VAREL
ENERGY SOLUTIONS

Drilling Solutions Catalog

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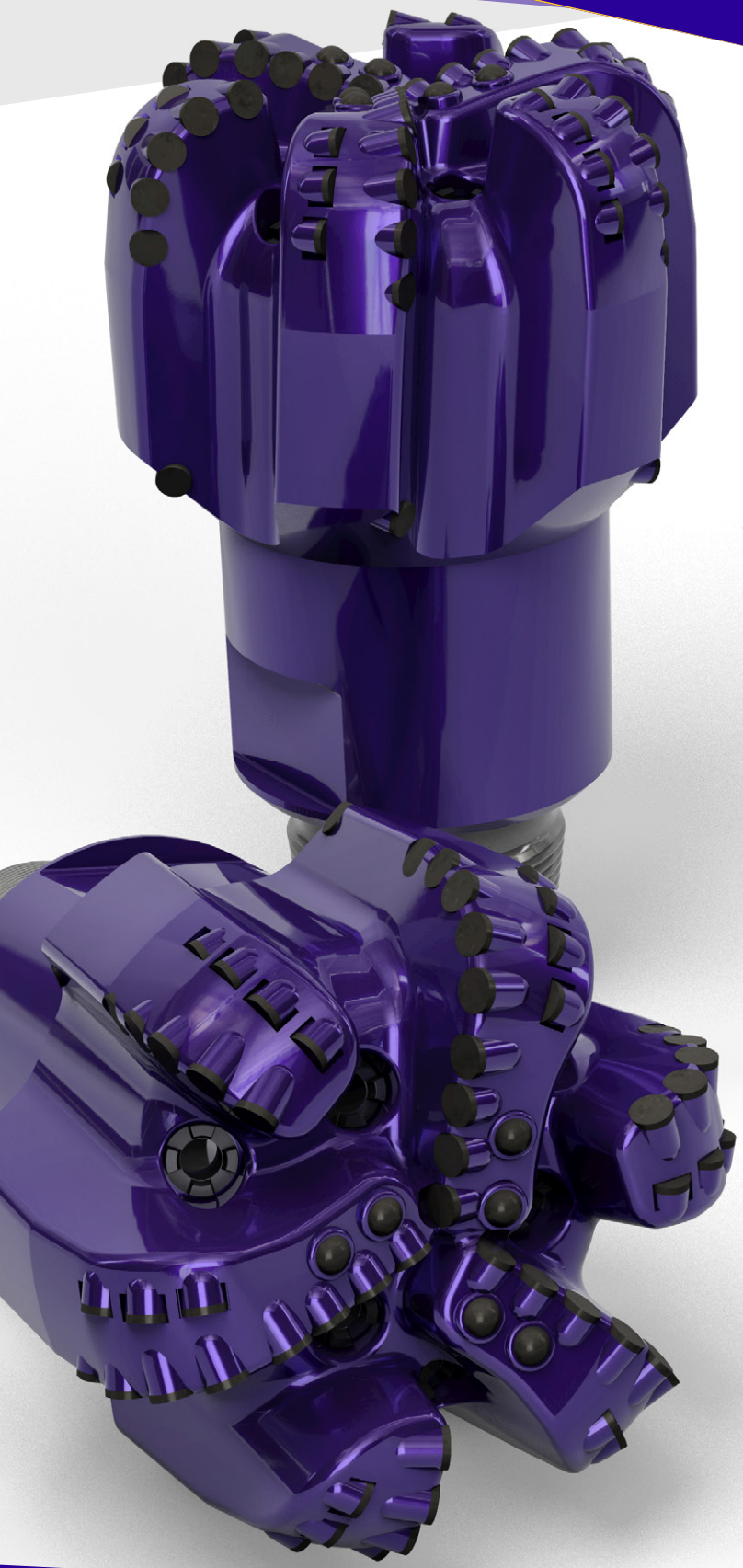
EVOS™

PDC Directional "Build" Drill Bits



EVOS PDC Directional "Build" Drill Bit series has been developed specifically for directional drilling applications where building angle with responsiveness and consistency is essential. EVOS has optimal ROP with maximized tool face control to deliver consistent yields regardless of the directional drive system. Utilizing bit to rock contact simulation software, customized tool face geometries allows directional solutions to be provided for any well program and lithology challenges.

Application

- Curve and lateral well bores
- Any motor, rotary steerable and high-speed applications
- Varying lithologies

Features / Benefits

- Managed Tool Face Geometry design features result in an engineered solution that stays passive during kick-off, but aggressive enough to deliver increased ROP later in the curve once the trajectory is established
- DIG-IT™ bit to rock contact analysis software shows accurate correlation of predictive component wear and formation contact to optimize cutting structure arrangement and chassis to optimize performance throughout the interval. Increase side cutting provides a bit that delivers predictable and consistent yield through the entire curve, generating a smooth curve with high well-bore quality for ease of lateral drilling and completion operations.

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HAVOX™

PDC Directional "Hold" Drill Bits

HAVOX PDC Lateral "Hold" Drill Bit series has been developed specifically for drilling applications where holding direction with speed and reliability is essential. HAVOX delivers smooth torque, advanced directional control, excellent well bore quality, and dynamic stability to meet your challenge for any directional or lateral wellbore application.

Application

- Horizontal and any combination of applications where holding trajectory is key
- For soft to hard formations
- For any motor, rotary steerable, and high-speed motor application

Features / Benefits

- Engineered and tested gage configurations to match any directional systems requirements to maintain trajectory
- VENOM™ cutter technology provides data that allows designers to compare an array of PDC cutters for a specific solution to your drilling needs. As a result, you get a bit that is designed for maximum performance for your unique application and ultimate value for your bottom line

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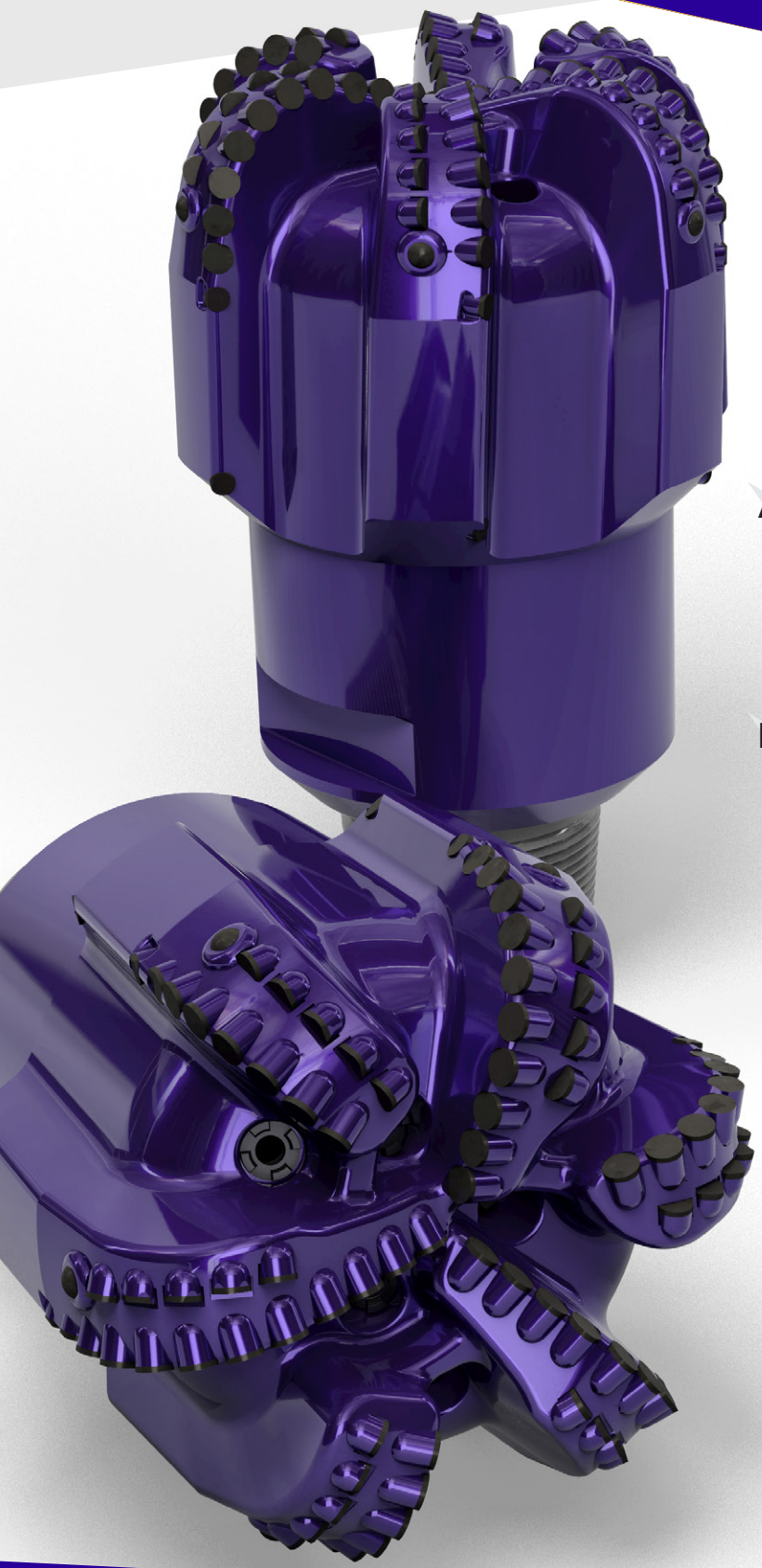
VION®

PDC Versatile "Tangent" Drill Bits



VION PDC "Tangent" Drill Bit series has been developed specifically for drilling applications where drilling through transitions requiring durability and control is essential. Designed from the start to handle the increased operating parameters of the new oilfield. Created with a balanced cutting structure profile adding greater bit stability to overcome the ROP and durability challenges of drilling transition zones and abrasive formations.

Application

- Tangent, Intermediate drilling intervals
- For soft to hard formations with transition zones
- For all rotary and PDM applications

Features / Benefits

- Utilizes, HYDRA™, our hydraulically optimized attribute with curved nozzles, webbed blades, and designed junk slots improving performance in sticky formation applications
- Balanced cutting structure leads to a toughened cone and strengthened nose and shoulder. A balanced bit design is more durable, faster drilling, and longer lived
- Steel body option leads to a design that is faster and more aggressive than a matrix body bit but retains the toughness of a VION
- VENOM™ Cutter methodology delivers the right cutter for any challenge

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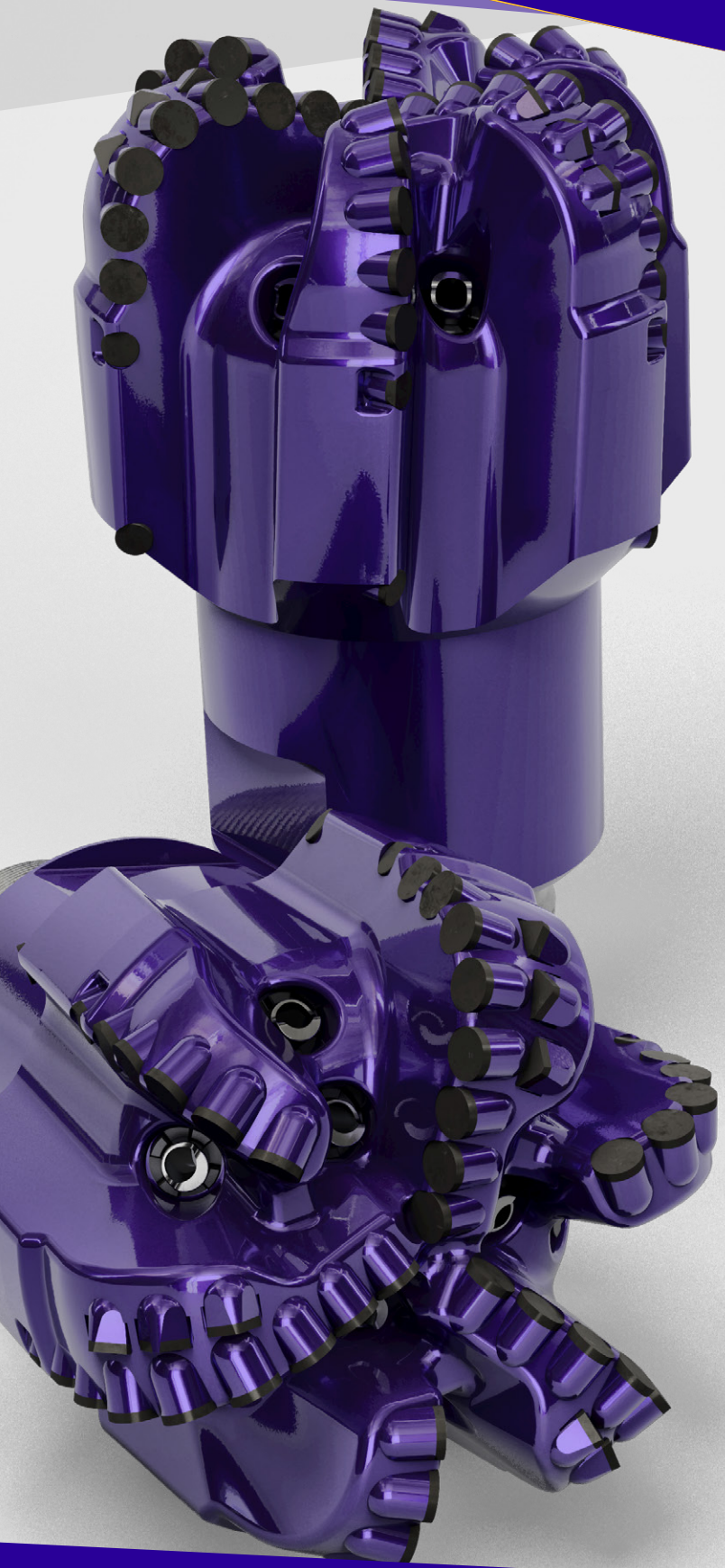
A-FORCE™
Air PDC Drill Bit



Introducing Varel's NEW, A-FORCE "Air PDC" Drill Bit series; our Air PDC products are designed specifically for drilling on air or mist in an underbalanced environment. Our proprietary technology caters to operators and service companies' expectation for speed, durability, steerability and increased bit longevity. A-FORCE Air PDC's effectively drill vertical, tangent, and curve sections without the loss of performance in transitioning to various sections of the wellbore. The A-FORCE design introduces a unique airflow control feature, effectively cooling the bit and lifts cuttings out of the wellbore without the conventional use of liquids. The result for operators is faster drilling and improved ROP, while helping eliminate lost circulation problems.

Application

- Bit Design, Features, and Cutters specific to drilling on AIR
- VION PDC "Tangent" Drill Bit Series developed specifically for AIR drilling applications where drilling through transitions requires enhanced durability and control
- Various designs and sizes are capable of building and holding +/- 60°
- AIR PDC features improve hole cleaning and help to remove cuttings immediately
- For soft to hard formations where high ROP is expected
- Sizes for AIR PDC Drilling range from: 6-1/8" to 24"

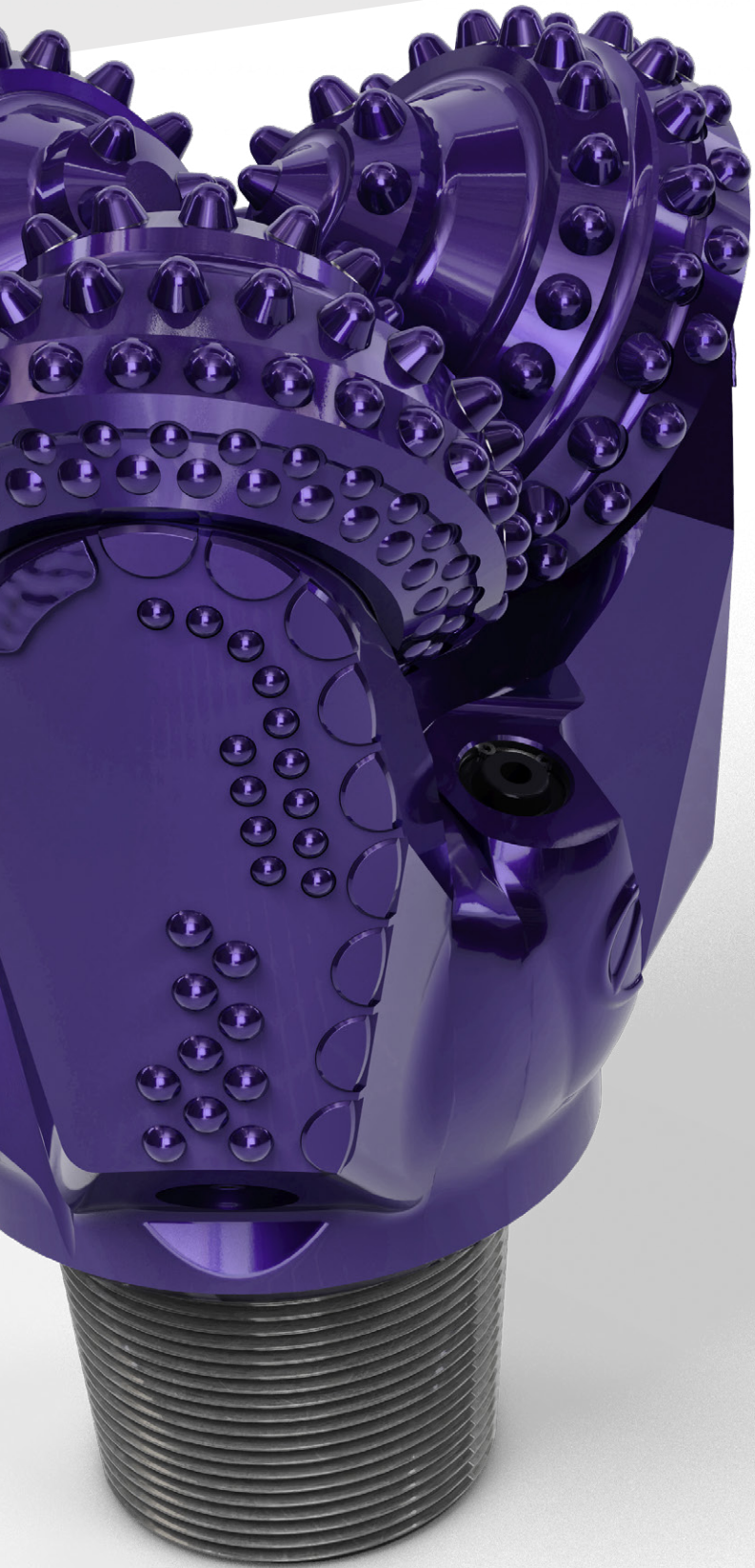
Features / Benefits

- VENOM™ Cutter technology utilizes the right PDC cutter solving various challenges while drilling on air
- Hydraulic optimization – "HYDRA", VES's hydraulically-optimized features include curved nozzles, twister nozzles, webbed blades and CFD optimized nozzle placement
- Airflow control cooling the drill bit while effectively lifting cuttings from the wellbore
- Greater ROP potential as compared to traditional air-drilling bit designs, reducing the likelihood of performance limitations
- Greater dull grade results in less damage to the bit and cutter substrates while improving borehole quality over traditional drill bit designs

VAREL ENERGY SOLUTIONS

A-FORCE™

Bits Designed for Underbalanced Drilling



Sealed journal bearing air bits meet the need of air, water mist, and foam fluid systems to drill in all under-balanced applications. A-FORCE TCI cutting structures are specifically designed for use in underbalanced drilling regardless of the fluid system being utilized. A sealed journal bearing system improves bearing heat management and accommodates increased drilling parameters.

Application

- Air, water mist, foam or any combination
- Medium hard formations
- For all rotary and motor drilling

Features / Benefits

- Cutting structures are designed aggressively for under-balanced drilling conditions and formations typically encountered
- Patented bearing seal package improves bearing life for longer drilling time and more footage drilled
- Replaceable nozzles with either nail retention or snap ring retention are supplied for the best hydraulics possible
- Advanced synthetic grease improves bearing lubrication and reliability in high speed motor applications
- High speed sealed journal with silver plated bearing elements provides for rotary or motor applications

VAREL ENERGY SOLUTIONS

COMPASS®
Slimhole Roller Cone Products

Slimhole product offering for reduced casing programs, re-entries, laterals, and coiled tubing operations. With a sealed journal bearing package and aggressive cutting structures in both steel teeth and Tungsten Carbide Insert bits, the COMPASS product provides reliable performance in all applications. COMPASS bits provide excellent steerability and high rates of penetration even when weight on bit is limited with bearing designs that can handle the increased RPMs in motor applications commonly found in this drill bit size range.

Application

- Vertical, directional, horizontal, and tangent well profiles
- Soft to medium formations for steel teeth bits
- Soft to hard formations for TCI bits
- For all rotary, motor, and RSS applications

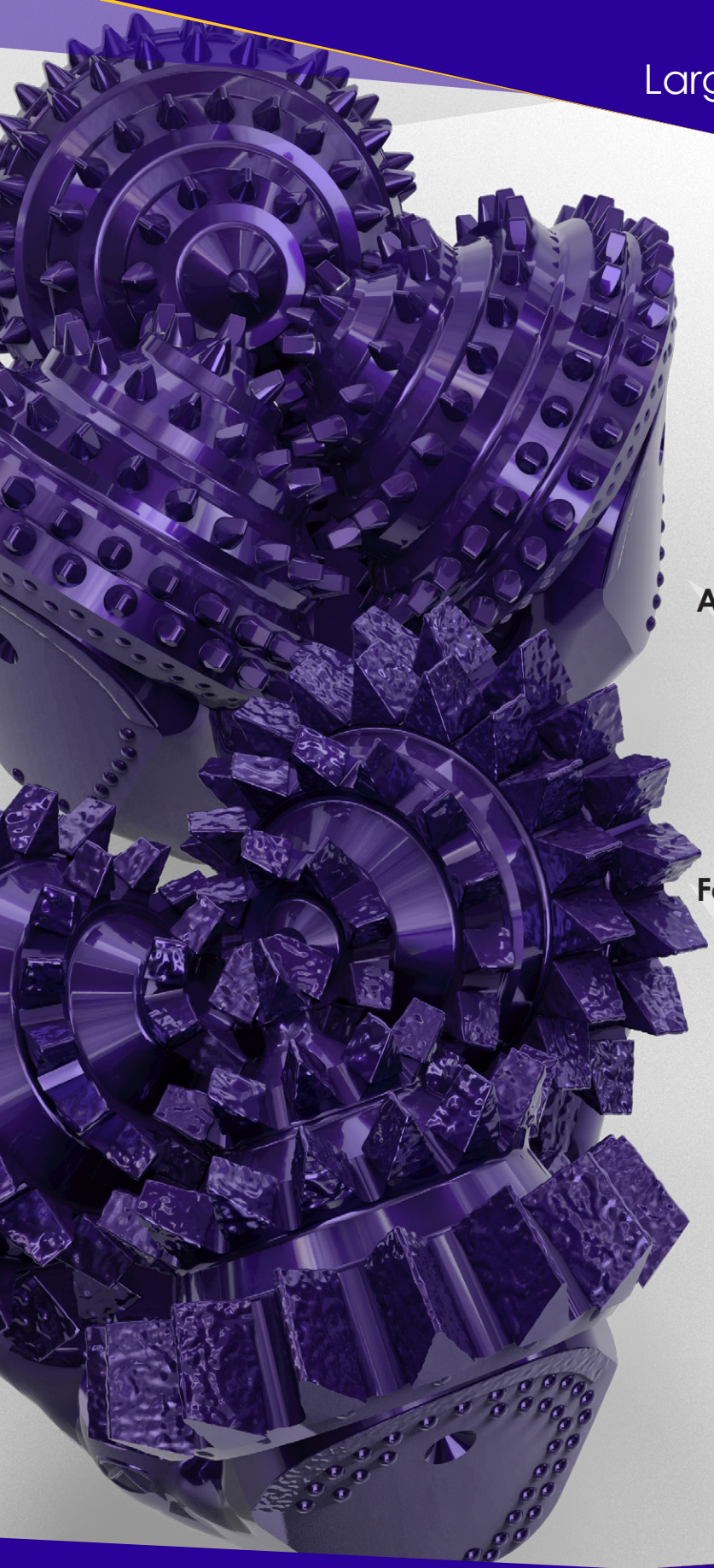
Features / Benefits

- Advanced cutting structures and gage designed for increased drilling speed and steerability with gage designs available for demanding applications
- Patented bearing seal package improves bearing performance in all applications
- High capacity grease reservoir capable of delivering bearing lubrication over longer and higher RPM runs leading to longer bearing life
- Enhanced shirttail protection with TCI along the leading edge, around the shirttail, and near the compensator provide extra protection for increased bit life

VAREL ENERGY SOLUTIONS

EVEREST®

Large Diameter Roller Cone Drill Bits



EVEREST drill bits are designed for consistent performance and reliability in surface and intermediate hole sections. Manufactured in the largest range of sizes from 14-3/4" up to 45" in diameter. EVEREST bits easily meet the demands of each hole section. Whether it is a fully featured sealed bearing bit or an open bearing bit for surface work, EVEREST product is up for any mountainous task. EVEREST products are available in both milled tooth and Tungsten Carbide Insert (TCI) cutting structures.

Application

- Vertical and directional well profiles
- Rotary or motor drilling
- Surface hole section drilling
- Intermediate hole section drilling
- Carbonate drilling

Features / Benefits

- Sealed bearing bits from 14-3/4" to 30" in diameter with patented conical seal gland and V-jet hydraulics with center jet
- DC30 hardfacing allows for double the hardfacing application to the critical areas of the steel teeth bits cutting structure
- Proprietary bearing machining processes support longer bearing life in all EVEREST products whether open or sealed bearing
- Carbonate grade TCIs reduce or eliminate the micro-fracturing induced heat checking of the carbide inserts associated with drilling carbonates

VAREL ENERGY SOLUTIONS

HIGH ENERGY™

Steel Teeth and Tungsten Carbide Insert(TCI) Drill Bits

Our HIGH ENERGY drill bit series is capable of increasing drilling performance by effectively utilizing maximum operating parameters. With the latest bearing technology and cutting structure design HIGH ENERGY drill bits deliver faster penetration rates, more footage drilled, and superior reliability in many applications. Patented bearing components and application specific features provide confidence in directional drilling applications while providing assurance in straight hole applications. HIGH ENERGY products are available in both steel teeth and tungsten carbide insert drill bits from 7” to 13-3/4” diameter.

Application

- Vertical, directional, horizontal, and tangent wells
- Soft to medium formations for steel teeth bits
- Soft to hard formations for TCI bits
- For all rotary and motor applications

Features / Benefits

- Optimized cutting structures - eliminates tracking and increases ROP
- Patented bearing seal package - improves bearing life for longer drilling time
- Advanced synthetic bearing grease is thermally stable providing high lubricity to lengthen bearing life
- Shirttail Protection - TCIs along the leading edge, around the shirttail, and near the compensator provide extra protection for increased life

VAREL ENERGY SOLUTIONS

SLIPSTREAM®

Hybrid Cutting Technology Designed for Milling

SLIPSTREAM bits are specifically designed to target non-homogeneous downhole components such as bridge and frac plugs and are capable of handling the cast iron or ceramic slips as well as the softer core of those plugs. Tungsten carbide inserts and hardfaced steel teeth are arrayed in the cutting structure to cut both hard and soft materials found in frac plugs. High performance journal bearing and shirttail protection allow for both motor and rotary applications when drilling plugs or other downhole equipment.

Application

- Frac plug drill out of any conventional type plug used in well fracking
- Clean out producing well bores
- For all motor and rotary applications

Features / Benefits

- Patented hybrid cutting structure - steel teeth located in the center for drilling composite materials and tungsten carbide inserts located on the outside to drill the cast iron or hard ceramic slips found in plugs used in well fracturing
- Patent pending journal seal design - keeps the seal protected and provides the best design for each size in the SLIPSTREAM product offering
- High speed sealed journal bearing - silver plated elements and advanced synthetic bearing grease provide for motor or rotary applications
- Shirttail protection - maximizes seal protection and provides bit stability when drilling

VAREL ENERGY SOLUTIONS

SLIPXTREME®

Hybrid Cutting Technology Designed for Milling

SlipXtreme is the latest generation of industry-leading hybrid cutting technology designed for milling. The new standard to the downhole product milling market and a revolutionary answer to isolation drill out and operational efficiency. SlipXtreme is engineered to target a variety of non-homogeneous downhole components such as bridge and frac plugs as well as the more demanding requirements of cast iron or ceramic slips. Tungsten carbide inserts and hard-faced steel teeth are arrayed in the cutting structure and designed to cut both hard and soft materials found in various plugs and downhole equipment. High performance journal bearing and shirttail protection allow for both motor and rotary applications when drilling plugs or other downhole equipment.

Application

- Frac plug drill out of any conventional or unconventional type plug used in lower completions fracking
- Cast-iron bridge plug milling in reentry and intervention applications
- Clean out producing well bores
- For all motor and rotary completions applications

Features / Benefits

- Bearing Package: High performance journal bearing with silver plated elements along with increased lubrication, and enhanced bearing seal provide an advanced bearing package for both motor and standard rotary completions applications
- Canister Compensator: Designed to extend bit life and maintain grease supply for the length of the run. Over twice the grease capacity of previous models ensures critical lubrication to the bearing
- Wear Resistant Hardfacing: Critical tooth hardfacing processes are continually monitored and updated to ensure the highest quality hardfacing deposit
- Shirttail Protection: Reinforced shirttail to maximize seal protection provide increased protection in horizontal wells
- Tungsten carbide inserts up the leg and below the reservoir provide enhanced protection and in turn improved bit performance

VAREL ENERGY SOLUTIONS

WORKOVER

Bits for Remedial or Re-Entry Operations

Varel's classic open bearing steel teeth bits for remedial, re-entry, and water well applications. All bits incorporate open throat hydraulics and can accommodate either regular through string flow or reverse circulation which is frequently used to re-enter wells. L2, L1, and LH1 are offered from softest to hardest of the cutting structure applications.

Application

- Workover bits can be used for drilling cement, drilling composites, drilling plugs, paraffin clean out, scale clean out, thru tubing operations, coiled tubing operations, and drill ahead re-entries
- Water well drilling
- HDD drilling

Features / Benefits

- Forged steel teeth cutting structures provide stronger more impact resistant teeth when compared to milled teeth because the forged metal teeth grain structure is preserved in the teeth
- Teeth hardfacing processes are continually monitored and updated to ensure the highest quality hardfacing deposits with regular testing of product and welders
- Advanced materials and manufacturing techniques result in oilfield grade quality workover bits
- Skirted bits are available as an option for reverse circulation applications. Drill bit skirts are added between the bit legs with the intention of directing fluid to the bottom of the hole to pick up cuttings off bottom before turning and exiting through the center of the bit

VAREL ENERGY SOLUTIONS

BI-CENTER

Increase Your WellBore Diameter Without the Risk

Designed to enlarge the wellbore by 15 to 25 percent larger than the pass through wellbore in all types of formations.

Application

- Vertical, Directional, Horizontal, and Tangent wells.
- For soft to hard formation drilling
- For all rotary, directional motor, and point the bit RSS applications

Features / Benefits

- Designed to reduce the risks associated with hole openers or under reamers
- Matrix or steel body designs for abrasive or maximum ROP applications
- One piece design shortens and strengthens the bit for better directional control
- Pilot bit and reamer body are balanced as one cutting structure that minimizes cutter and casing damage while drilling out

VAREL ENERGY SOLUTIONS

COREBIT™

The Ultimate COREBIT Designed Specifically for Your Application

Every COREBIT application is unique and Varel leads the way in COREBIT technology with PDC bit design features and optimized hydraulics for every design.

Application

- For every core barrel design as each bit is customizable to the core barrel required
- For soft to hard formation coring

Features / Benefits

- PDC cutters, TSP, Natural Diamond, and Impregnated cutting structures available on request depending upon the formations to be cut
- Hydraulically optimized for each cutting structure and formation application
- Balanced cutting structure with PDC cutters and full coverage designs with TSP, Natural Diamond, and Impregnated are standard

VAREL ENERGY SOLUTIONS

FUSION®

Impreg Drill Bits That Make a Difference

High performance FUSION bits are the latest in design, materials, and manufacturing science for diamond impregnated drill bits. The FUSION product is a highly flexible series that allow materials and designs to be quickly adjusted to the requirements of a specific application. The result is optimal drilling performance in very challenging formations.

Application

- Vertical, Directional, Horizontal, and Tangent wells
- For medium hard to extremely hard formations with high abrasive content and/or hard carbonate drilling
- For all high speed motor and turbine applications

Features / Benefits

- Controlled Atmosphere Infiltration reduces oxidation and graphitization to improve bit wear characteristics and durability
- Pelletization prevents diamond aggregate and reduces areas of low diamond concentration to a more uniform stone distribution within the matrix material
- Diamond Impregnated HIP Segments undergo a sintering process to achieve reduced porosity and are then placed in the face of the bit in specific patterns determined by SPOT-DN, Varel's proprietary design software
- Optimum Hydraulics are utilized as each design undergoes extensive computational fluid dynamics evaluation to ensure regrinding and recirculation of cuttings is eliminated

VAREL ENERGY SOLUTIONS

CASEBIT™
Casing While Drilling Bit

CASEBIT is designed to get your string to bottom every time using applied technologies. From PDC drill bit technology to flexible manufacturing technology, this product eliminates the need for a second trip and ensures uninhibited delivery and positioning of the casing string to bottom every time. Computer balanced cutting structure design, cutter wear modeling, and computational fluid analysis complete the package of CASEBIT to provide a custom formation designed casing bit for your specific application.

Application

- Casing or liner while drilling
- Running casing or liner to bottom with CASEBIT as a casing shoe
- Vertical or directional wells
- Soft to medium hard formations
- For any RPM application

Features / Benefits

- Asymmetric raised blades, blind holes and other disconformities to accelerate drill out and improve breakup of the CASEBIT face
- Pressure controlled rupture disc port allows for continuous flow of drilling fluids or cement in the event of nozzle or port plugging
- Wide open face area limits body erosion and accommodates a wide range of flow rates eliminating the need for special nozzles
- Optimized cutting structure for each formation, resulting in a custom bit designed for the application
- Drillable face alloy to enhance PDC drill out
- Full thru-bore

Options

- Integral float valve qualified to API RP 10F CAT IIIC
- Fully flexible design with varying blade count, tool OD, casing weight, and premium casing connection

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