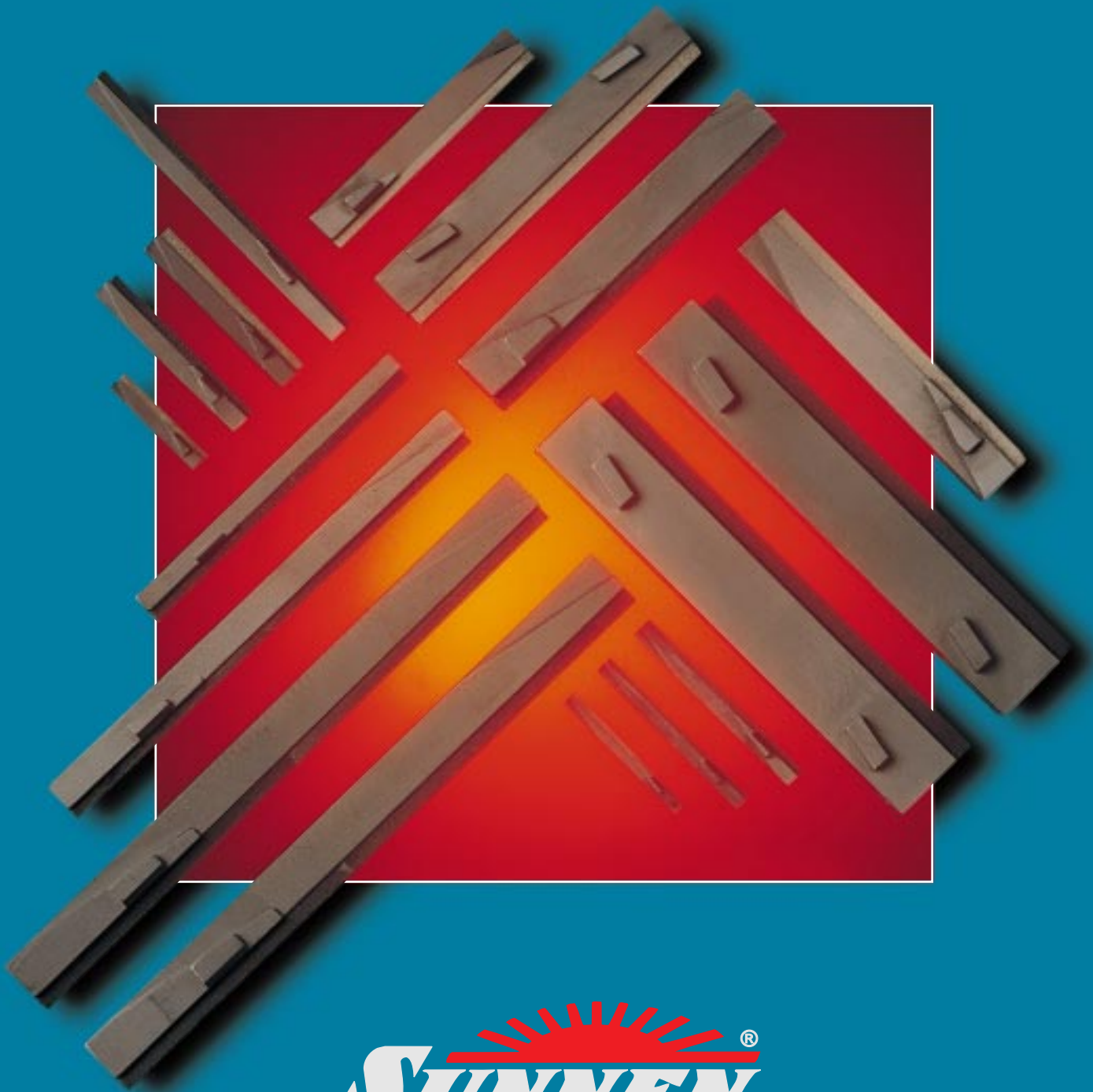


SUNNEN SUPERABRASIVE HONING STONES



**SUNNEN**[®]

Where Precision Starts



When Performance Is Key ... Count On Sunnen Superabrasives.

Why use Sunnen Superabrasives? In a word, **performance**. Sunnen Superabrasives are a new generation of metal-cutting abrasives that outperform ordinary stones in cutting action, finishing speed and wear resistance. The standard of excellence set by Sunnen Superabrasives combines superior performance with increased efficiencies. And even more importantly, lower production costs.

With these new, long-lasting abrasives, your operation will achieve greater economies and higher quality levels of bore sizing and precision finishing on every job that comes down the line. Even the most difficult bore sizing and finishing problems can be handled easily and smoothly when Sunnen Superabrasives are on the job.



Zoom In On Sunnen Superabrasives.

Diamond vs. Borazon®? Usage depends on your application. Sunnen Diamond Superabrasives have no equal. Sunnen “diamonds”, both natural and man-made, are brilliant performers, essential in the honing of cast iron, glass, quartz and the many varieties of tungsten carbide and ceramic material.

Man-made cubic boron nitride superabrasives (known as Borazon® or CBN), are not quite as hard as diamonds, but they’re significantly harder than conventional abrasives. They are produced under extreme heat and pressure, much like synthetic diamonds. They resist chemical attrition in honing ferrous materials, yielding superior cutting action and increased tool life, making them the choice for many problematic workpieces.

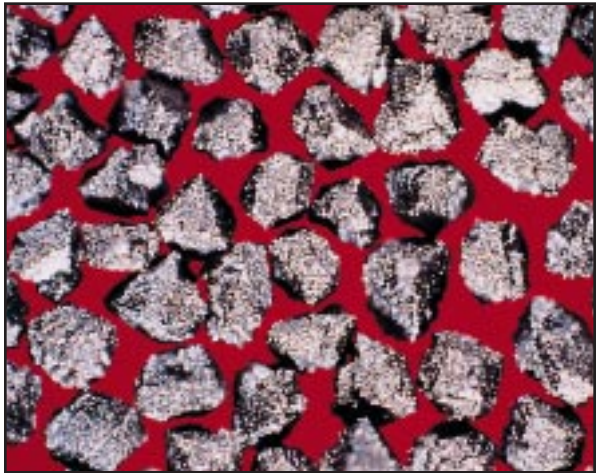
Sunnen offers three types of Superabrasive bonds: **vitrified, metal and resin**. In addition, Sunnen offers a variety of metal bond formulations to ensure proper stone characteristics for each application and to optimize production efficiencies. The many combinations of hardness and bond strength enable you to tackle virtually any honing or finishing application with extremely high levels of precision and accuracy ... from the smallest to the largest dimensions. Plus, Sunnen Superabrasives perform equally well on non-Sunnen equipment.

Sunnen also offers the **industry’s largest variety** of grit sizes and stone configurations ... all in stock and ready for immediate shipment. And here’s a little something extra you’ll appreciate. Sunnen abrasives are already radiused right out of the box, not rectangular like the others. You can start making parts immediately ... your first piece is as precise as the last. Another time = money saver from Sunnen.

Borazon® is a registered trademark of General Electric Co.



Sunnen diamond abrasives (as shown in magnified photo above) are essential in the honing of glass, quartz, tungsten carbide and ceramics. Photo courtesy of Diamond Abrasive Corporation.



Sunnen Borazon® abrasives (as shown in magnified photo above) resist chemical attrition in honing ferrous materials, yielding superior cutting action and increased tool life. Photo courtesy of GE Superabrasives.



Sunnen provides the industry’s largest variety of grit sizes and stone configurations — all in stock and ready for immediate shipment.

Sunnen Superabrasives Can Do The Impossible!



Sunnen Superabrasives are the most advanced metal-cutting abrasives available in the world today. Their outstanding performance ensures the honing of even the most difficult materials, that until now, have resisted cutting by any method. You'll find they significantly improve cutting action, overall production rates and abrasive life over any other abrasive known.

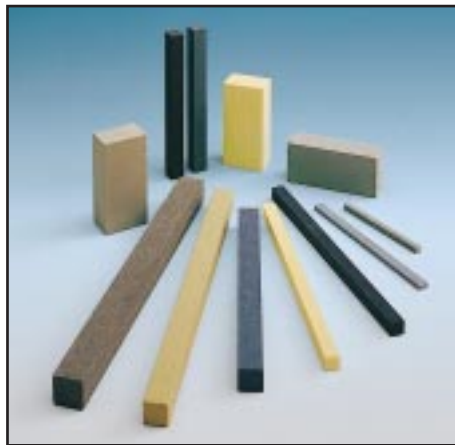
Most of the popular tool steels can be honed as easily as ordinary hardened steel. Even difficult exotics like stellite, inconel, ferrotic, nickasil, alnico and a wide range of ceramic materials can be quickly honed with predictable results. **What you once considered "impossible" materials are no longer impossible with Sunnen Superabrasives.**

Sunnen Superabrasives are setting new standards and production records every day with a lot of the common materials now in use. Case hardened steel, 4140, 6150, 52100 and many stainless steels are just a few of the materials now being honed two or three times faster than ever before.



The World Class Leader: Sunnen Is Honing.

As the world's foremost authority on honing, Sunnen has incorporated over 70 years of expertise, experience and advanced technology into our new Superabrasives to complement an already broad range of honing abrasives. Not only do we offer the industry's largest variety of abrasive materials, bond types, grain sizes and stone configurations, we also have the



Sunnen offers the industry's largest selection of abrasive materials, bond types, grain sizes and stone configurations

largest staff of technical experts as well. With this depth of experience and technical support, whatever your honing problem, we've probably seen it before and already have the solution.

Sunnen's extensive inventory guarantees 90% of orders are shipped the very same day. Even Superabrasives not typically stocked get 48-hour turnaround time. And consistency rules ... stone to stone, shipment to shipment, time after time. It's one-stop shopping taken one step further: One purchase order for all your honing needs. Nobody makes it faster or easier to get exactly what you want when you want it.

Parts made of difficult exotics like stellite, inconel, nickasil, ferrotic, alnico and a wide range of ceramic materials can easily be honed with Sunnen Superabrasives.



Expensive? Not At All. Total Value Is More Like It.

If you think Sunnen Superabrasives cost more, think again. Think about what you're really paying for. Quality. Performance. Long life. Reliability. Consistency. Service. Support. Your honing equipment is only as good as your abrasives. Even the best honing machine in the world cannot produce low cost, top quality products without top quality abrasives.

The Bottom Line: Cheap abrasives from "copy-cat" companies just don't cut it because they don't make your total bore sizing operation cost any less in the long run. Look at the total picture of total cost to hone the

bore. You might pay a bit more for Sunnen Superabrasives upfront, but you'll produce a finished product for less because of better, longer-lasting performance from your abrasives.

With Sunnen, you not only get what you pay for, you'll save money on the total operation. Because the savings in labor costs generated by the use of correctly graded Sunnen Superabrasives are far greater than the few cents saved by buying the cheaper alternatives.

Remember: With Sunnen Superabrasives, you operate much more cost-effectively. You'll find it really does cost less to use the best. NOTE: Sunnen also offers blanket-order pricing and quantity discounts for high volume accounts. Ask your Field Engineer for details.



The Sunnen System: All Wrapped Up.



When you get the Sunnen System, you get everything all wrapped up in one integrated package of quality and consistency: Sunnen machines, gages, tooling, abrasives, honing fluids and technical assistance, designed to work in perfect combination for increased production efficiencies and long service life.

Our factory-trained Field Engineers are your personal consultants, backed by our factory support team.

You're always only minutes away from service and solutions.

Technical Support

The Sunnen Technical Center and Metrology Lab is equipped with the latest Sunnen equipment



and bore measuring instruments, including an advanced Talyrond bore geometry analysis system.

Our technicians will hone your sample workpieces and determine which combination of machine, abrasives, honing oils and honing techniques will produce finished parts at top efficiency.

Superabrasives And Sunnen's Retractable KR Mandrels Make Honing Easy.

Sunnen Superabrasives and the KR series of honing mandrels with retractable stone assemblies ensure greater efficiency in virtually all bore sizing and finishing operations.

Here's how the retractability feature operates: As the wedge retracts into the mandrel body wedge slot, the superabrasive retracts from its cutting position and returns to its original location prior to the beginning of the honing cycle. Advantages include:

- 1) Superabrasives are retracted from the cutting position for much easier loading and unloading of parts which increases production and lowers manufacturing costs.
- 2) Stronger mandrels allow stock to be removed at a faster rate, increasing production speeds and lowering cost per part honed.
- 3) Units come with extended wear surfaces (shoes) standard, in either hard steel or plated diamond. This ensures longer service life and significantly reduces centerline changes from cycle to cycle. Also, downtime is lowered which increases productivity and reduces unit costs.
- 4) Mandrel units have hardened wedges to prolong wedge life. This assures high performance honing from start to finish for better cost efficiency.
- 5) The stone retraction feature is ideal for use in automated applications for facilitated loading and unloading — reducing cycle times and lowering costs.
- 6) Retraction marks and scratches that can occur when taking the part off the mandrel after honing are greatly minimized. This ensures a consistently higher-quality end product.

Sunnen Superabrasives and Retractable KR Mandrels are an unbeatable combination. Sunnen offers its retractable mandrel and superabrasive assembly at the same price as the company's non-retractable mandrel units.

Sunnen retractable KR mandrels are available for diameter ranges from 4,70 - 18,90 mm (.185 - .744 inch). Longer stones are available for the same diameter range and are designated as the BLR series.



Sunnen Superabrasives Are Perfect For Any Size Operation.

Small Machine Shops

Sunnen Superabrasives, in conjunction with Sunnen's Retractable KR Mandrels, efficiently manage small runs, exotic materials and the rigors of constant setups. Improved cutting action, superior quality and longer life make Sunnen Superabrasives the cost-efficient alternative, even for the small shop.



The efficiency of the Sunnen MBC-1805, typically used in small shops, can be significantly upgraded with the use of Sunnen Superabrasives and Retractable KR Mandrels.

Medium-Sized Production Operations

For long or short honing runs, Sunnen is the solution. Sunnen Superabrasives and Retractable KR Mandrels provide easy changeover between jobs and provide the quality and service life needed for highly efficient operations.



Total cost efficiency of the Sunnen EC-3500 Honing Machine can be greatly increased when outfitted with Sunnen Superabrasives and Retractable KR Mandrels.

Large, High-Production Facilities

Sunnen Superabrasives are the perfect tools for dedicated, high-production equipment that require long-lasting abrasives. These stones are radiused right out of the box, require fewer changeovers, improve cutting action and last longer. And combined with Retractable KR Mandrels and superabrasive inserted guide shoes, these abrasives increase the efficiency and profits of any operation.



Sunnen's Automated ECA-3500 Honing Machine, equipped with Sunnen Superabrasives and Retractable KR Mandrels, provides a more precisely finished bore at a significantly lower cost.

Case Histories: Proof Positive Of Sunnen Performance

APPLICATION — WHEEL CYLINDER



Material: Cast Iron
Hardness: Soft
Diameter: 22,225 - 22,301mm
(.8750 - .8780 inch)
Length: 76,2mm (3 inch)
Previous Op: Bored
Stock Removal: 0,051mm (.002 inch)
Honing Time: 30 seconds
Spindle Speed: 900 RPM
Stroke Rate: 160 SPM
Honing Pressure: 12
Stone Grade: K20-NM05 Metal
Bond Borazon

APPLICATION — 340ML PUNCH



Material: C12 Carbide
Hardness: 65-70 Rc
Diameter: 46,429 - 46,434mm
(1.8279 - 1.8281 inch)
Length: 184,15mm (7.25 inch)
Previous Op: Sintered
Stock Removal: 1,016/ 0,025mm
(.040/.001 inch)
Honing Time: 45 min. roughing/30min.
finishing
Spindle Speed: 310 RPM
Stroke Rate: 80 SPM
Honing Pressure: 1
Stone Grade: P28-XH99-51(Metal Bond
Diamond) /P28-DV87
(Vitrified Diamond)

APPLICATION — GEAR



Material: SAE 8620H
Hardness: 58-62 Rc
Diameter: 55,008-55,026mm
(2.1657 - 2.1664 inch)
Length: 33,76mm (1.3291 inch)
Previous Op.: Heat Treat
Stock Removal: 0,127mm (.005 inch)
Honing Time: 40 seconds
Spindle Speed: 400 RPM
Stroke Rate: 200 SPM
Honing Pressure: 8 rough/3 finish
Stone Grade: R28-NM65 Metal
Bond Borazon

APPLICATION — COUPLER



Material: Anodized Aluminum
Hardness: Soft
Diameter: 9,525mm (.375 inch)
Length: 25,4mm (1.0 inch)
Previous Op: Anodize
Stock Removal: 0,012mm (.0005 inch)
Honing Time: 10 seconds
Spindle Speed: 3000 RPM
Stroke Rate: 250 SPM
Honing Pressure: 1.1
Stone Grade: KR12-DM005 Metal
Bond Diamond

APPLICATION — DRILL BUSHING



Material: 52100
Hardness: 62 - 64 Rc
Diameter: 9,525 - 9,601mm
(.375 - .378 inch)
Length: 50,8mm (2.00 inch)
Previous Op: Hardened
Stock Removal: 0,076mm (.003 inch)
Honing Time: 20 seconds
Spindle Speed: 2,000 RPM
Stroke Rate: 200 SPM
Honing Pressure: 2.0
Stone Grade: K12-NM85 Metal
Bond Borazon

APPLICATION — BLOCK



Material: 12L14 Steel
Hardness: Soft
Diameter: 28,004 - 28,014mm
(1.1025 - 1.1029 inch)
Length: 68,58mm (2.700 inch)
Previous Op: Bored
Stock Removal: 0,064mm (.0025 inch)
Honing Time: 14 seconds
Spindle Speed: 1000 RPM
Stroke Rate: 110 SPM
Honing Pressure: 5.5
Stone Grade: R28-NM05 Metal
Bond Borazon

NOTE: Sunnen reserves the right to change or revise specifications and product design in connection with any feature of our products contained herein. Such changes do not entitle the buyer to corresponding changes, improvements, additions, or replacements for equipment, supplies or accessories previously sold. Information contained herein is considered to be accurate based on available information at the time of printing. Should any discrepancy of information arise, Sunnen recommends that user verify the discrepancy with Sunnen before proceeding in any bore sizing and finishing operation.



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