

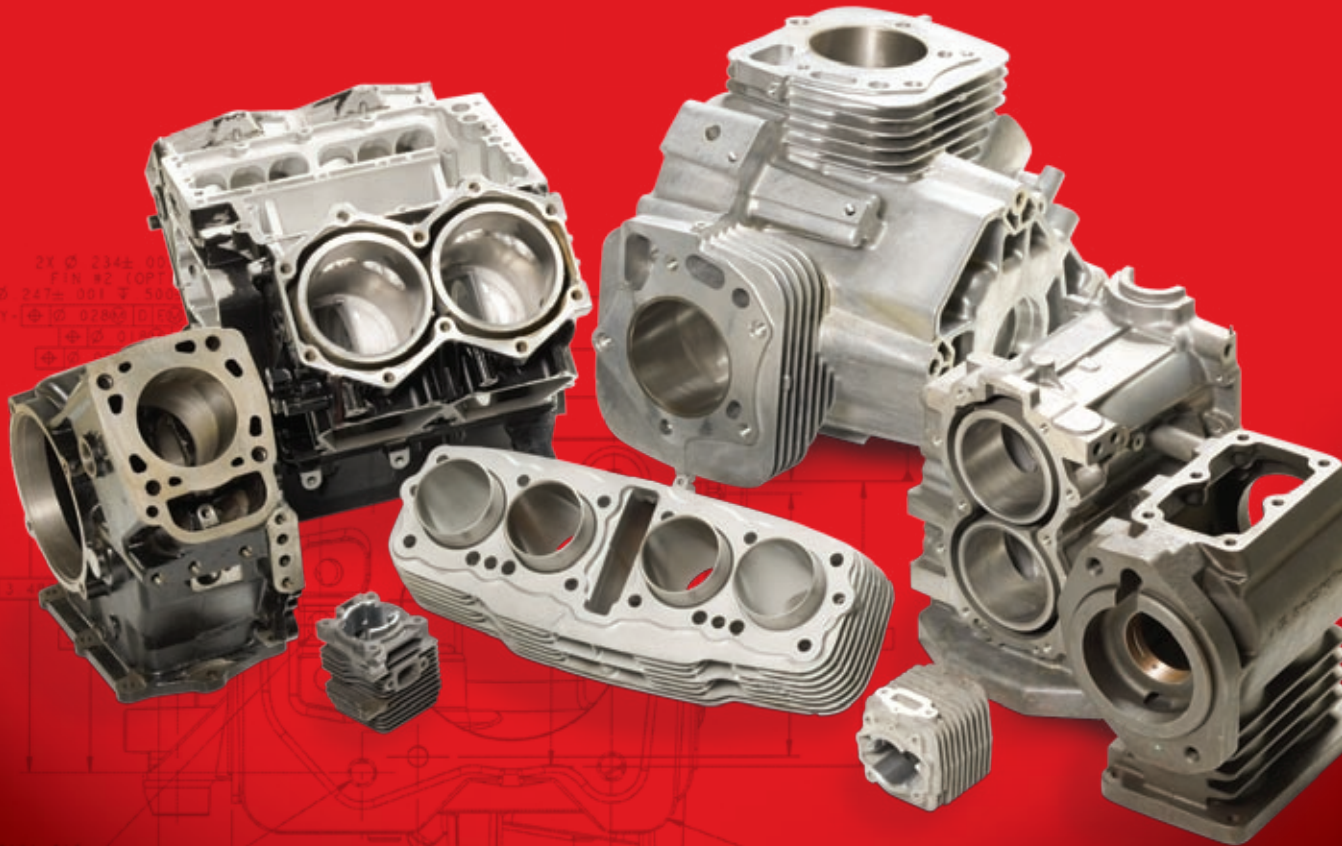


ABOVE AND BEYOND HONING



SMALL ENGINE

PRECISION BORE MACHINING SYSTEMS & SOLUTIONS



WHEN IT COMES TO HONING SMALL ENGINES, SUNNEN DELIVERS.

MORE MACHINES | MORE TOOLING | MORE ABRASIVES | MORE HONING FLUIDS | MORE GAGING | MORE FIXTURING | MORE AUTOMATION | MORE PRECISION | MORE CHOICES



With over 80 years of technological leadership, Sunnen has *the* solution for the precision honing of small engines. Our advanced, precision bore machining technology:

- Delivers improved bore accuracy for reduced emissions, reduced blow-by, higher power and lower oil consumption
- Reduces the clearance between the bore and the piston, increasing engine efficiency
- Creates surface finishes that provide better oil retention for longer engine life
- Provides improved process control and greater accuracy for reduced customer warranty claims

We can provide a system for virtually any small engine application, including:

- A wide range of materials and surface finishes
- Bore diameters from 1,5 mm – 165 mm (.118 inch – 6.5 inch)*
- Ported bores or simple bores
- Open or blind bores

Sunnen produces the industry's largest selection of honing machines – horizontal or vertical, single or multi-spindle, automated or manual, standard or customized – and our systems are designed with a focus on reliability, flexibility and ease of use.

* OTHER SIZES AVAILABLE UPON REVIEW.

SUNNEN PROVIDES GLOBAL SUPPORT

Sunnen's worldwide sales and service team provides comprehensive support for the installation and operation of every system we make. To find the Sunnen representative nearest you, visit our website: www.sunnen.com

SUNNEN





SV-500
VERTICAL HONING MACHINE

The SV-500 features the latest in honing technology. Using a linear feed system that allows the most precise and fastest feed control on the market, this system delivers mid- to high-volume manufacturers the lowest costs per honed part.

The all-new, patent pending stroking system produces a true vertical stroke that can dwell in any part of the bore – selectively removing stock – delivering a true constant crosshatch pattern throughout the entire length of the bore. And the Auto-Dwell feature corrects bore straightness automatically – great for blind bores.

A 3-axis hand wheel allows fine-tuning of the vertical stroke, honing tool position and column position for ease of set-up.

Built on a proven, flexible platform, this versatile system can be automated or otherwise customized to satisfy most any application requirements.

BORE DIAMETER RANGES (I.D.):
19 mm – 300 mm
(.75 inch – 12 inch)



SV-310
VERTICAL HONING MACHINE

This versatile system combines power, precision, durability, and technology to make vertical honing more economical and productive than ever before.

The SV-310 incorporates a patent-pending stroking system that produces a true vertical stroke and can dwell in any part of the hole, end-to-end, producing the straightest, roundest bore possible with a consistent crosshatch pattern throughout its entire length.

And for ease of setup, the SV-310 features a three-axis hand wheel for fine-tuning the vertical stroke, honing tool position, and column position. Multiple positions can be programmed for in-line bore honing. And, because it's built on a proven, modular platform, this system can be automated or otherwise customized to meet your exact requirements.

BORE DIAMETER RANGES (I.D.):
19 mm – 200 mm
(.75 inch – 8 inch)*



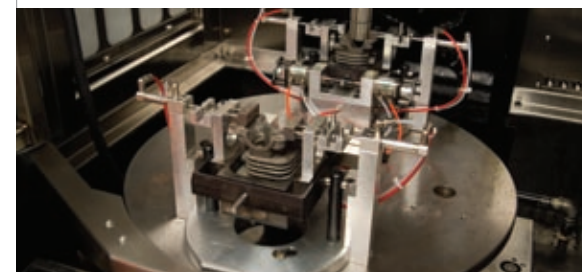
SV-1000 SERIES
VERTICAL HONING MACHINES

The SV-1000 Series is capable of holding the industry's tightest production environment tolerances – as fine as 0,00025 mm (0.000010 inch) – tolerances far superior to I.D. grinding.

Built on a proven, modular platform, the SV-1000 Series can be easily customized and automated to suit your exact specifications – whatever your needs demand, from multiple spindles to air gaging. Plus, this flexible system supports both single-pass and conventional reciprocating honing. Brushing stations can also be added.

Perfect for mid- to high-production manufacturers, the SV-1000 Series delivers the lowest cost per honed part with the tight bore tolerances you expect from Sunnen.

BORE DIAMETER RANGE (I.D.):
3 mm – 65 mm
(.118 inch – 2.56 inch)*



CUSTOM, HIGH-PRODUCTION
VERTICAL HONING SYSTEMS

Since 1924, Sunnen has defined the state of the art in the industry, and our current generation of high precision honing systems represents the very finest solutions available anywhere in the world. Sunnen systems are reliable, durable, and flexible and are designed to deliver the precision our customers have grown to expect.

From design to delivery, you have the Sunnen commitment to service and quality. Our technical experts will work with you to create a complete solution to fit your exact requirements, including the machine model, number of spindles, style of tooling, fixture design, abrasives selection, automation and gaging packages, and any other platform customization you may require.

After your system is built, we'll set up a live run-off demonstration at our facility. Once it meets all specifications, we'll commission your system and train your staff.

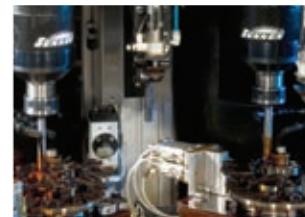


* OTHER SIZES AVAILABLE UPON REVIEW.



MAKE YOUR SUNNEN SMALL ENGINE SOLUTION WORK EVEN HARDER.

Our automation and other customization options are designed to increase the operational efficiency of your precision honing system while significantly reducing labor costs. From integrated air gaging to robotic materials handling, Sunnen solutions can be customized to satisfy the requirements of even the most specialized applications.



AT THE BEGINNING, MIDDLE, OR END OF THE HONING PROCESS, SUNNEN'S INTEGRATED AIR GAGING SYSTEMS ENSURE PRECISE BORE SIZE AND STRAIGHTNESS, PART AFTER PART.



MULTI-AXIS SERVO ROBOT SHOWN INTEGRATED INTO A SUNNEN MODULAR HONING SYSTEM.



"BECAUSE OF THEIR VERSATILE DESIGN, WE CAN CUSTOMIZE AND AUTOMATE MANY OF OUR SYSTEMS TO MEET YOUR SPECIALIZED SMALL ENGINE HONING REQUIREMENTS. JUST CONTACT YOUR SUNNEN REPRESENTATIVE FOR A FREE NEEDS ANALYSIS TO GET THE DESIGN PROCESS STARTED."



TOOLING

Sunnen offers an extensive line of tooling that delivers precise, accurate and consistent bore sizing of small engine parts. Tooling choices include diamond or CBN multi-stone tools and vitrified abrasive tools.



GHSS SINGLE-STAGE MULTI-STONE TOOLS

These tools use precision graded Sunnen metal bond CBN and diamond abrasives to provide fast cycle times, consistent geometry and surface finish accuracy.

BORE DIAMETER RANGE:

37,59 mm - 140,71 mm
(1.480 inch - 5.54 inch)

GHTS TWO-STAGE MULTI-STONE TOOLS

These two-stage tools perform both rough and finish honing operations within the same honing tool, without changing stones, to reduce overall bore sizing costs.

BORE DIAMETER RANGE:

62 mm - 120,14 mm
(2.44 inch - 5.44 inch)

PH PRECISION MULTI-STONE HONING TOOLS

This tool optimizes bore geometry and efficiency in mid- and high-volume production applications. Available in single-stage and two-stage configurations for improved process efficiency, and with integral air-gaging or plug sizing for in-process measuring.

CUSTOM-DESIGNED FOR
YOUR SPECIFIC APPLICATION

TC HIGH PRECISION MANDRELS

Designed for two cycle engines or other interrupted bores. These four-segment mandrels have six to eight stones per segment, precisely arranged to ensure accurate bore geometry and no washout on the edges.

CUSTOM-DESIGNED FOR
YOUR SPECIFIC APPLICATION

MMT MULTI-STONE MANDRELS

These mandrels offer faster cycle times, superior accuracy, longer time between stone changeovers, and maintain superior bore geometry.

CUSTOM-DESIGNED FOR
YOUR SPECIFIC APPLICATION

ABRASIVE SELECTION: METAL BOND CBN OR DIAMOND ABRASIVES

SRT MULTI-STONE TOOLS

These multi-stone honing tools feature metal bond CBN or diamond abrasives. Can be used on many bore finishing applications because of their dependability for both production and high precision tolerances.

BORE DIAMETER RANGE:

35 mm - 102 mm
(1.38 inch - 4.02 inch)

SUNNEN-MADE ABRASIVES & LUBRICANTS

From aluminum oxide to silicon carbide to diamond and CBN, Sunnen offers the industry's largest variety of mounted or un-mounted stick abrasives, bond types, grain sizes and stone configurations.

Before any stone is shipped, it is graded and qualified, maintaining the most exacting quality control standards in the industry to assure you of the most precise honing performance available.

Sunnen offers the right honing oil or waterbase coolant for virtually any honing application. The use of Sunnen's premium line of lubricants will help produce the lowest overall honing cost per part.



A LEGACY OF EXCELLENCE SINCE 1924.

WORLDWIDE

Our global manufacturing, distribution, and sales and service network allows us to deliver quality Sunnen solutions worldwide.

And our state-of-the-art Technical Services Centers allow our technical experts to develop innovative solutions to customer application challenges. The Centers also provide answers for customer questions and training for Sunnen representatives around the world.

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