



 **US Synthetic**<sup>®</sup>

# Meet the Toughest

## Diamond Cutters You'll Ever Use

The oil exploration business demands speed, durability, and toughness. And there's no place where those three things matter more than where diamond meets rock at the bottom of a hole.

That's why US Synthetic has spent more than a decade perfecting polycrystalline diamond cutters (PDCs) that drill faster and last longer—especially in tough conditions that test the limits of the most durable drilling equipment.

Today, US Synthetic leads the industry in the development and production of innovative, top-quality PDC inserts that meet the highest standards and match the requirements of the most demanding oil exploration and development projects.

This absolute, no compromises commitment to superior quality and constant innovation—combined with a personal “do whatever it takes” approach to business—sets us apart from the crowd and makes US Synthetic your best choice for all kinds of diamond solutions.





## Driven by **Innovation**

The fast-paced, constantly evolving nature of today's oil exploration industry requires aggressive research and constant innovation. A commitment to innovation made US Synthetic a major force in the PDC industry more than a decade ago. We've led the industry in the development of new PDC technology ever since. And we're determined to expand our reputation for innovation as we move forward.

This commitment to innovation starts with some of the industry's most sophisticated and advanced research, development, and testing facilities—staffed by engineers and scientists with decades of collective experience.

But at US Synthetic, innovation doesn't stop at the doors of our labs and research facilities. Our engineers also work closely with customers in the field to observe performance, become more familiar with the challenges field engineers face every day, and develop new technologies that reflect real-world situations and circumstances.

This unique blend of theoretical and practical research means we're in the best position to both understand and solve your biggest exploration challenges.



## Dedicated to **Service**

US Synthetic takes customer service personally. We have never been—and will never become—an off-the-shelf, one-size-fits-all company. Our business revolves around close, personalized relationships with every customer, and we tailor every PDC solution to your unique needs. In fact, more than 95% of US Synthetic cutters are designed to meet unique requirements—and built to perform a specific job flawlessly.

This commitment to superior personalized service extends from our management team, through our engineering staff, and down to our front-line customer service representatives. Every time you call US Synthetic to order cutters or discuss a project, you'll speak with knowledgeable, friendly, and well-informed people who are willing to take extraordinary steps to meet your needs. This includes an absolute commitment to on-time delivery every time you place an order.

We understand that delays and broken promises can cost your business tens of thousands of dollars, and we'll do whatever it takes to make sure you can keep moving without interruption. We believe this no-holds-barred approach to customer service sets us apart from our competition, and we're convinced you'll notice the difference every time you call.



## Obsessed with **Quality**

We understand that quality saves you time and money—by allowing you to spend more time drilling and less time replacing damaged parts.

That's why you simply won't find higher quality PDCs anywhere in the industry—or uncover an organization that pays closer attention to the painstaking details required to manufacture consistently flawless cutters.

US Synthetic was the first diamond supplier to become ISO 9000 certified, and we were the first to qualify to ship PDCs directly to bit manufacturers without additional inspections upon arrival at their facilities. That means you can rest easy knowing we have the processes in place to ensure consistent, long-term quality.

We also subject our cutters to rigorous testing that includes ultrasonic examination and electron microscope analysis in our labs; impact, abrasion, and heavy wear tests in our testing facilities; and extensive downhole testing in the field.

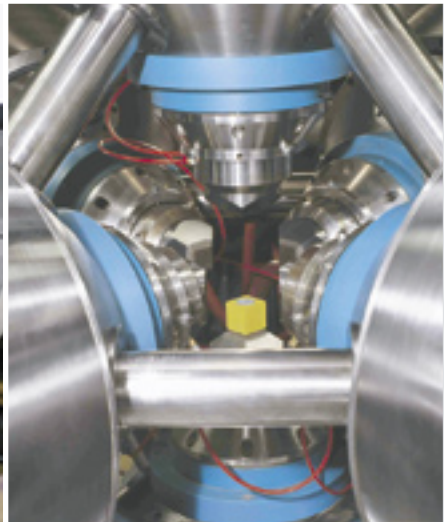
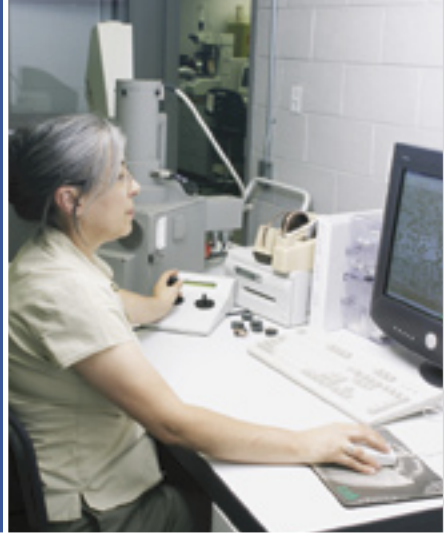
As a result, US Synthetic PDCs have gained a reputation, built and maintained over many years, for superior quality, durability, and performance.



# Discover the US Synthetic Difference

## CUSTOMER SERVICE

When you place an order with US Synthetic, you always speak with knowledgeable, experienced people who work with you to understand your needs and make sure you get the right parts for the job—every time.



## QUALITY

US Synthetic is absolutely committed to making sure you receive the parts you need when you need them. Most inserts ship the same day you order them. For special orders and unusual circumstances, we'll take extraordinary measures to make sure you receive exactly what you need in the shortest possible timeframe.



## CUSTOMIZATION

We understand that every project is different. That's why US Synthetic engineers work directly with you to define the specific requirements of your drilling project—and design the ideal PDC solution for your needs.



## RESEARCH AND DEVELOPMENT

At US Synthetic, experienced research and development engineers constantly test and analyze current products, work closely with customers in the field, and develop new innovations for strengthening and improving our PDC products.

## DIAMOND SINTERING

State-of-the-art manufacturing processes, including proprietary cubic presses that apply nearly 1 million pounds of uniform pressure and generate temperatures of 1,400° Celsius, are used to synthesize the strongest, most durable PDCs in the world.

## FINISHING

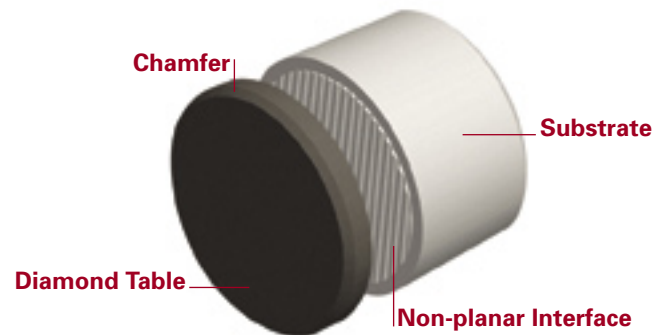
Meticulous finishing processes refine PDCs to your exact specifications—and make sure they're perfectly suited for your unique drilling application. This includes designing and manufacturing cutters with different diameters, lengths, shapes, diamond thickness, and chamfers.

## LAB TESTING

Extensive quality testing ensures every US Synthetic PDC meets the highest quality standards. This includes impact resistance testing, heavy wear testing, ultrasonic and electron microscope scans, and other rigorous quality tests.



## Why We're **Superior**



**Substrate** This carbide shaft provides a strong, durable base for the diamond cutting surface. We manufacture substrates in many different shapes and sizes to meet the specific needs of any drilling application.

**Diamond Table** Our diamond cutting surfaces are the hardest and most durable in the industry. Diamond thickness varies depending on the requirements of the project.

**Chamfer** These customized angled cuts on the diamond table improve performance and durability in different drilling conditions.

**Non-planar Interface** These patterns on the surface where carbide meets diamond create a stronger, more durable bond between the two materials.



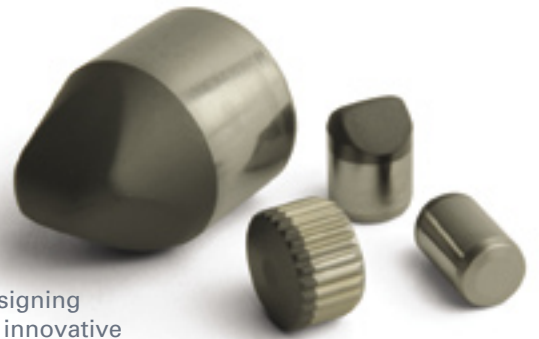
## Diamond Fixed Cutter Bit Inserts

US Synthetic first began manufacturing diamond cutters for fixed cutter drill bits in 1983. Since then, we have developed this technology aggressively, and a number of significant US Synthetic innovations have made it possible to use fixed cutter bits in harder, more demanding formations. Thanks to these continuous advancements in design, materials, processing, manufacturing, and testing, US Synthetic leads the industry in fixed cutter diamond products—with some of the fastest, longest lasting, and best-made cutters in the world.

Nearly all of our fixed cutter inserts are designed and manufactured to meet specific project requirements. Inserts range in size from 5 mm to 25 mm in diameter and 3 mm to 25 mm in length. They can be manufactured in many different shapes—from basic cylindrical cutters to inserts with customized angles, diamond thickness, chamfers, and sizes. When we design and manufacture your diamond cutter insert, we'll work closely with you to find the optimum combination of abrasion and impact resistance for your specific drilling application. This customized approach, combined with our meticulous attention to quality, make US Synthetic PDCs the ideal solution for almost any drilling application.

## Diamond Rock Bit Inserts

Using diamond inserts in traditional rock bits can boost performance, increase durability, and dramatically improve drilling economics. Diamond-enhanced rock bits also make it possible to drill formations that are too difficult for traditional tungsten carbide inserts. Since 1994, US Synthetic has been designing and manufacturing some of the most technically advanced and innovative diamond rock bit products in the industry.



This includes using diamond inserts in many different strategic bit locations, from inner row use to gauge protection on the cones or bit body. We can design and manufacture bit inserts that meet virtually any size or shape requirement, including ovoids, conicals, and chisels, and we're constantly searching for new shapes that make more effective use of diamond. Our rock bit inserts range in size from 5mm to 25 mm in diameter and 3mm to 35mm in length. And of course, we're always ready to design and manufacture rock bit inserts to match your unique specifications, including customized diameters, lengths, shapes, and chamfers.

## The Unique Properties of Diamonds

- Hardest known material
- Highest thermal conductivity
- Highest wear resistance
- Excellent electrical insulator
- Extremely low thermal expansion
- Low coefficient of friction
- High sonic velocity
- Optically transparent
- Wide band-gap semiconductor
- Chemically inert
- Biologically compatible

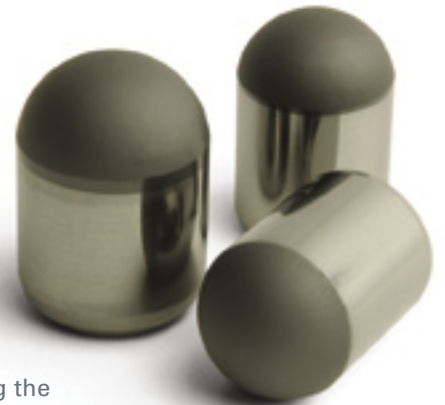
## Diamond Downhole Bearings

Drill bits aren't the only place where durability and reliability are essential. That's why US Synthetic also provides diamond thrust bearings for use in downhole motors, turbines, and drilling tools. Since we began offering diamond-enhanced bearing assemblies in 2000, these innovative products have already been approved for a number of mission-critical downhole components. Unlike other manufacturers, we never use diamond bearing pads that have already seen service in drill bits—all of our bearing inserts use top-quality new diamond inserts. As the use of diamond inserts in downhole equipment evolves and expands, US Synthetic will continue to innovate, explore new uses for diamond inserts, and develop new products for extending the life of downhole drilling components.



## Diamond Hammer Bit Inserts

Traditionally, diamond hammer bits have not been widely used for oil exploration, but they are very effective in certain hard rock situations, and they are increasing in popularity. Since 1995, US Synthetic has been enhancing hammer bits with diamond inserts that make them more durable, effective, and capable of withstanding the punishment of hammer drilling in the most demanding hard rock conditions. Our hammer bit inserts range in size from 13mm to 25mm in diameter and 19mm to 35mm in length, and we can design and manufacture hammer bit products with different diameters, lengths, shapes, and chamfers to meet your unique specifications.



## Help Us Explore the Possibilities

US Synthetic uses the unique properties of diamond to solve important problems in the oil exploration industry today, but we also realize that we've only begun to explore the possibilities. We're constantly searching for innovative new applications for diamond, and we invite you to contact us with your insights, ideas, and suggestions.

US Synthetic produces polycrystalline diamond cutters (PDCs) for oil and gas exploration. Thanks to constant innovation, proven quality, and superior customer service, more of the world's energy suppliers rely on US Synthetic than any other PDC manufacturer.

For more information about how US Synthetic can enhance your products or operations, please call 1-801-235-9001 or visit [www.ussynthetic.com](http://www.ussynthetic.com).



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