





# **PREMIUM PDC Drill Bits:** Superior performance for the most challenging applications



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# **TRIDENT**<sup>TM</sup>

## **Design Optimization Process**



### **Every Trident design is the result from BESTEBIT's continuous** 360 degree optimization process

Starts with reviewing all available 01 information. The better the data Step quality, the better the solution. Thus, it is important to work with the Drilling Engineers to understand how relevant the offset data is to the target application.

Step

Using BitScan Software to engineer a bit with the required features to help overcome the offset issues and achieve the target objectives.



Step

Abrasion & USC Rattiness. Future Step revisions will include IADC matching vs UCS. Operating parameters and vibrations logs can also be plotted to better understand formation behaviors and bit performance or Power Curves. Run the BESTEBIT drill bit in the intended application. Gather data

The software benchmarks UCS, CCS

and generates three indices: Balling,

and qualify if the drilling objectives were met. Evaluate the bit performance, parameters and formation hardness with BESTE ROCK software. Generate a bit report with dull photos, DD comments and offset performance benchmarks.

Work with the Drilling Engineer to fully document and rank the objectives or performance qualifiers

Document the lessons learned as to 06 why or why not the objectives were met. Based on current technology, Step recommend changes to: bit design features, BHA and/or parameter.

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

**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.

# **TRIDENT**<sup>™</sup> Feature Benefits

	Feature	Benefit & Advar
	TRIDENT™ PDC Cutters	Longer bit life, d and higher TD s
	Directional Bit Profile	Bit profiles are c and application i
$\langle O \rangle$	Directional Gauge Pad Design	Custom gauge p to the target Do
<u> </u>	Depth of Cut Control	DOCC Manager providing superi
	Short Shank	Reduces the dist thus generating
	Anti-Balling & CFD	Eliminates the "I the CFD fluid pa
$\bigcirc$	ARMOR Hard Facing	Higher wear res



Thermal

### **TRIDENT** <sup>™</sup> PDC Cutters

- Comprises four application-specific PDC cutters
- Match cutter type with primary failure mode
- Proprietary diamond blends & synthesis
- Low cobalt concentration without leaching



Impact

### itage

- deeper intervals, faster ROP uccess rate.
- customized to meet the BHA requirement.
- pad designs offer flexibility to match the bit og Leg.
- ment smooths out downhole torque fluctuations, ior directional control on motor and RSS.
- tance between the Bit-to-Bend or RSS steering unit, higher side cutting forces to achieve high Dog Legs.
- Dead Zone" by mechanically forcing cuttings into ath for faster ROP in balling formations.
- sistant body materials significantly increase s for longer runs.

### **TRIDENT**<sup>™</sup> 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



Abrasion

# **Directional Bit Profile**

	Steerable Index	Profile Height	Cone Angle
	Level 1	Medium	Deep
	Level 2	Medium	Shallow
	Level 3	Short	Shallow

# Short Shank

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# Hydraulics: CFD & Anti-Balling Feature

Location	Non Optimized	Partially Optimized	Optimized
Cone	Reverse flow	Low flow	Full coverage
Blade Front	Low flow	Low flow	Full coverage
Junk Slot	Scattered flow	Improved flow	Parallel flow paths

### **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.

### Standard

**Customized Torque** 



### CFD

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



# **Directional:** Gauge Pad Design

### **Gauge Pad Features**

Step

Step Gauge & Bit Tilt







Active 2



BESTEBIT offers





## **Anti-Balling Feature**

balling for faster ROP.

Passive

Active 1

Active 3

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

### Hard Facing

Standard

## Matrix







Conventional Gauge

Tangent

Orient



allows thebit to tilt and change direction.

**RSS & Motor** 

Gauge pad relief

Improved

### formations +62% • Pushing steel body into Hours matrix applications

**ARMOR Hard** 

• 40% higher carbide

Facing

density

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

# **Improved Materials:** Hard Facing & Matrix



### Improved Matrix

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

## **Thailand Onshore**

# **Middle East Offshore**

16" T1679 on Steerable Motor

Footage Drilled Vs ROP

## 12 ¼" Cutter Durability Comparison. Primary Dull Characteristic.



# **USA** Onshore

### 97/8"T1944 Footage Drilled Vs Bits Usage Footage Per Day Vs Bits Usage Savings: +1 Bit 6000 Per sections 600 Bits Used Per Section ed (ft) ge Per Day (ft) 500 5000 +2 Davs Drill 4000 400 Drilling 3000 > \$60.000 2000 Savings \*Longest Distance Drilled O Bits Used Per Section BESTEBI Competitor

# **Middle East Offshore**





3000

2800

2700

2600

£ 2900

õ

ROP	20% Faster
Cost Per Foot	20% Lower
Savings	\$33,200

# **UAE Offshore**



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



3000

£ 2900

2800

2700

00 07 2600

2500

100 E

00 (ft/h

Non Optimized



BESTEBIT

Competitor

### Performance:

193% Faster ROP

More Footage

Less Drilling Hours

Savings:

**\$400,000** Savings

Saves 2 Trips & 2 Bits



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