Over 50 years of experience has given rise to improved design of parts and tools, adapted to all kinds of terrain while maintaining quality standards in tune with international market demands.

DIAMANTINA CHRISTENSEN is a pioneer in the manufacture of diamond tools and reverse circulation products.

ANTOFAGASTA / CHILE PLANT
Manufacture and repair of hydraulic cylinders for earth-moving equipment, trucks and loaders by chrome & High velocity oxy-fuel (HVOF). Brake reparation for electromechanical shovels.
At Diamantina Christensen, product quality and R&D of new solutions are priorities. We manufacture tools at affordable prices, safeguarding the maximization of service life and performance.

Our highly qualified staff visit client jobsites frequently to assess the use and performance of our products. This service helps our users to improve handling of tools and becomes invaluable for our continuous progress.

All our manufacturing plants have ISO 9001 certification, cutting-edge equipment and are subject to exhaustive quality controls throughout their manufacturing stages.
CORE BITS
DIAMOND PRODUCTS

VERSATILITY AND DURABILITY

The UP series offers greater adaptation and resistance for a wide-ranging of ground.

<table>
<thead>
<tr>
<th>FORMATION</th>
<th>UP Series</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOFT TO MEDIUM FORMATION</td>
<td>2-4</td>
</tr>
<tr>
<td>MEDIUM TO HARD FORMATION</td>
<td>4-7</td>
</tr>
<tr>
<td>SLIGHTLY FRACTURED AND NONABRASIVE FORMATION</td>
<td>7-10</td>
</tr>
<tr>
<td>EXTREMELY HARD FORMATIONS</td>
<td>10-13</td>
</tr>
</tbody>
</table>

REINFORCED OUTER AND INNER DIAMETER
With sintered tungsten carbide inserts, PCD/TSP and natural diamonds.
The strategic location of inserts and diamonds prevents inner diameter losses and extend service life.

MORE DURABILITY AND FASTER, penetration due to the use of high quality coated diamonds.

Inquire our availability in:
- Crown height XL and XXL.
- Waterway configuration Standard, Conical and Turbo.

CORPORATE PRODUCTS
Diamantina Christensen.

MINING PRODUCTS
Diamantina Christensen.
## SELECTION TABLE

<table>
<thead>
<tr>
<th>ROCK FEATURES</th>
<th>EXAMPLES</th>
<th>UP SERIES 12 MM.</th>
<th>NG SERIES 13 MM.</th>
<th>NG SERIES 13 MM.</th>
</tr>
</thead>
<tbody>
<tr>
<td>FRACTURING</td>
<td>LIMESTONE, LIMOLITE, HALITE, SEDIMENTARY AND CONGLOMERATE ROCK</td>
<td><strong>UP</strong> 2-4</td>
<td><strong>NG</strong> 7</td>
<td><strong>NG</strong> 9</td>
</tr>
<tr>
<td>ABRASIVENESS</td>
<td>SANDSTONE, SCHIST, SERPENTINE, CLAY.</td>
<td><strong>UP</strong> 4-7</td>
<td><strong>NG</strong> 7</td>
<td><strong>NG</strong> 9</td>
</tr>
<tr>
<td>HARDNESS (MOHS)</td>
<td>SLATE, MARBLE, SHALE AND DOLOMITE.</td>
<td><strong>UP</strong> 7-10</td>
<td><strong>NG</strong> 9</td>
<td><strong>NG</strong> 11</td>
</tr>
<tr>
<td></td>
<td>BASALT, GABBRO, HEMATITE, MAGNETITE, OBSIDIAN, PERIDOTITE.</td>
<td><strong>UP</strong> 10-13</td>
<td><strong>NG</strong> 11</td>
<td><strong>NG</strong> 11</td>
</tr>
<tr>
<td></td>
<td>GABBRO, GNEISS, GRAITE, DIORITE.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>DIORITE, ANDESITE, RHYOLITE, GNEISS, PEGMATITE, FLINT.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PEGMATITE, TACONITE, QUARTZITE, CHALCEDONY, FLINT, BANDED IRON FORMATIONS, ITABRITE, JASPIRITE.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **HIGHLY FRACTURED**: 1
- **COMPACT**: 10
SYNTHETIC DIAMOND REAMER SHELL

Diamonds and Reinforcements
We offer reamer shells with high quality synthetic or natural diamonds, reinforced with rectangular inserts. These elements are distributed in the matrix to maximize the bit’s protection area, wear resistance, and increased useful life.

Matrix
Extensive field testing resulted in best trade-off between hardness and ductility. Hardness was increased to maximize wear resistance and maintain the required ductility required to withstand adverse conditions during drilling.

NEW
The enlarged water ways at the top of the reamer reduces wear and expedite detritus evacuation.

DOUBLE-RING REAMER SHELL

Benefit well’s rectitude

Innovation in reamer shell design optimizes fluid flow and minimize diamond’s wear.

Efficient design with wide and deep waterways for effective washing, increase service life.
QUALITY, DURABILITY AND INNOVATIVE DESIGN

HIGH TECH

Our impregnated shoes are developed for the first section of over-burden, clay, fractured rock or sand. Their design includes tungsten carbide inserts embedded in inner & outer diameters and inner & outer waterways.

Reinforcements in the steel body may be requested.

- Interior and exterior reinforcement allow preserving diameters in over-burden drilling operations.
- Internal and external waterways optimize cooling, increasing service life.
- New high-quality diamonds provide a highly durable product.
**MO THREAD GREATER PRODUCTIVITY AND ASSURANCE IN DEEP HOLES**

**MO THREAD**
Available in H, N and B diameters. Conical trapezoidal thread with 90° flank, 3 threads per inch. Joint load efficiency: 45% of the mid body under a given load.

**O THREAD**
Available in P, H, N, B and A diameters. Conical trapezoidal thread, 3 threads per inch. Joint load efficiency: 35% of the mid body under a given load.

**MO Thread Operation Range**
Up to 1200 m deep in HMO diameter and up to 2400 m deep in NMO diameter.

**O Thread Operation Range**
Up to 800 m deep in H diameter and up to 1500 m deep in N diameter.

**MAXIMUM DRILLING DEPTH**

<table>
<thead>
<tr>
<th>A</th>
<th>AO / 1000 m. (3200 ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>BO / 1500 m. (4900 ft)</td>
</tr>
<tr>
<td>N</td>
<td>NO / 1500 m. (4900 ft)</td>
</tr>
<tr>
<td>H</td>
<td>HO / 800 m. (2600 ft)</td>
</tr>
<tr>
<td>P</td>
<td>PO / 500 m. (1640 ft)</td>
</tr>
</tbody>
</table>

**MAXIMUM TIGHTENING TORQUE**

<table>
<thead>
<tr>
<th>A</th>
<th>AO / 350 lbf x ft - 474 (Nm.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>BO / 430 lbf x ft - 583 (Nm.)</td>
</tr>
<tr>
<td>N</td>
<td>NO / 580 lbf x ft - 786 (Nm.)</td>
</tr>
<tr>
<td>H</td>
<td>HO / 1050 lbf x ft - 1423 (Nm.)</td>
</tr>
<tr>
<td>P</td>
<td>PO / 3100 lbf x ft - 4203 (Nm.)</td>
</tr>
</tbody>
</table>
WT CASING THREAD
Conical trapezoidal thread with 90° flank, and deeper than “M” thread. Excellent performance in casing/rod pull up. Average strength.

- Strict raw material control at reception to assure the use of materials that conform to our specifications. These controls check mechanical properties and chemical composition of our standard.
- Metal microstructure control using metallographic analysis.
- NDT (non-destructive testing) applied to 100% of production to guarantee a crack and fissure-free product.
- Dimensional and geometrical inspection of threads with certified patterns.
SAFE AND PRODUCTIVE OPERATION

Design supported by good field results agrees a safe operational procedure and high productivity rates.

OPTIONAL PARTS

Our optional parts optimize drilling mud flows, decrease operational cost and help to extend the bit’s service life, especially in formations with fluid return problems.

- Chrome plated inner tubes.
- Exterior tubes (Full hole).
- Reinforced locking coupling.
Heat treated product. Optional inner chroming extends its useful life.

Stabilize the inner tube from the core barrel.

Used for triple tube system. Under adverse and highly fractured conditions.

Spring retainer.
STRAIGHT BROACHING
Designed for fractured to compact rock. Adapts to irregular core forms. Broaching provides a more elastic Core Lifter developed for various types of terrain.

HELICAL BROACHING
Designed for competent to slightly fractured ground. The angular broaching make an easier cut. It increases the internal area of contact with the core and prevents its sliding, thus improving core recovery.

CENTRAL WAIST
Designed for competent rock. Adapts to irregular core forms. Broaching provides a more elastic Core Lifter that allows its use in various types of terrain.

SLOTTED
Improved Slotted Core Lifter design for all terrain conditions. Larger core gripping area.

DIFFERENT SHAPES FOR DIVERSES GROUND

<table>
<thead>
<tr>
<th>TYPE</th>
<th>DIAMETER</th>
</tr>
</thead>
<tbody>
<tr>
<td>PO</td>
<td>3,345&quot;</td>
</tr>
<tr>
<td>PO3</td>
<td>3,270&quot;</td>
</tr>
<tr>
<td>HO</td>
<td>2,500&quot;</td>
</tr>
<tr>
<td>HO3</td>
<td>2,406&quot;</td>
</tr>
<tr>
<td>NO</td>
<td>1,875&quot;</td>
</tr>
<tr>
<td>NO3</td>
<td>1,775&quot;</td>
</tr>
<tr>
<td>BO</td>
<td>1,432&quot;</td>
</tr>
</tbody>
</table>
THRUST BEARING HOUSING

Protects thrust bearings from direct fluid contact, avoiding lubricant washing and early bearing wear.

GREAT PERFORMANCE AND DURABILITY

The Core Barrels design meet the most demanding drilling needs. They are manufactured with high quality materials.

TAPERED ROLLER BEARING

Better performance than ball bearings due to greater raceway contact.
WATER SWIVEL & HOISTING PLUG

EXPLORATION PRODUCTS

WATER SWIVEL
K 25,000 lbs / BW Connection.

WATER SWIVEL
Underground K-5000 / AW Connection.

WATER SWIVEL
K-5001 / AW Connection.

HOISTING PLUG
Capacity 35,000 lbs / NW connection.

HOISTING PLUG
Capacity 12,000 lbs / NW connection.
WATER SWIVEL REPAIR KIT
Wide range of kits for our water swivels. The Kit contains Packing, Packing cases, bearings, compression springs, flat washers, lock washers and o’rings.

INNER TUBEHEAD REPAIR KIT
Include high quality plastic and cast metal parts. The Kit contains Lacht, link, shut off valve, contact indicator, spring pin, ball, compression spring and retaining o-ring.

OVERSHOT REPAIR KIT
Include high quality metal cast and machined parts. The Kit contains a spring, pin, spring pin and lifting dog.
REVERSE CIRCULATION DRILLING ROD WITH INTERCHANGEABLE INNER TUBE

Type RC-FB 4½ x 6 mt.

- Outer tube made of high alloy steel heat treated throughout its length for greater wear resistance.

- Interchangeable inner tube made of high alloy steel to improve its wear resistance, and intermediate outriggers to prevent vibrations. (Optional Inner Tube in A-106 quality).

- Terminals made of high alloy steels with heat-treated ends.

- Total Weight 172 Kg.  
  Outer tube weight 125 Kg.  
  Inner tube weight 47 Kg.

New outer tube attachment design, including a radial and axial mounted ring which increases duration by over 100%.
ACCESSORIES

We manufacture different adapters and fittings used in reverse circulation drilling processes. Available for various types of rods, threads and machines existing in the market or can be adapted to your needs.

- Saver Sub
- Flow Subinverter
- Packer Sub
- Tricone Casing
- Central Tubes

TRICONE CASING

Threaded Coupling
2-7/8”
A.P.I. Regular

CASING GENERAL MEASUREMENTS
- Connection: Square thread

THP 5 ½” TRICONE CASING
- Diameter: 5 7/16” (138.1 mm)
- Length: 119 mm

SDK / AC 5 ½” TRICONE CASING
- Diameter: 5 7/16” (138.1 mm)
- Length: 130.2 mm

SDK 5 ¼” TRICONE CASING
- Diameter: 5 3/16” (131.7 mm)
- Length: 125 mm

TRICONE 2 ¼” CASING INTERCONNECTOR
- Int.Diam.: 2 1/8” (53.97 mm)
- Length: 80.9 mm
- O’Rings: 1410 ORI 0000006

CASING GENERAL MEASUREMENTS
- Connection: Whitworth Thread

TRICONE 5 ⅝” CASING SDK
- Diameter: 5 13/16” (147.6 mm)
- Length: 124 mm

TRICONE 5 ⅞” CASING SDK
- Diameter: 5 11/16” (144.4 mm)
- Length: 122 mm

THP 5 ⅞” TRICONE CASING
- Diameter: 5 9/16” (141.3 mm)
- Length: 114 mm

TRICONE 3 ½” BIT HOLDER
- Int.Diam.: 2 1/4” (57.15 mm)
- Length: 86.5 mm
- O’Rings: 1410 ORI 0000019
ADAPTER
Allows coupling of different sizes and brands.

FLOW INVERTERS
Causes a vacuum to prevent fluid return.

SAVER SUB
Wear adapter.

RELIEF VALVE
Allows one-way fluid flow.

PACKER
To diagnose blow back and check leak.
High hardness and tensile strength product designed to recover a string of lost rods.

Used to cut a string of rods or casing, when cannot be lifted. Available in connection to NO-Box and HO-Box rods.

Heat-treated high alloy steel.
ACCESSORIES & TOOLS

COMPLETE RANGE OF TOOLS AND ACCESSORIES FOR OPTIMIZING MINING PROCESSES

UNDERGROUND CLAMP
- Replacement clamp designed for multiple rod sizes.
- Include tungsten inserts for a safety grip.

LOWER HYDRAULIC PRESS
- Applicable in diamond equipment
- Adjustment does not require dismantling parts
- Supports and prevents rotation of rod string as required by the operation.
- Used for extraction, change of barrel components.
- Repositioning of rods, screwing and unscrewing.

MUD PUMP
- Powered with pistons and continuous operation.
- Self-cleaning system.
- Easy replacement and maintenance.
- Abrasion-resistant valves allow handling viscous additives.

SPARE PARTS
- Plunger, valve seat, press plunger, plunger holder (cup + nut) and ceramic cylinder.
ADJUSTABLE WRENCH
Available from 8" to 60" designed for long-lasting work.

Floating jaw for quick grip.
Special tooth geometry ensures an immediate grip.
Fast and easy adjustment nut allows one-handed operation.
One-piece body casting for very heavy work.

SPARE PARTS
Wide range of spare parts to increase service life.
Features:
- Upper and lower jaw
- Adjusting nut
- Spring (thread)

WRENCH PARMALEE TYPE
Circular wrench for handling thin wall tubes with full circle grip.

REVERSE CIRCULATION RH5RC HAMMER
- No valves and pneumatic percussion. Suitable for all types of rock formations.
- One-piece hammer piston makes it robust and reliable.
- One-piece sample tube, can be removed without hammer disassembly.
- Hardened critical parts to reduce wear and extend useful life.
Our goal is to keep this position working hand-in-hand with our customers to successfully overcome the difficulties that may arise in their drilling activities.

<table>
<thead>
<tr>
<th>PRODUCT NAME</th>
<th>FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>BARAFLOC®</td>
<td>Flocculent</td>
</tr>
<tr>
<td>BARAFOS®</td>
<td>Thinner and dispersant</td>
</tr>
<tr>
<td>BAROLIFT®</td>
<td>Pit cleaning / Suspension</td>
</tr>
<tr>
<td>CORE-LUBE</td>
<td>Rod lubricant for mine drilling</td>
</tr>
<tr>
<td>DEXTRID® LT</td>
<td>Leak Control Agent</td>
</tr>
<tr>
<td>Drilling Paper</td>
<td>Circulation loss material</td>
</tr>
<tr>
<td>EP MUDLUBE®</td>
<td>Extreme pressure lubricant</td>
</tr>
<tr>
<td>Flocele</td>
<td>Circulation loss material</td>
</tr>
<tr>
<td>PACMR-L</td>
<td>Leak control agent</td>
</tr>
<tr>
<td>PACMR-R</td>
<td>Leak control agent/ Viscosifier</td>
</tr>
<tr>
<td>Seadrill S-110</td>
<td>Defrother</td>
</tr>
<tr>
<td>Soda Ash</td>
<td>PH adjustment / Water softener</td>
</tr>
<tr>
<td>ZEOGEL®</td>
<td>Gelling agent / Viscosifier in salt water.</td>
</tr>
</tbody>
</table>

Our philosophy of combining quality products with best services at the pit site led us to become a world leader in the industry.
PRODUCT LINES

- Bentonite clay
- Attapulgite clay (for drilling in salt water)
- Dry and liquid polymers
- Additives for performance (thinners/dispersants, deflocculants)
- Waterproofing products
- Surfactants and foaming agents
- Injection of grout, well plugging and sealing - individual products and systems
- Defrother
- A SAC products for ease of use and minimizing the costs of products
- Other specialized products for equipment lubrication, cleaning and maintenance
- Diverse specialized and support products.

SUPPORT FOR DRILLING SYSTEMS

- Cable tool
- Rotary drilling, direct circulation
- Rotary drilling, reverse circulation
- Rotary drilling, with air-foam
- Rotary drilling, pneumatic hammer
- Bit
- Core extraction with diamond bit

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>FUNCTION</th>
<th>DIFFERENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>QUIK GEL-GOLD</td>
<td>High-performance bentonite</td>
<td>Increase performance to over 5%</td>
</tr>
<tr>
<td>QUIK TROL GOLD</td>
<td>Leakage control</td>
<td>Very dispersible</td>
</tr>
<tr>
<td>QUIK TROL GOLD IV</td>
<td>Low viscosity control leaks</td>
<td>Very dispersible</td>
</tr>
</tbody>
</table>
EXPLORATION DRILLING PRODUCTS

Lo Campino 432 / Quilicura / Santiago - Chile
Phone: +56 (2) 2620 7808

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Phone: +51(1) 326 0494

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