PREMIUM PDC Drill Bits: Superior performance for the most challenging applications
**Design Optimization Process**

Every Trident design is the result from BESTEBIT’s continuous 360 degree optimization process.

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Review Offset: - Parameters - Bit Records - Formations - BHA</td>
</tr>
<tr>
<td>02</td>
<td>BESTE ROCK (RMA)</td>
</tr>
<tr>
<td>03</td>
<td>Identify Target Well Objectives</td>
</tr>
<tr>
<td>04</td>
<td>Document Lessons &amp; Case History</td>
</tr>
<tr>
<td>05</td>
<td>Design: - BitScan - Force Balance - CFD / FEA</td>
</tr>
<tr>
<td>06</td>
<td>Field Testing &amp; Post Run Report</td>
</tr>
</tbody>
</table>

Since this is a continuous 360 degree optimization process, all the information is feedback into Step 01 & the process starts over to achieve additional performance gains and value to the customer.

**TRIDENT™ PDC Cutters**

**Engineered Improvements:**

1. **Impact resistance**
2. **Thermal degradation**
3. **Abrasion wear resistance**

Premium next generation cutters

**TRIDENT™ Feature Benefits**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Benefit &amp; Advantage</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRIDENT™ PDC Cutters</td>
<td>Longer bit life, deeper intervals, faster ROP and higher TD success rate.</td>
</tr>
<tr>
<td>Directional Bit Profile</td>
<td>Bit profiles are customized to meet the BHA and application requirement.</td>
</tr>
<tr>
<td>Directional Gauge Pad Design</td>
<td>Custom gauge pad designs offer flexibility to match the bit to the target Dog Leg.</td>
</tr>
<tr>
<td>Depth of Cut Control</td>
<td>DOCC Management smoothes out downhole torque fluctuations, providing superior directional control on motor and RSS.</td>
</tr>
<tr>
<td>Short Shank</td>
<td>Reduces the distance between the Bit-to-Bend or RSS steering unit, thus generating higher side cutting forces to achieve high Dog Legs.</td>
</tr>
<tr>
<td>Anti-Balling &amp; CFD</td>
<td>Eliminates the “Dead Zone” by mechanically forcing cuttings into the CFD fluid path for faster ROP in balling formations.</td>
</tr>
<tr>
<td>ARMOR Hard Facing &amp; Improved Matrix</td>
<td>Higher wear resistant body materials significantly increase operating hours for longer runs.</td>
</tr>
</tbody>
</table>

**TRIDENT™ Cutter Summary:**

- Comprises four application-specific PDC cutters
- Employs proprietary diamond grits and ultra-high pressure synthesis process
- Produces low cobalt concentration without leaching
- Matches cutter to primary failure modes
- Delivers high impact abrasion resistance
- Provides excellent thermal stability
- Drills more footage per run
- Lowers cost per foot

**Trident Cutters** - BESTEBIT’s latest cutter technology to improve both wear and impact resistance. Commercially released in Mid-2016.

**Directional Bit Profile** - Selected from a variety of proven bit profiles to meet the BHA & application requirement.

**Directional Gauge Pad Design** - We can quickly modify the bit’s gauge pad configuration to meet the DL objectives.

**Depth of Cut Control** - An excellent feature to reduce vibrations and assist with directional control.

**Short Shanks** - Shorter bit lengths for high steering forces and dog legs on motor & RSS.

**Anti-Balling & CFD** - A combination of technologies for proven ROP gains in balling prone applications.

**ARMOR hard facing & Improved matrix** - With new cutters lasting longer than ever, the Steel & Matrix body materials also need to improve to yield higher drilling hours.
Directional Bit Profile

<table>
<thead>
<tr>
<th>Steerable Index</th>
<th>Profile Height</th>
<th>Cone Angle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 1</td>
<td>Medium</td>
<td>Deep</td>
</tr>
<tr>
<td>Level 2</td>
<td>Medium</td>
<td>Shallow</td>
</tr>
<tr>
<td>Level 3</td>
<td>Short</td>
<td>Shallow</td>
</tr>
</tbody>
</table>

Short Shank

Hydraulics: CFD & Anti-Balling Feature

<table>
<thead>
<tr>
<th>Location</th>
<th>Non Optimized</th>
<th>Partially Optimized</th>
<th>Optimized</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cone</td>
<td>Reverse flow</td>
<td>Low flow</td>
<td>Full coverage</td>
</tr>
<tr>
<td>Blade Front</td>
<td>Low flow</td>
<td>Low flow</td>
<td>Full coverage</td>
</tr>
<tr>
<td>Junk Slot</td>
<td>Scattered flow</td>
<td>Improved flow</td>
<td>Parallel flow paths</td>
</tr>
</tbody>
</table>

Depth of Cut Control Technology

Depth of Cut (DOC) Control Technology is an excellent feature to reduce vibrations and assist with directional control on motor & RSS. As shown in the graph (WOB vs. Torque), the Engineering team can design the DOC Control feature to match the application’s wide DOC range.

Customized Torque

CFD

- Reduces Erosion
- Higher Hours
- Decreases Bit Balling
- Faster ROP

Improved Materials: Hard Facing & Matrix

Hard Facing

- ARMOR Hard Facing
  - 40% higher carbide density
  - Longer hours in abrasive formations
  - Pushing steel body into matrix applications

Matrix

- Improved Matrix
  - Higher erosion resistance
  - Increased drilling hours
  - Reduces Lost Cutters & Ring Out
  - Higher TD success

Directional: Gauge Pad Design

Gauge Pad Features

- Passive
- Step
- Active 1
- Active 2
- Active 3

BESTEBIT offers a wide range of gauge configurations, depending on the requirements for: Dog leg and/or Gauge pad wear resistance.

Step Gauge & Bit Tilt

RSS & Motor

Gauge pad relief allows the bit to tilt and change direction.

Anti-Balling Feature

A small dome contour in the center removes the “Dead Zone” and thereby pushes formation into the fluid path, effectively cleaning the bit and reducing bit balling for faster ROP.

Improved Matrix

- Improved ARMOR Hard Facing
  - 62% higher carbide density
  - Faster ROP

Standard

- Standard ARMOR Hard Facing
  - 40% higher carbide density
  - Longer hours in abrasive formations
  - Pushing steel body into matrix applications

Conventional

- Conventional ARMOR Hard Facing
  - 40% higher carbide density
  - Faster ROP

Improved

- Improved ARMOR Hard Facing
  - 62% higher carbide density
  - Faster ROP

Tangent

- Tangent ARMOR Hard Facing
  - 62% higher carbide density
  - Faster ROP

Orient

- Orient ARMOR Hard Facing
  - 62% higher carbide density
  - Faster ROP
Thailand Onshore

12 ¼" Cutter Durability Comparison. Primary Dull Characteristic.

- 12 x Offset Bits = 432 Cutters
- 1 x TRIDENT Bit = 36 Cutters

- 4 Sections: 4,290 m Drilled in 94.5 hr IADC
- 10 Sections: 9,708 m Drilled in 240 hr IADC

- 53% Broken & Chipped
- 45% Less Broken & Chipped Cutters

USA Onshore

9 7/8" T1944

- Footage Drilled Vs Bits Usage
- Footage Per Day Vs Bits Usage

- Savings: +1 Bit Per section
- +2 Days Drilling > $60,000 Savings
  *Longest Distance Drilled

Middle East Offshore

16" T1679 on Steerable Motor

- Footage Drilled Vs ROP
- Footage Drilled Vs Cost Per Foot

- Non Optimized
- Partially Optimized

- ROP: 20% Faster, 29% Faster
- Cost Per Foot: 20% Lower, 17% Lower
- Savings: $33,200, $58,600

- BESTEBIT vs Competitor

UAE Offshore

8 1/2" T1389 on Rotary Steerable & Motor

- Footage Drilled Vs ROP
- Footage Drilled Vs Cost Per Foot

- Performance:
  - 193% Faster ROP
  - 17% More Footage
  - 60% Less Drilling Hours
- Savings: $400,000
  *Saves 2 Trips & 2 Bits

Middle East Offshore

12" T1665 on Rotary Steerable

- ROP
- Distance Drilled

- Performance:
  - 12% Faster ROP
  - 10% More Footage
  - 12% Lower Cost per Foot

Reliability - Durability - Consistency

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