When Every Run Counts™
Ulterra designs and manufactures high-performance PDC bits and downhole tools for the global oil and gas industry.

When Every Run Counts, you need a drilling-focused partner like Ulterra whose sole purpose is matching the right PDC bit with the application to lower your drilling costs.

Named "the fastest growing drill bit company" by a prestigious oilfield research company, Ulterra is the bit supplier of choice when drillers require a partner with unmatched credibility and a commitment to excellence. Ulterra is unique by its flexibility to changing industry dynamics and its ability to respond to a customer’s specific applications with customized solutions. Its strength resides in the experience and wisdom culled from industry veterans, designing high-quality, high-performance PDC bits for a global market.

When Every Run Counts, operators count on Ulterra.

**ULTERRA Advantages**

- Fast and effective customer response
- Drilling focused
- Modern manufacturing facilities
- Consistent quality
- Outstanding PDC bit performance
- Talented PDC experts
- Advanced engineering tools for cost-effective applications

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ULTERRA Field Engineering

Ulterra places applications engineers close to the customer at the district level to ensure customer requirements are fully understood and products deliver the desired results.

Performance Database - Ulterra's proprietary Performance Database captures well and offset runs information to put vital information at our engineer's and sales team's fingertips.

Ulterra RAP - Run Analysis reports put vital performance information into our customer's hands recapitulating recent performance of our bits and ensuring the value of continuous product improvement in your drilling Application.

Rock Analysis - Ulterra's Rock Destruction Analysis tool helps our sales team and engineers better understand our customer's challenging drilling environment to ensure proper application of our latest technologies.

Cypher Application Database - Cypher captures analytical knowledge of drilling applications and defines the goals of engineering projects in terms of customer needs.

Performance Chart Maker - Ulterra's PCM is unrivaled in the industry. This tool allows fast analysis of Ulterra's product vs. our competition to ensure product performance and delivering superior value to our customers.

ULTERRA Design Engineering

Ulterra engineers employ the very latest technologies, including advanced computer-aided design (CAD), to develop reliable bits that consistently meet and exceed customer requirements.

3D Solid Modeling Design - Ulterra design engineers use 3D modeling design tools (CAD) to accelerate design and to insure that high quality precision is built into every bit. Once the designer's intent is verified, an automated process creates the drawing packages for production. This state-of-the-art design tool guarantees unmatched precision and design repeatability for a bit built now or in the future.

Computational Fluid Dynamics - To reduce the tendency for bit balling and to reduce erosion of the bit body, Ulterra Engineers utilize CFD analysis to balance fluid flow, cutter cooling and erosion in each of their bit designs.

Blade Strength Calculation - Each bit design undergoes a mathematical process to optimize blade strength and geometry. Physical & geometrical characteristics of each blade are adjusted to optimize blade integrity and cuttings flow.

Work Curve Analysis – Each bit undergoes an analysis of individual cutter work load to reduce cutter imbalance. Cutter configuration is then designed to distribute work evenly among the cutters to increase a bit’s drilling efficiency.
With all of Ulterra’s PDC bit’s you can expect a quality product with consistent performance.

- **Performance Driven Solutions** - Every design variable in the book is used to tailor designs for optimum ROP and durability in the customer’s application and goal set.

- **Premium PDC Cutters** - New PDC cutter technologies are continually tested to ensure all bits employ the most current, cutting-edge technology and custom designs provide the ideal combination of aggressiveness and durability for a specific application.

- **Enhanced Hydraulics** - Computational Fluid Dynamics is used to optimize nozzle placement, flow balance and cuttings evacuation to maximize bit cleaning, cutter cooling and reduce body erosion.

- **Proprietary Technology** - Superior materials tied to application-driven customer needs. Bits run longer, faster, with less damage.

Ulterra designs and builds PDC bits from either steel or tungsten-carbide matrix body materials to meet customer-driven application and performance demands. Complete design and manufacturing flexibility allows Ulterra to use the best materials for the job, whether that means achieving the shortest makeup length in the industry with a single piece integrated-body steel bit or a fighting off sour gas corrosion with a resistant matrix blend.

The Ulterra LightSpeed cutter development process assures our customers receive the most advanced cutter technology in every bit they order.

LightSpeed is the exclusive process Ulterra developed to ensure you always receive the latest generation cutter – the lifeblood of any high performing PDC bit. The responsiveness and flexibility inherent in LightSpeed means Ulterra can consistently deliver the most reliable PDC bits in the market, often well before the competitors have completed field trials. That means you are assured that every bit arriving on your location will be a new design customized for your application. No longer do you have to wait for an overstocked inventory to be whittled down before receiving the most advanced technology.

What’s more, Ulterra has been recognized as having not only the fastest, but the most thorough and quality-focused testing procedure in the industry. The result is two families of PDC cutters engineered for specific applications. This tool allows fast analysis of Ulterra’s product vs. our competition to ensure product performance and delivering superior value to our customers.

**ULTERRA PDC Drill Bits**

**ULTERRA PDC Cutter Technology**

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LightSpeed MAGNUM delivers exceptional impact resistance for extended reach and similarly demanding drilling applications.

LightSpeed NITRO offers the utmost in abrasion resistance, making it ideal for hard-rock and high-temperature drilling, particularly in the shale plays.
**OneShot**

Ulterra’s OneShot designated bits are designed specifically for curve and lateral applications to reduce drilling time and hit precise directional targets without unnecessary bit trips. OneShot bits have been proven in their specific applications to save operators money and reduce risk by reliably achieving build rates.

- Reduced drilling time in the curve
- Decreased risk of bit trips
- Excellent directional control

**SplitBlade**

SplitBlade looks different because it is different. The physical disruption of the typical straight blade keeps cuttings separated through evacuation to keep the cutting structure clean. Dedicated hydraulic flow to physically separated portions of the cutting structure sweeps cuttings down the junk slot, reducing the risk of balling up in the bit.

- Dedicated flow to troublesome areas
- Reduce risk of balling
- Improved cuttings evacuation

**Heavy Oil Grade Series**

Heavy Oil Grade matrix body PDC bits are designed to drill long distances with excellent steerability, repeatability and backreaming capability. The bit’s abrasion-resistant, XT cutters optimize diamond exposure to the formation to protect the bit body; improve ROP; and enable the bit to remain in the hole longer. Enhanced hydraulics and a step-down feature behind each blade prevent sand and debris build-up and help ensure accurate steerability over the entire lateral length, even in the most unconsolidated sands. A strengthened gauge pad and robust backreaming feature ensure trouble-free backreaming while maintaining the original gauge diameter specifications.

- Abrasion resistant
- Higher ROP
- Enhanced steerability

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**CounterForce**

A patent pending PDC bit technology which utilizes a unique cutter configuration to lower bit reactive torque and vibration, dramatically improving drilling efficiency. Unlike traditional PDC bits, the cutters of this step-change advancement work together to lower lateral vibration and increase crack propagation. The CounterForce cutting structure is engineered to slice through rock while maintaining a more consistent torque signature thus increasing stability and ROP.

- Reduced torque and vibration
- Improved drilling efficiency
- Improved directional performance
- Higher ROP

**FastBack**

FastBack’s unique shape gets the blade out of the way and the cutters deep into formation. Instead of limiting PDC bits by the weaknesses of the materials, FastBack strategically aligns their strengths, each component enhances the others. The body material maximizes strength without restricting the cutting action or evacuation. Advanced surface coatings provide maximum erosion control without sacrificing strength. Hydraulic pathways have ultimate flexibility to enable extreme ROP. All of which converge on driving all available drilling energy into premium diamond cutters application optimized through Ulterra’s industry-leading LightSpeed™ cutter testing program. The result—another stepchange in Ulterra’s front-running reliability and ROP.

- Energy focused on the cutters drills faster with lower WOB
- Wide open blade structure provides optimal hydraulics
- Quality-focused design and process ensures industry-leading reliability
- Materials used deliver consistent performance

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Ulterra’s “U-Technology” brand represents our commitment to be a top performer in every field we operate. We achieve this performance by focusing our applications engineering teams on a district level to insure continuity of local knowledge and decrease the time it takes to bring a solution to the field.

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**Ulterra’s U-Technology**

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ULTERRA PDC Optional Features

Load Limiters
TCI inserts reduce depth of cut and minimize torque variations

Casing Drill Out
TCI positioned to enhance bit’s casing drilling capability

Double Row Cutters
Row of back-up cutters

Extended Gauge
Longer gauge than standard for greater stability

Fixed Ports
Open areas to improve hydraulics in bit designs with space limitations

In-gauge PDC
Flush mounted PDC cutter positioned in gauge for added protection drilling abrasive applications.

Short Gauge
Shorter gauge than standard for enhanced steerability

Up Drill Cutters
PDC cutter positioned to enhance bit’s movement when tripping out of the hole.

ULTERRA Nomenclature

<table>
<thead>
<tr>
<th>Number of Blades</th>
<th>Cutter Size (mm)</th>
<th>Bit Body Material</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Steel</td>
<td>Load Limiters</td>
</tr>
<tr>
<td>3</td>
<td>11</td>
<td></td>
<td>Casing Drill Out</td>
</tr>
<tr>
<td>4</td>
<td>13</td>
<td></td>
<td>Double Row Cutters</td>
</tr>
<tr>
<td>5</td>
<td>16</td>
<td></td>
<td>Extended Gauge</td>
</tr>
<tr>
<td>6</td>
<td>19</td>
<td></td>
<td>Fixed Ports</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
<td>In-Gauge PDC</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
<td>Short Gauge</td>
</tr>
<tr>
<td>9</td>
<td></td>
<td></td>
<td>Up Drill Cutters</td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
<td>CounterForce™</td>
</tr>
<tr>
<td>11</td>
<td></td>
<td></td>
<td>FastBack™</td>
</tr>
<tr>
<td>12</td>
<td></td>
<td></td>
<td>OneShot™</td>
</tr>
<tr>
<td>13</td>
<td></td>
<td></td>
<td>SplitBlade™</td>
</tr>
<tr>
<td>14</td>
<td></td>
<td></td>
<td>Heavy-Oil Grade</td>
</tr>
</tbody>
</table>

Ulterra’s design catalog has over 3,000 unique part numbers with products ran in every major market around the world. We are constantly increasing our capacity to build premium PDC bits that are exactly what YOU need.
**ULTERRA TorkBuster®**

Ulterra’s unique TorkBuster tool dramatically reduces bit related torque and stick-slip problems adding significant efficiency to drilling operations.

- Improved stability, reduced stick-slip
- Smoother reactive torque in BHA
- Improves bit life and ROP
- Extends PDC bit range
- Enhances directional control
- Reduces BHA fatigue

**ULTERRA TruGauge**

Short near bit stabilizer designed specifically to achieve a better quality well bore by reducing hole spiraling and increasing directional control by changing the location of the BHA contact points.

- Removes bit related Stick-Slip and improves bit stability
- Allows use of more aggressive/efficient cutting structures
- Improves bit life and ROP
- Allows harder formations to be drilled with PDC bits
- Allows easier control of directional assemblies
- Reduces fatigue on BHA components

**ULTERRA Inertia™ Friction reduction Tool**

The INERTIA tool generates lateral vibration into the drill string to reduce friction. Its ability to add friction-reducing vibration into a drill string can enhance weight transfer to the bit, alleviate torque and drag effects in the string and aid in drilling efficiency.

- Reduced reactive torques
- Improved tool-face control
- Faster ROP
- Added lateral vibration to drill string enhances weight transfer to bit and drilling efficiency
- Lower pressure drop allows utilization of multiple tools
- Zero mud pulse eliminates MWD frequency interference
- Robust design and all metal construction insures industry leading operating life and high temperature capability

In today’s extended reach highly deviated drilling applications, the complexity of the well path and increased drill string friction often impede a driller’s ability to drill efficiently. The inability to slide, drill fast and achieve targets cost time and money. The fully compatible INERTIA Tool stimulates the drill string, increasing drilling efficiency and extending reach in lateral intervals.
API Recommended Make-Up Torques

<table>
<thead>
<tr>
<th>Bit Size (in.)</th>
<th>CD Tolerances (in.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-3/4 and smaller</td>
<td>-0.015 to + 0.00</td>
</tr>
<tr>
<td>6-25/32 to 9</td>
<td>-0.020 to + 0.00</td>
</tr>
<tr>
<td>9-1/32 to 13-3/4</td>
<td>-0.030 to + 0.00</td>
</tr>
<tr>
<td>13-25/32 to 17-1/2</td>
<td>-0.045 to + 0.00</td>
</tr>
<tr>
<td>17-11/32 and larger</td>
<td>-0.060 to + 0.00</td>
</tr>
</tbody>
</table>

ULTERRA PDC Dull Grading

1. Inner Cutting Structure
2. Outer Cutting Structure
3. Primary Dull Characteristic:
   BC – Broken Cutter*
   BT – Broken Teeth*
   BU – Balled up
   CR – Cored
   CT – Chipped Teeth/Cutters
   DEL – Delaminated Cutter
   ERO – Erosion
   HCA – Heat Checking
   JD – Junk Damage
   LT – Lost Teeth/Cutters
   PNL – Plugged Nozzle
   RO – Ring Out
   SP – Spalled Cutter
   WC – Wash Out
   WT – Worn Teeth

4. Location of Primary Characteristic:
   When the primary dull characteristic has been determined, enter the main location of this characteristic. For example, if WT is the primary dull condition, enter WT into the field.

5. Bearing Seals
   (Only used for roller cone)

6. Amount Under Gauge
   The gauge section of the dull grading system is represented by either IN or an integer representing 1/16” under gauge beginning at number 1. IN means that the bit is still at full gauge.
   A value of 1 equals 1/16” under gauge
   A value of 2 equals 1/8” under gauge
   A value of 3 equals 3/16”, etc...

7. Other / Secondary Dull Characteristic
   In cases where there are multiple dull characteristics present on a bit, the “other” field can be used. After the primary dull characteristic has been determined, find the secondary condition and enter its code in the field. If there is no other dull condition, enter NO into the field.

8. Reason Bit Was Pulled

ULTERRA References

API Bit Tolerances

<table>
<thead>
<tr>
<th>Bit Size (in.)</th>
<th>CD Tolerances (in.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 1/2 - 4 1/2</td>
<td>2,300</td>
</tr>
<tr>
<td>4 17/32 - 5 3/4</td>
<td>2,200</td>
</tr>
<tr>
<td>5 1/2 - 7 3/8</td>
<td>2,100</td>
</tr>
<tr>
<td>7 13/32 - 9 3/8</td>
<td>2,000</td>
</tr>
<tr>
<td>9 13/32 - 14 1/2</td>
<td>2,000</td>
</tr>
<tr>
<td>14 9/16 &amp; larger</td>
<td>2,000</td>
</tr>
</tbody>
</table>

TFA Values of Common Nozzle Sizes

Size (in.) | Number of Nozzles |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2 3/8 REG</td>
<td>1.000</td>
</tr>
<tr>
<td>3 1/2 REG</td>
<td>0.750</td>
</tr>
<tr>
<td>4 1/2 REG</td>
<td>0.500</td>
</tr>
<tr>
<td>5 1/2 REG</td>
<td>0.333</td>
</tr>
<tr>
<td>6 1/4 REG</td>
<td>0.250</td>
</tr>
<tr>
<td>7 1/8 REG</td>
<td>0.188</td>
</tr>
<tr>
<td>8 1/16 REG</td>
<td>0.143</td>
</tr>
</tbody>
</table>

API Recommended Make-Up Torques

<table>
<thead>
<tr>
<th>Bit CD (in.)</th>
<th>API REG Connection</th>
<th>Bit Sub CD (in.)</th>
<th>Make-up torque (min.) (ft. lb.)</th>
<th>Make-up torque (max.) (ft. lb.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 1/2 - 4 1/2</td>
<td>2 3/8 REG</td>
<td>3</td>
<td>1,800</td>
<td>2,100</td>
</tr>
<tr>
<td>4 17/32 - 5 3/4</td>
<td>2 7/8 REG</td>
<td>3</td>
<td>1,500</td>
<td>1,800</td>
</tr>
<tr>
<td>5 1/2 - 7 3/8</td>
<td>3 1/2 REG</td>
<td>4 1/8</td>
<td>1,100</td>
<td>1,300</td>
</tr>
<tr>
<td>7 13/32 - 9 3/8</td>
<td>4 1/8 REG</td>
<td>4 1/4</td>
<td>1,000</td>
<td>1,200</td>
</tr>
<tr>
<td>9 13/32 - 14 1/2</td>
<td>5 1/4 REG</td>
<td>6</td>
<td>1,500</td>
<td>1,800</td>
</tr>
<tr>
<td>14 9/16 &amp; larger</td>
<td>7 1/2 REG</td>
<td>8</td>
<td>400</td>
<td>500</td>
</tr>
</tbody>
</table>

Rating for both inner and outer cutting structure is given in a scale of 1 to 8:
0 – no lost or worn cutters
1 – 1/8 of cutter's diamond table is worn
2 – 1/4 of cutter's diamond table is worn
3 – 1/2 of cutter's diamond table is worn
4 – 3/4 of cutter's diamond table is worn
5 – no effective diamond table left
6 – no effective diamond table left
7 – no effective diamond table left
8 – no effective diamond table left

The inner cutting structure consists of the inner 2/3 of the bit diameter whereas the outer consists of the final 1/3. A general rule of thumb is the inner number represents the cutters inside the nose and the outer represents those outside.

The gauge section of the dull grading system is represented by either IN or an integer representing 1/16” under gauge beginning at number 1. IN means that the bit is still at full gauge. A value of 1 equals 1/16” under gauge.
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A value of 3 equals 3/16”, etc...

In cases where there are multiple dull characteristics present on a bit, the “other” field can be used. After the primary dull characteristic has been determined, find the secondary condition and enter its code in the field. If there is no other dull condition, enter NO into the field.

When the primary dull characteristic has been determined, enter the main location of this characteristic. For example, if WT is the primary dull condition, enter WT into the field.

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A value of 3 equals 3/16”, etc...

8. Reason Bit Was Pulled:
   BHA – Change the bottom hole assembly
   DFM – Down hole motor failure
   DTF – Down hole tool failure
   DSF – Drill string failure
   DST – Drill stem test
   DP – Drill Plug
   CM – Condition Mud
   CP – Core Point
   FM – Formation change
   HP – Hole problems
   LIH – Left In Hole
   LOG – Run logs
   PP – Pump Pressure
   PR – Penetration Rate
   RG – Rig repair
   TD – Total/ casing Depth
   TW – Twist Off
   TQ – Torque
   WC – Weather Conditions
When Every Run Counts™

*Ulterra* is dedicated to maximizing the efficiency of oil and gas drilling operations through the use of steel and matrix PDC bits and application technologies. Throughout the world’s drilling basins we are building our reputation on performance. With over 80 locations worldwide, let *Ulterra* show you how we can improve your drilling efficiencies and lower your costs by contacting a representative near you or visit us at www.ulterra.com.