Steel Body

TAILOR MADE FOR HIGH ROP APPLICATIONS
What’s your challenge?

Varel brings together the most advanced knowledge and understanding of PDC bit design with the latest manufacturing technology to produce a new line of Steel Body bits to meet the needs of your high ROP applications.

Durable, directionally responsive — and fast, Varel Steel Body bits are already delivering “One BHA” performance in shale plays, drilling both vertical and curve sections on a single bottomhole assembly without tripping out.

That’s the kind of challenge we’re built for.

Available in both Raider™ and Voyager™ series configurations, our steel body bit allows for more aggressive designs. Every Varel Steel Body bit is designed using proprietary SPOT-DN technology, resulting in designs that consistently deliver:

> Better Torque Management
> More Directional Control at Faster ROP
> Greater Stability and Whirl/Vibration Resistance
We take bit design right to the limit.

Build a bit that’s fast – and stable. That’s the challenge of bit design, where speed and control are tradeoffs: The faster the bit, the more stability comes into play. Varel’s SPOT-DN design process achieves the “sweet spot,” balancing the two into stable, fast-drilling bits with excellent steerability. Our proprietary software allows us to better model the cutting structure, and affords greater flexibility in cutter positioning, to create bits tailor-made for your specific applications.

Evolution of SPOT: SPOT-DN
Through continuous research and development, a new version of our successful design software SPOT™ has been introduced and implemented to bit design - SPOT-DN™. This elevated platform features the ability to output results in log format, showing simulated bit performance based on wireline log information. Designers are also now equipped with an upgraded functional cutting structure model to create a more holistic view of cutter interaction with the rock. By focusing on the specific well objectives, application, and drilling system used, Varel’s SPOT-DN design program defines the connection between specific bit design changes and their full impact on drilling deliverables.

Using continuously updated algorithms and input that includes operating and performance data straight from the rig, as well as sophisticated rock analytics, SPOT-DN enables us to determine how changing bit features and dimensions affect steerability and bit walk, DLS capability, and vibration control, for any given well trajectory and BHA.

In conjunction with GeoScience rock analytics, SPOT-DN fully models bit behavior in various rock types during drilling, evaluates cutter failure as a result of friction and heat transfer, and even performs sensitivity analysis for various drilling parameters to evaluate their effects on penetration rate, bit wear, vibration and footage.

The process means there’s no limiting design options to a product series or line. Instead, SPOT-DN design frees the team to select the most appropriate cutter and most effective cutting structure to control bit behavior as desired.

These designs may incorporate impact- and thermal-resistant Thor™ cutters or abrasion- and thermal-resistant Vulcan™ cutters, depending on the lithology.

Whatever the objective, SPOT-DN design enables us to fine-tune cutter back rake, side rake and torque limitations to engineer a “system” that makes optimum use of torque inherent to the design. The result is a bit tailor-made for the application at hand.

Evolving since 1995 with continually improving inputs and output, SPOT bit design is now SPOT-DN. The platform creates a collaborative environment for the design team, where bit designers, field engineers and other stakeholders can fully engineer a bit design for optimal directional performance with a specific drilling system.
When you push the edge in bit design as we do at Varel, manufacturing to very tight tolerances is imperative. That means each bit must be manufactured to exacting standards, every time.

Our new five-axis milling machine is the most advanced available for steel milling, and produces output that is “spot-on” with engineering design/instructions, confirming that each and every cutting structure is built exactly as designed.

That’s precision manufacturing at the limits of design, for bits that deliver at the limits of performance.

**Design Advantage: Steel**

Because of the ductile nature of steel, Varel Steel Body bits can be manufactured with much taller, thinner blades. This one characteristic provides the design advantage of allowing a much more aggressive bit design to handle faster ROP requirements.

The erosion resistance of the advanced hardfacing material allows designers to take full advantage of hydraulic configurations optimized through extensive computational fluid dynamics (CFD) evaluations which ensure possible stagnation zones are eliminated, improving cleaning efficiency, cutter cooling and increasing ROP.

Steel body bits can be designed with a very short make-up length, which creates a shorter bit-to-bend length for greater DLS capability. The shorter the distance between the bend in the motor and the face of the bit, the easier it is to build angle to complete a curve.

Design flexibility. Durability. And speed. Varel Steel Body designs offer benefits tailor-made for challenges like One BHA applications: better torque management and greater control at fast penetration rates.

Mirror laser testing verifies the extremely tight tolerances of the state-of-the-art manufacturing process.