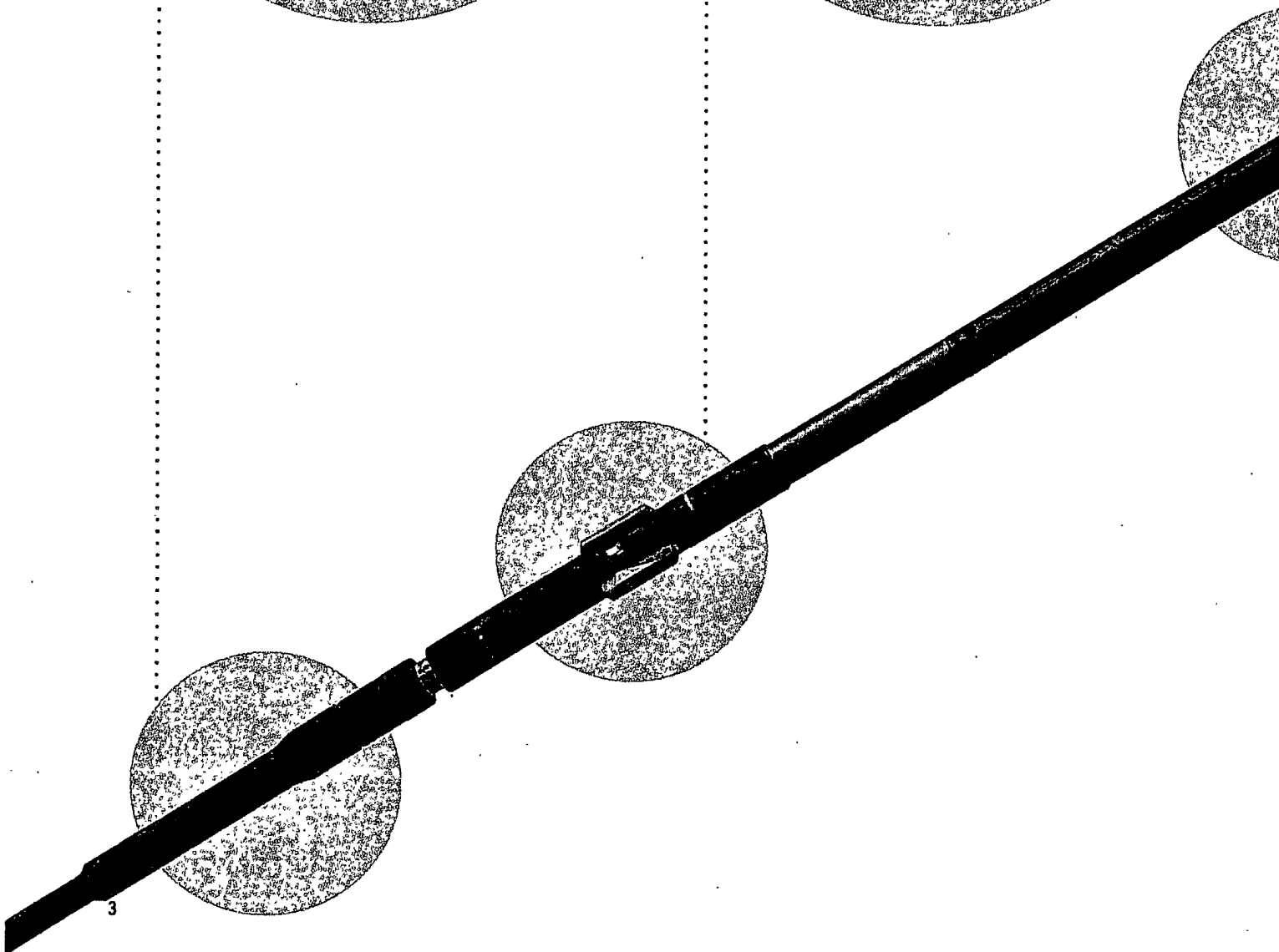
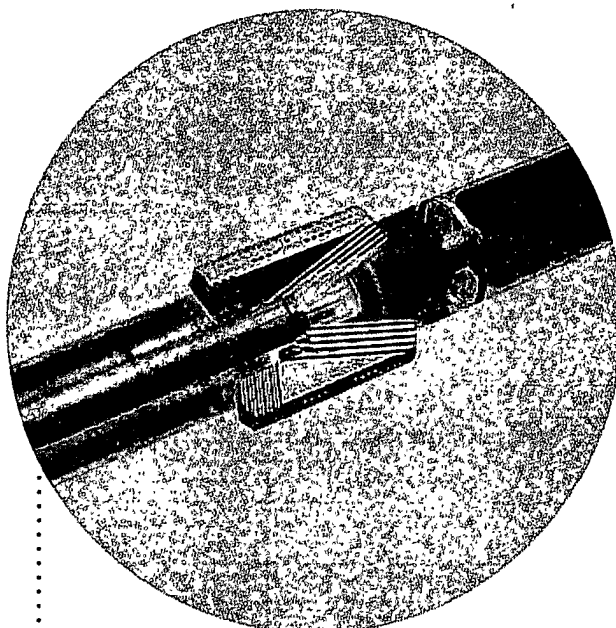
Burst Barrel

After hydraulically setting the anchor, pressure is increased to shear a piston in the burst barrel sub, allowing communication with the annulus.



Anchor

Hydraulically set expandable anchor enables kickoff at a specific depth, and allows immediate sidetracking without cement cure wait time. Tnaxial steel firmly grips the borehole wall.

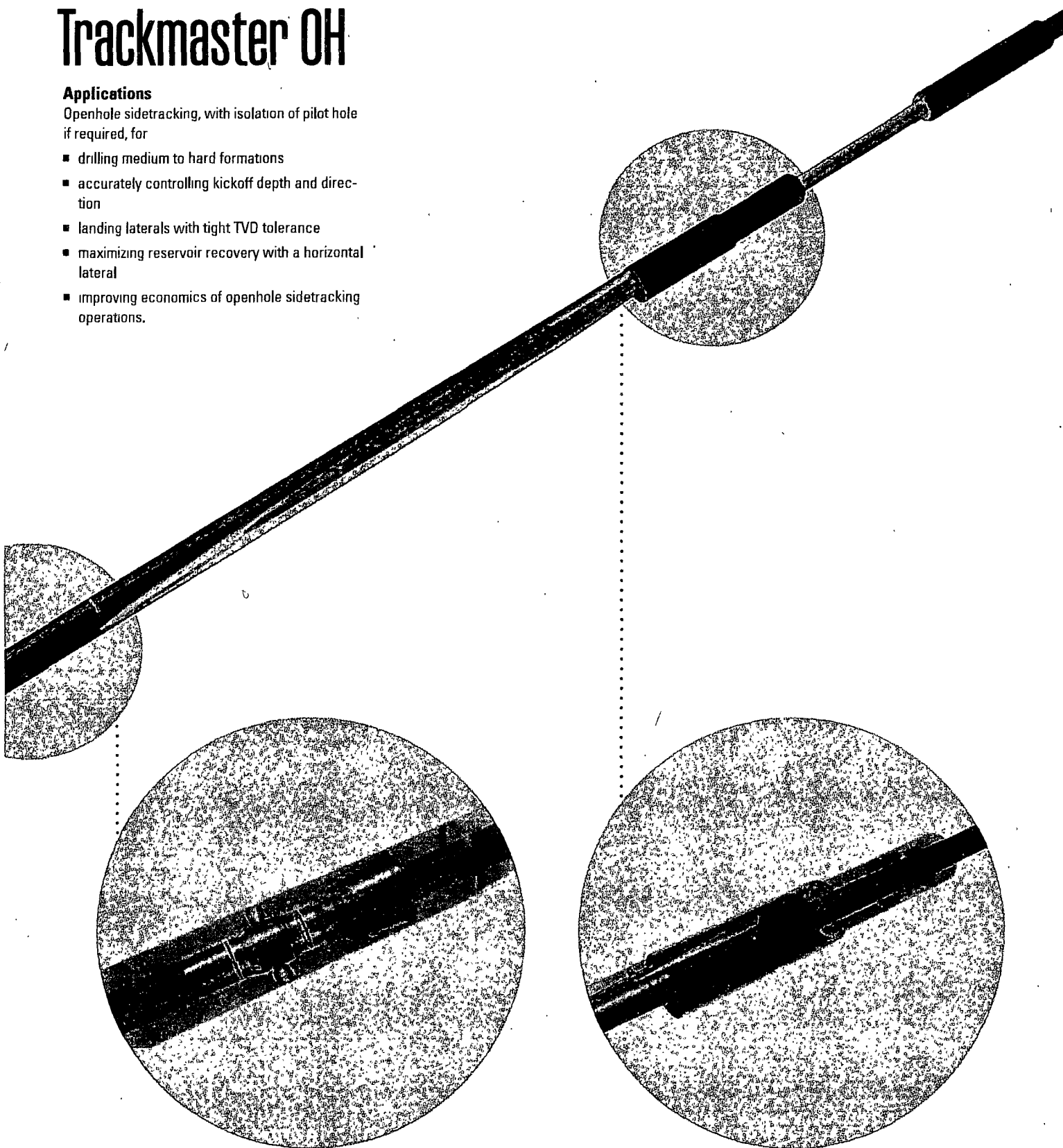


Trackmaster OH

Applications

Openhole sidetracking, with isolation of pilot hole if required, for

- drilling medium to hard formations
- accurately controlling kickoff depth and direction
- landing laterals with tight TVD tolerance
- maximizing reservoir recovery with a horizontal lateral
- improving economics of openhole sidetracking operations.

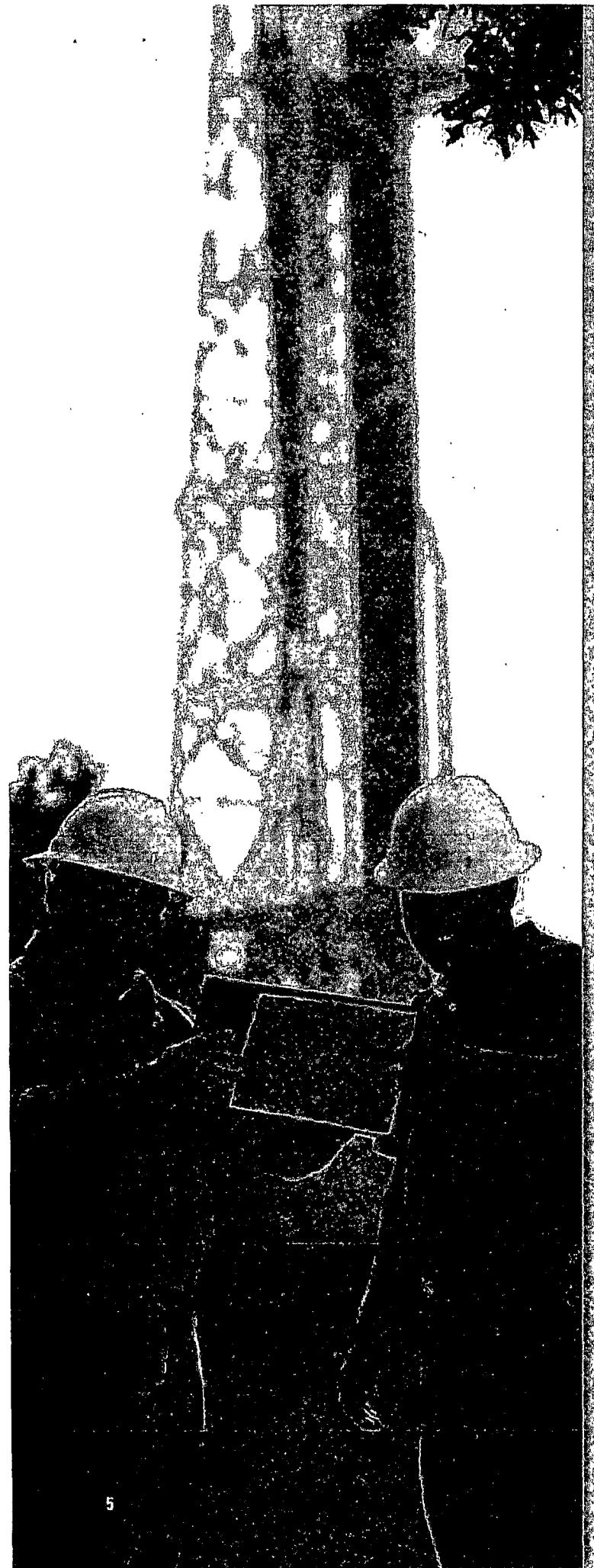


Sealing Area and Shear Bolt

Through bore incorporates stinger assembly and forms the conduit for pumping cement. A second, or lower, shear screw engages windows in the extension nipple that align with jetted ports on the landing collar. When the whipstock is set hydraulically, the jets are blanked off. When set mechanically, the ports are run open to allow communication with the annulus.

Spline and Shear Bolt

Running tool has a flat shoulder so that weight can be applied while running in the hole. Internal splines engage with the spline mandrel, transmitting torque through the whipstock for orientation and rotation as required.



Accuracy and success with Trackmaster OH system

The Trackmaster OH* openhole whipstock system circumvents all the obstacles encountered with conventional cement plug sidetracking. It facilitates initiation of a lateral while allowing cementing of the lower zones. At the same time it increases operational reliability, and saves time.

The process involves:

1. running in hole with the whipstock and expandable anchor at about 2 min/stand
2. orienting the whip and hydraulically setting the anchor at an optimal depth; anchor firmly grips the borehole wall
3. rupturing the burst barrel, establishing communication with the annulus
4. shearing off by setting weight, with two positive indicators—weight and movement—that the pins have sheared and the tool has set
5. pumping cement through the whipstock, unseating the stinger, and pulling out of hole
6. running in with the directional drilling BHA without delay, establishing the desired borehole trajectory, and drilling ahead. Deflection is provided by the 3° ramp. Compared with using a cement plug as a deflector, the ramp design lowers bending stresses in the drilling assembly.

The probability of successfully sidetracking on the first attempt is very high.

Savings in time and materials

By providing a positive means of controlling the kickoff depth and orientation with a steel ramp, the Trackmaster OH openhole whipstock system eliminates the uncertainty of kicking off with a cement plug, making expensive repeat attempts unnecessary. A clean, smooth transition is created for directional and horizontal applications. With no packer, running in hole is faster, and the large tool ID enables cement to be pumped at a higher rate. The system avoids rig time wasted waiting for the cement plug to cure. These factors, combined with a reduced interval for time-drilling, result in a significant saving of rig time. As an added benefit, the anchor slip design allows flow around the anchor, avoiding bullheading cement.

The expandable anchor technology has consistently proven to be a reliable choice for openhole sidetracking. Both PDC and roller cone bits have been used to successfully sidetrack and drill ahead.

Features

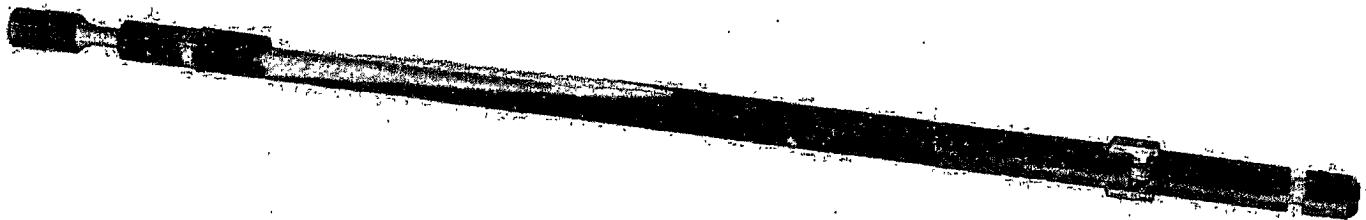
- Accurate control of kickoff depth and direction with special fine-grain alloy steel whip deflector
- Lower bending stresses with 3° ramp
- Higher rate of pumping cement enabled by large ID
- Faster running in speed with no packer to damage
- Hydraulically set expandable anchor with triaxial steel slips for
 - spanning multiple hole sizes
 - optimum placement at specific depths
 - immediate sidetracking—no waiting for cement to cure
- Torque transmission through running tool-whip interface and spline
- Flow around anchor and protection from bullheading cement, with anchor slip design

Benefits

- Maximizes probability of successful sidetrack on first attempt
- Saves rig time with faster run in hole speed and cement pump rate
- Eliminates wait for cement to cure before sidetracking
- Reduces interval required for time-drilling

Trackmaster OH System Specifications

Tool size/Casing OD	Maximum OD of whipstock assembly	Whipstock OD	Average size of hole opening
(in)	(in)	(in)	(in)
7	5.750	5.375	6.12 - 6.75
9-5/8	8.000	7.530	8.50 - 8.75
13-3/8	11.875	11.380	12.25 - 12.38

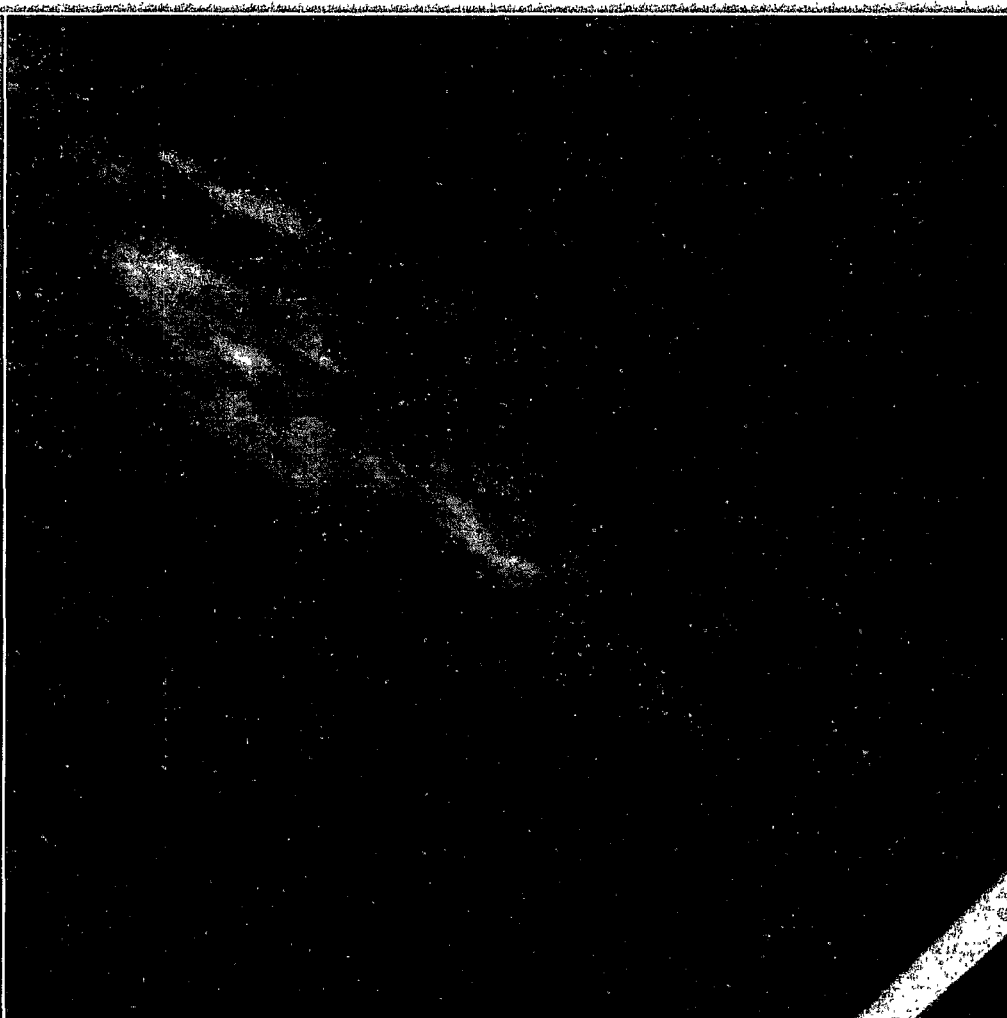


Expandable Anchor Specifications

Size	Body diameter	Maximum expanded diameter	Average size of hole opening
(in)	(in)	(in)	(in)
7 x 9-5/8	5.76	9.217	6.125 - 7.875
9-5/8 x 13-3/8	8.19	13.165	8.5 - 8.75
13-3/8 x 20	11.94	19.085	12.25

Trackmaster OH

Trackmaster OH open-hole whipstock and cementing system delivers faster, higher-quality sidetracks, matching specific technologies to borehole properties and your objectives in order to achieve high success rates.



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