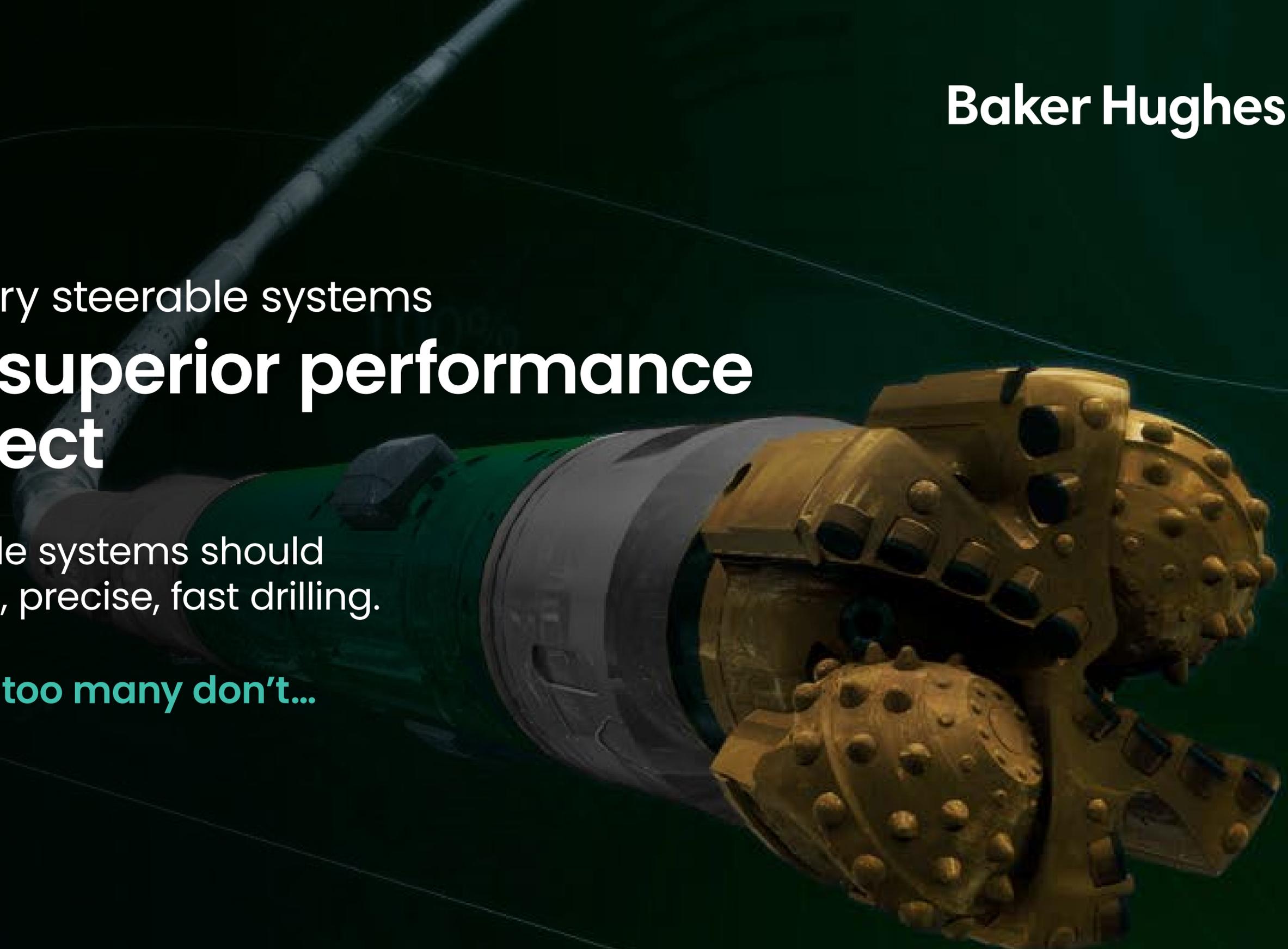


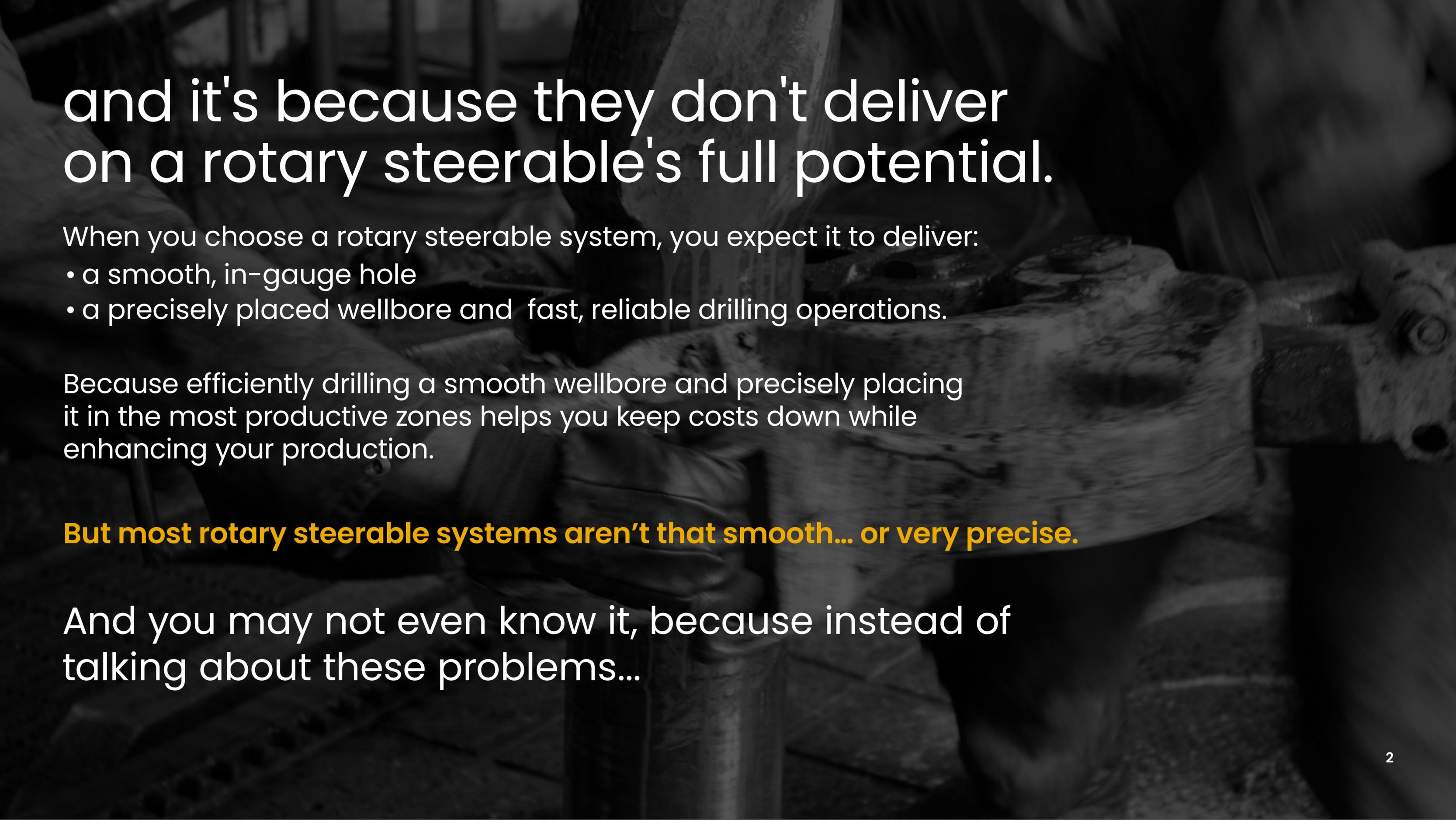
AutoTrak rotary steerable systems

Get the superior performance you expect

Rotary steerable systems should
deliver smooth, precise, fast drilling.

Unfortunately, too many don't...





and it's because they don't deliver
on a rotary steerable's full potential.

When you choose a rotary steerable system, you expect it to deliver:

- a smooth, in-gauge hole
- a precisely placed wellbore and fast, reliable drilling operations.

Because efficiently drilling a smooth wellbore and precisely placing it in the most productive zones helps you keep costs down while enhancing your production.

But most rotary steerable systems aren't that smooth... or very precise.

And you may not even know it, because instead of talking about these problems...

too many service providers waste your time

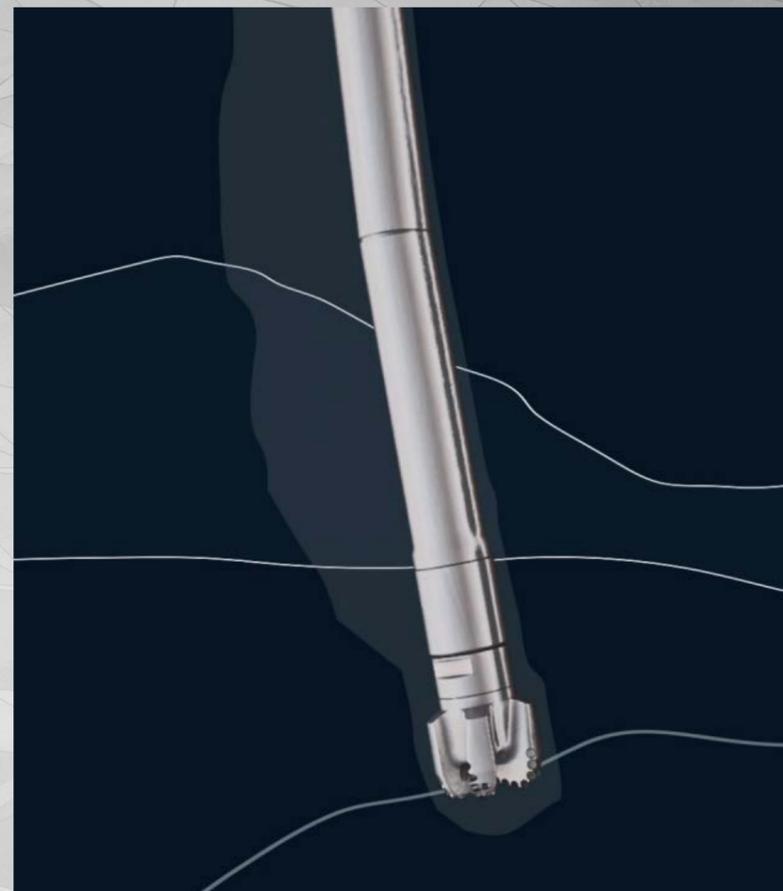
debating the relative merits of “push-the-bit” steering versus “point-the-bit” steering. Or vice-versa.

These debates miss the point.

Neither technique can consistently deliver the premium performance you need because both use a “pseudo steering” approach.

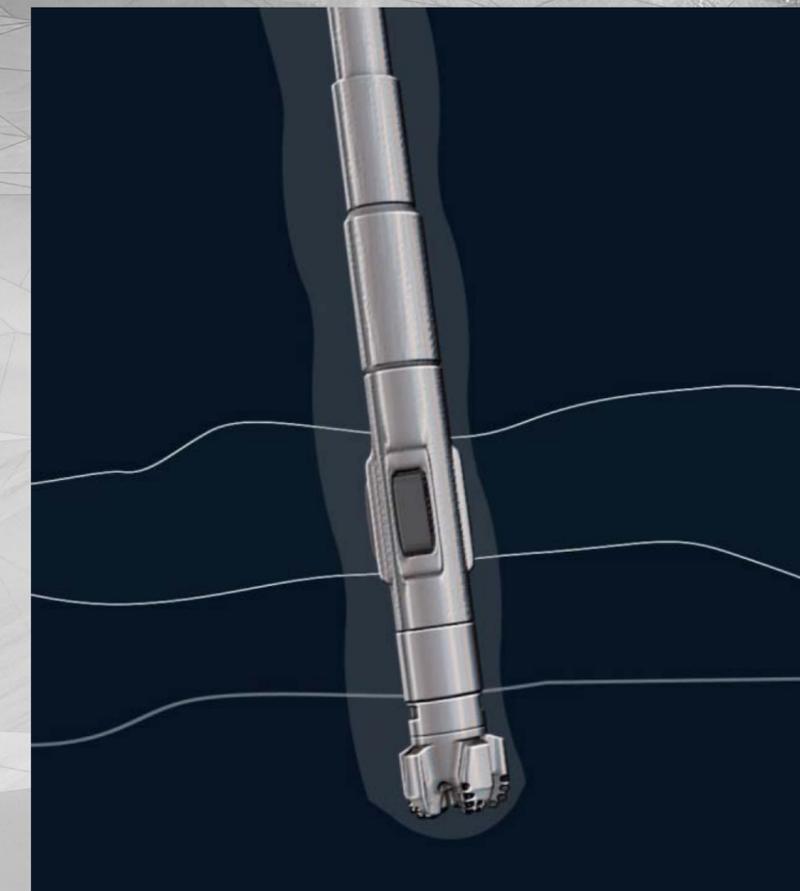
pseu•do steering

attempting to steer with a fixed-tilt BHA or on/off pad cycles



POINT-THE-BIT

“Point-the-bit” systems use a BHA with a fixed tilt which causes hole spiraling and a consistently over-gauge wellbore.



PUSH-THE-BIT

“Push-the-bit” systems use steering pads that deflect against the wellbore in an on/off cycle that creates doglegs and an angular wellbore.

Pseudo-steering can't consistently deliver the superior rotary steerable performance you need.

But it does deliver some things with consistency.

High local doglegs.

Over-gauge wells.

Hole spiraling.

Angular wellbores.

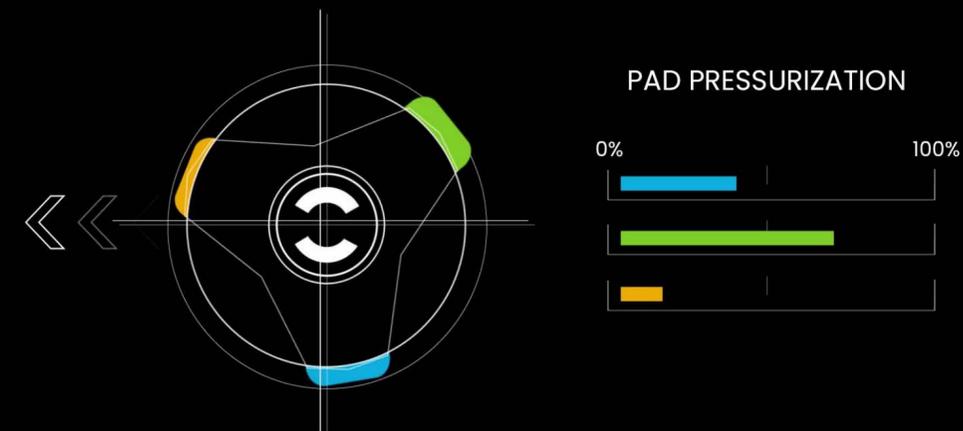
And, because most systems that use pseudo-steering also restrict bit selection and flow rates, they artificially limit ROP and overall performance.

That won't deliver the results you need. Instead, you get higher well construction costs and lost production.

There's a better approach

One that delivers the quality wellbore and drilling performance you expect.

CONTINUOUS PROPORTIONAL STEERING ►



AutoTrak systems are the only ones that use continuous proportional steering.

When you steer with precision-controlled pads that maintain a continuous proportional steering vector, you get superior control and a quality wellbore. And when you have the flexibility to optimize the system for the application, you get faster, more reliable drilling performance.

REDUCE WELL CONSTRUCTION COSTS WITH

UNSURPASSED HOLE QUALITY

ENHANCE PRODUCTION WITH

EXACT WELL PLACEMENT

FASTER, MORE RELIABLE PERFORMANCE WITH

OPTIMIZED DRILLING

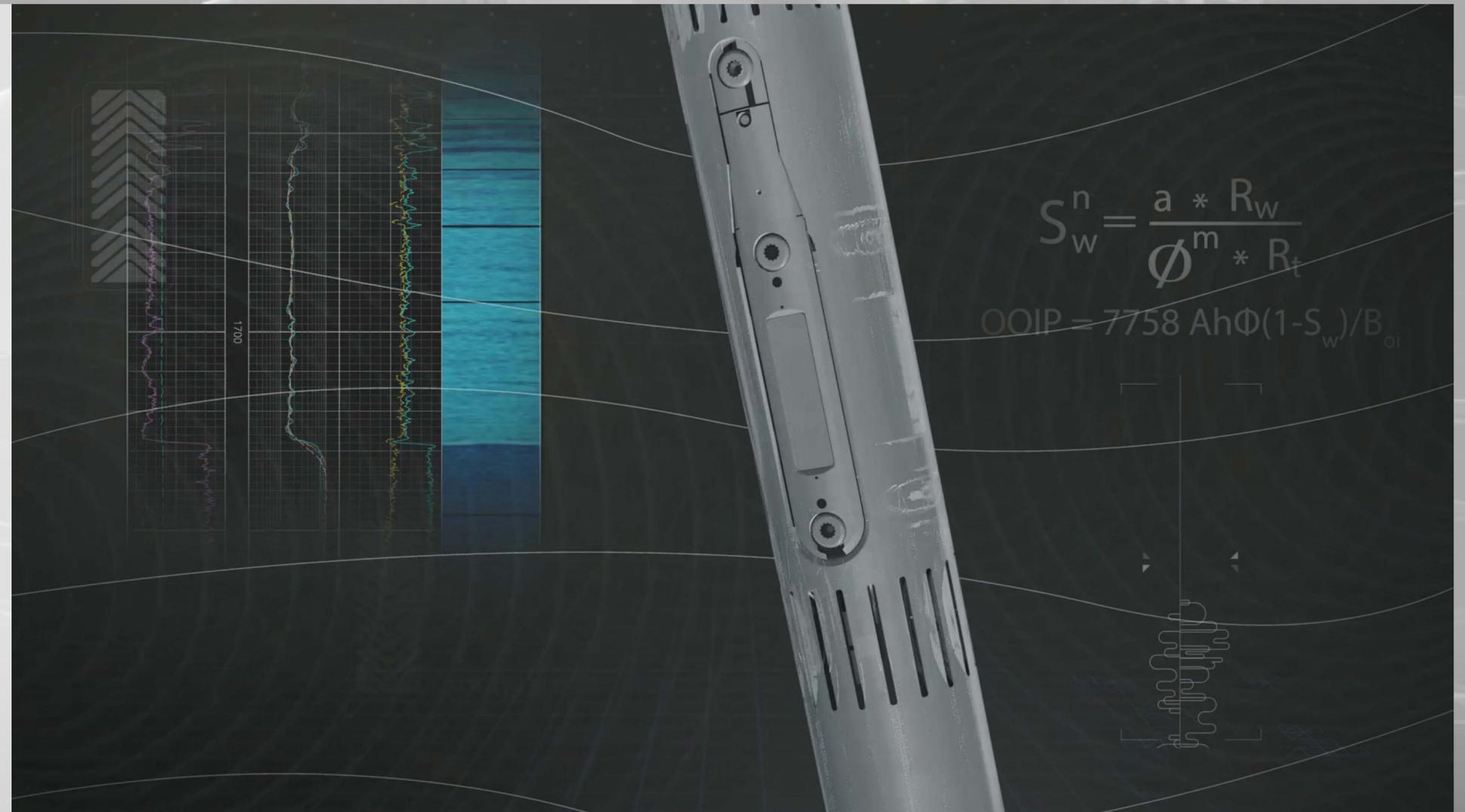
AutoTrak[™]
Rotary steerable system

REDUCE WELL CONSTRUCTION COSTS WITH UNSURPASSED HOLE QUALITY

Using precision-controlled pads that maintain a continuous proportional steering vector, AutoTrak systems drill a smooth, in-gauge hole.

The system constantly monitors near-bit inclination and steering vector and makes course adjustments every second if needed, effectively eliminating the risk of high-local doglegs for trouble-free casing and completion runs.

And because holes stay in-gauge, you collect high-quality FE data to optimize drilling, placement, and reserve estimation. In-gauge holes also minimize cuttings and maximize hole cleaning velocity.

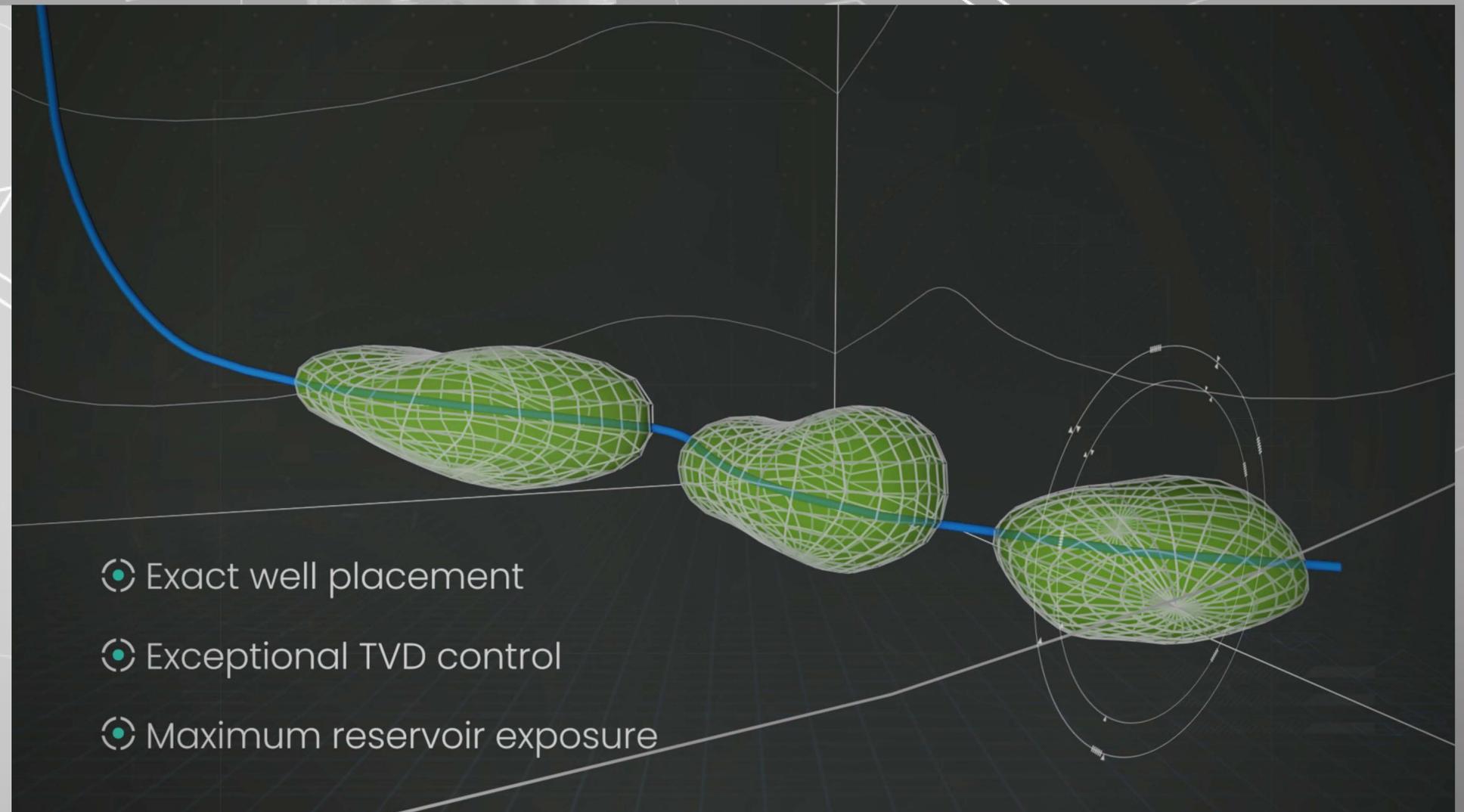


ENHANCE PRODUCTION WITH EXACT WELL PLACEMENT

Using continuous proportional steering, **AutoTrak systems** check azimuth and inclination every millisecond and automatically adjust steer forces second-by-second for **precise control**.

Using real-time formation evaluation, course corrections can be implemented with ease—adjusting the AutoTrak system's well path with smooth precision to **keep you on target** through all formation types.

The result: maximized reservoir exposure and enhanced recovery.

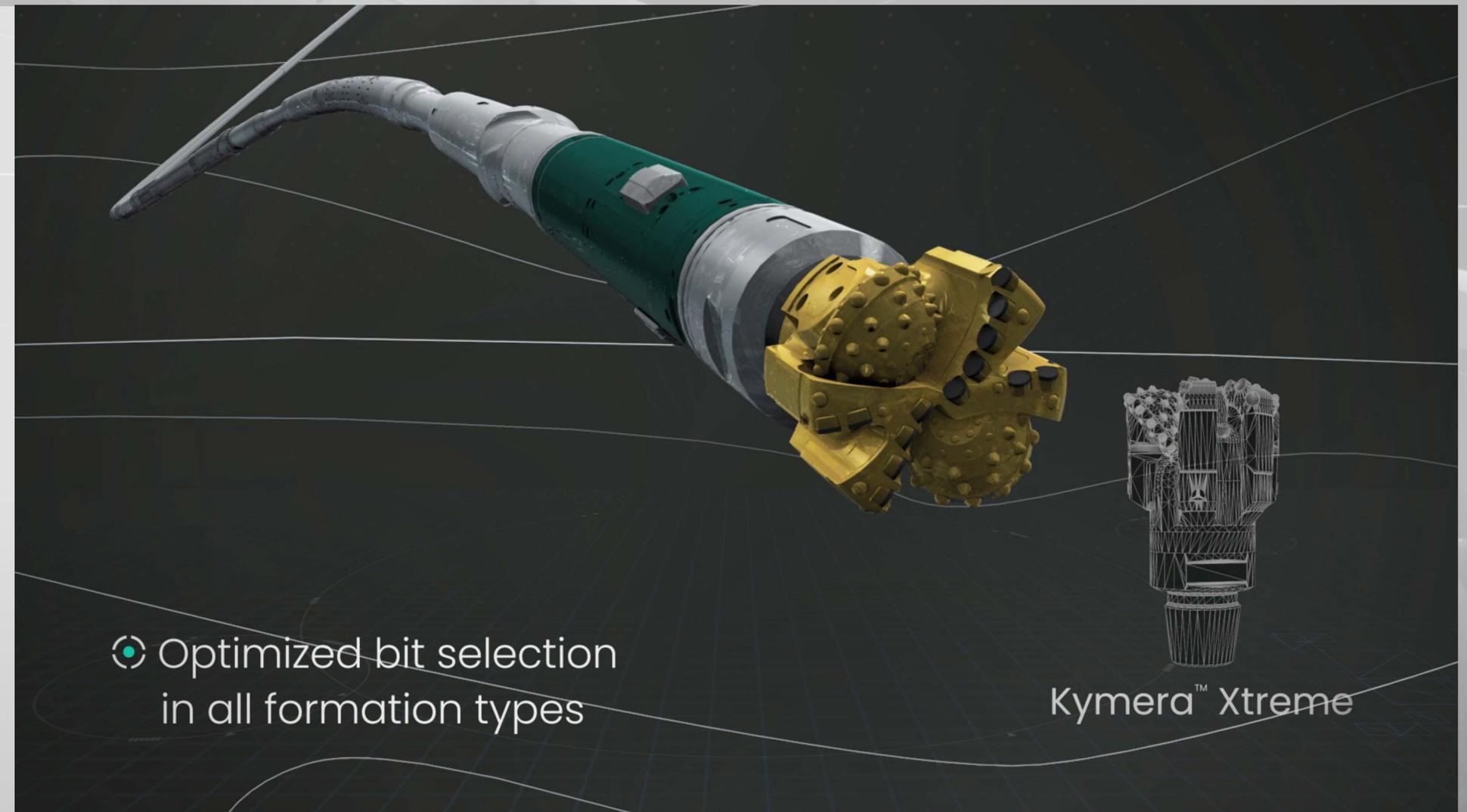


GET FASTER, MORE RELIABLE PERFORMANCE WITH OPTIMIZED DRILLING

Because AutoTrak systems use internal hydraulics to power independent ribs mounted on a decoupled, slowly rotating sleeve, their steering control is not affected by drilling dynamics.

As a result, the systems operate independently of bit pressures, flow rates and drilling fluid properties—allowing you to **optimize your bit and program** design to formation challenges as opposed to competitive rotary steerables which often restrict BHA design and bit selection.

Continuous proportional steering also provides **enormous versatility and reliability** in all formation types—from soft to hard—allowing you to drill the vertical, curve, and lateral in a single run.



These operators got the performance they needed from their RSS

CLICK OR TAP THE TABS BELOW TO LEARN MORE ▼

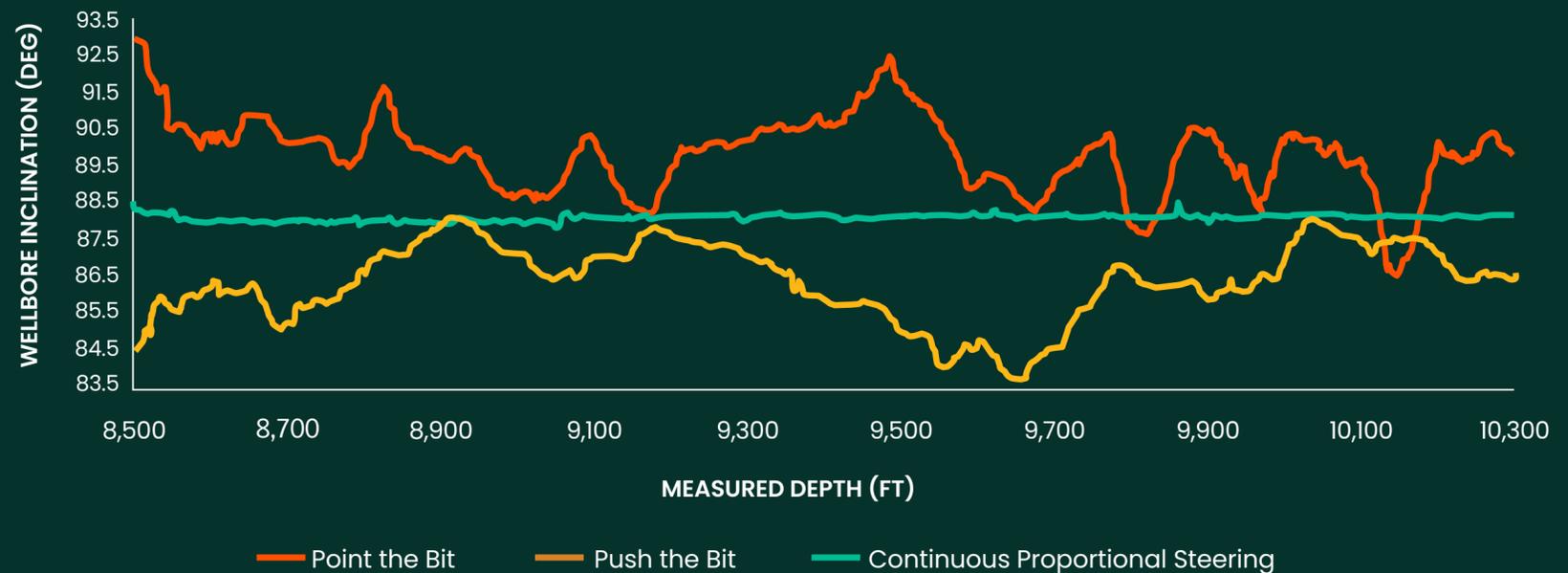
UNSURPASSED HOLE QUALITY

MIDDLE EAST

A customer in the Middle East wanted to test available rotary steerable system technologies to establish which provided the best hole quality. The customer compared data from over 700 wells to isolate the effectiveness of the three types of rotary steerable system (RSS) technologies—push-the-bit systems, point-the-bit systems, and the only continuous proportional steering system on the market, the **AutoTrak RSS**.

Results overwhelmingly concluded that using continuous proportional steering reduced tortuosity by magnitudes of 4 to 6 times when compared to push-the-bit and point-the-bit RSS methods. The AutoTrak RSS consistently delivered better hole quality in horizontal drilling.

That translates into fewer stuck pipe incidents, less chance of encountering problems during completion installation, and greater production potential in both the short- and long-term.



Comparison of well tortuosity from the study using high resolution wireline surveys from three offset wells. The difference is unmistakable when comparing wells drilled with push-the-bit (yellow), point-the-bit (orange), and continuous proportional steering (green) technologies. The AutoTrak RSS clearly delivers substantially superior hole quality.

These operators got the performance they needed from their RSS

CLICK OR TAP THE TABS BELOW TO LEARN MORE ▼

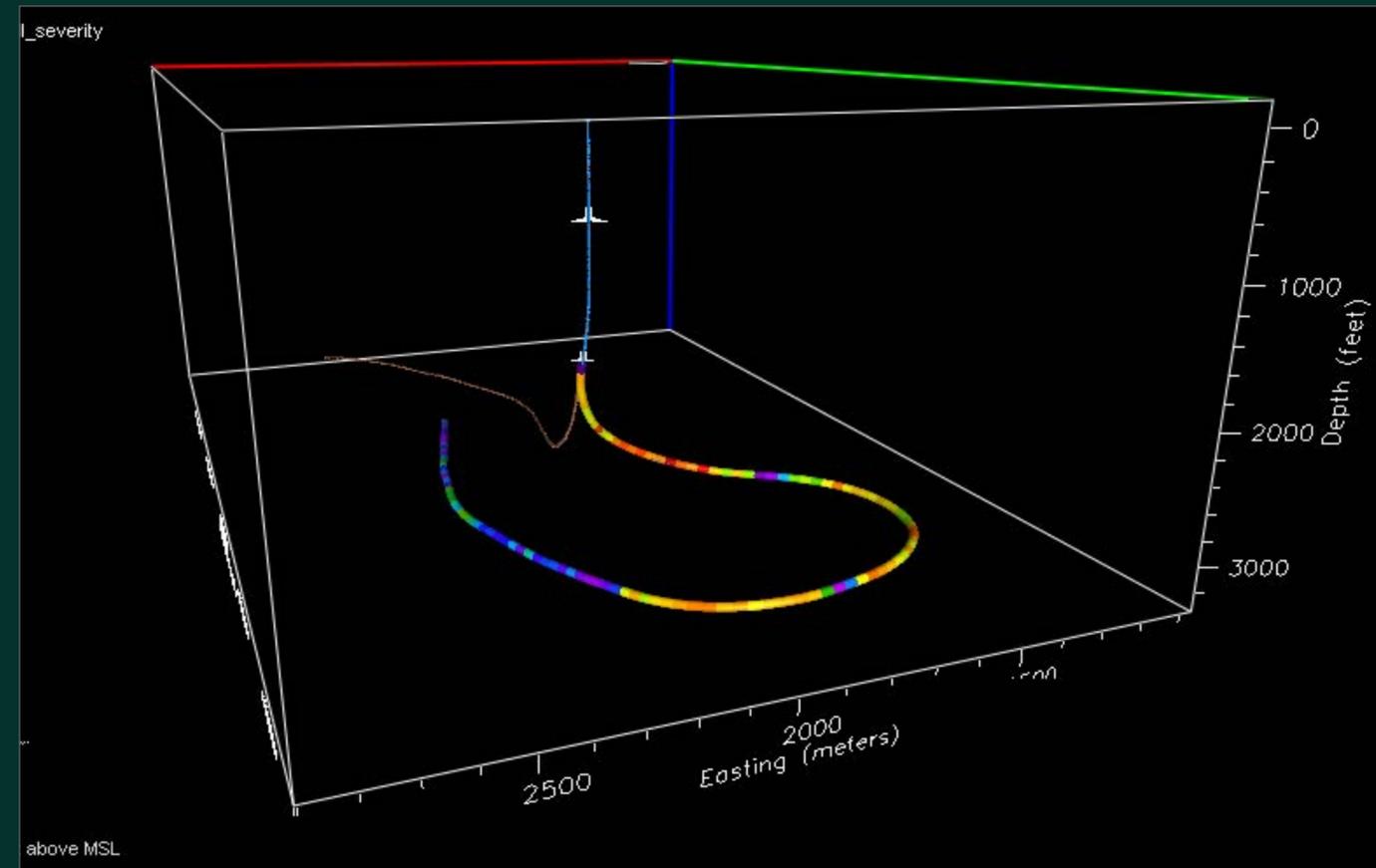
EXACT WELL PLACEMENT

UK CONTINENTAL SHELF

An operator needed to drill a challenging well profile that included a BUR of $5.8^\circ/100\text{ ft}$ (30 m) and a turn rate of up to $7^\circ/100\text{ ft}$ (30 m), including two ESP tangent sections.

The operator previously experienced steering issues in offset wells due to the stick-slip-inducing chalk. The operator also required precise control to ensure exact liner placement and avoid nearby wells in the congested field.

Baker Hughes used a $6\frac{3}{4}$ in. **AutoTrak eXact system** with continuous proportional steering to execute the complex directional plan (a total azimuthal turn $>370^\circ$ was achieved while building from 23° to 91° inclination) with no stick-slip issues in 166 hours.



Using continuous proportional steering, an AutoTrak eXact system efficiently drilled a complex, corkscrew-shaped well profile that required a long turn of $>370^\circ$ while building from 23° - 91° .

These operators got the performance they needed from their RSS

CLICK OR TAP THE TABS BELOW TO LEARN MORE ▼

OPTIMIZED DRILLING

MIDDLE EAST

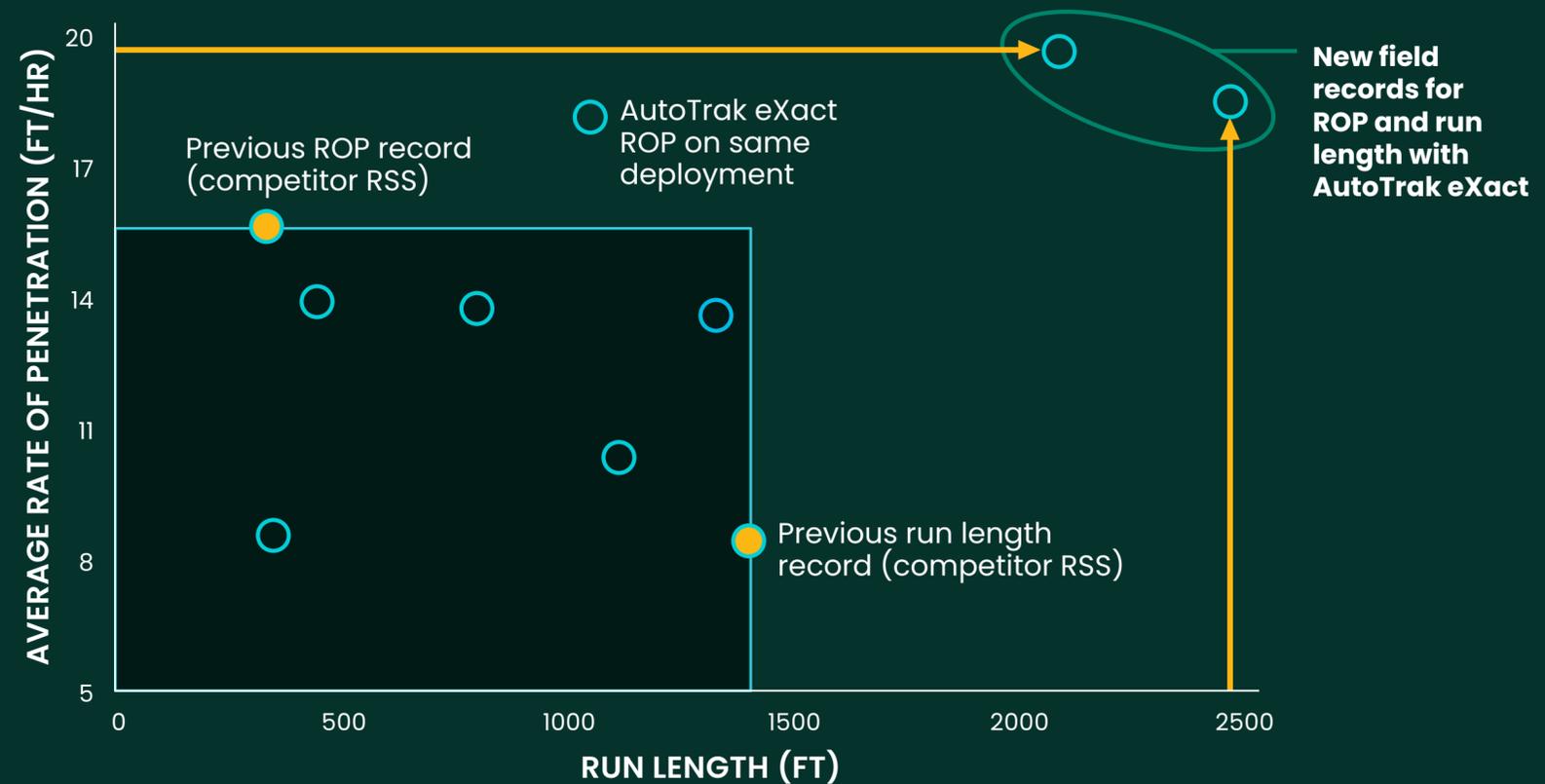
An operator needed to drill an extended-reach lateral totaling 21,548 ft MD, targeting two different layers in a field containing hard and abrasive sands. Torsional stick-slip and high wear-and-tear on drilling equipment were expected.

Working with Baker Hughes, the client chose the new 4¾ in. **AutoTrak eXact system** because its steering capabilities best matched the operational requirements.

Despite the challenging conditions and highly-deviated well path, the system set three new records and saved 1.5 days compared to a previous record-setting run.

The AutoTrak eXact system used continuous proportional steering to:

- Drill up to 5% faster than the best offset
- Extend the average run length by up to 15%
- Achieve 7,296 ft of pay zone exposure



Using an AutoTrak eXact system, an operator in the Middle East set three new records while drilling a highly deviated well path through a challenging formation.



Get the superior drilling performance you deserve.

Smooth. Fast. Precise.

Contact your Baker Hughes representative today to learn more about how an AutoTrak system—the only RSS capable of delivering Continuous Proportional Steering—can help you get the drilling performance you crave.

[bakerhughes.com](https://www.bakerhughes.com)

© 2020 Baker Hughes Company. All rights reserved. 81541

Baker Hughes 