



**YOUR PARTNER IN
PRECISION BORE SIZING**





Honing solutions worldwide

Sunnen global network Close to your company and your production

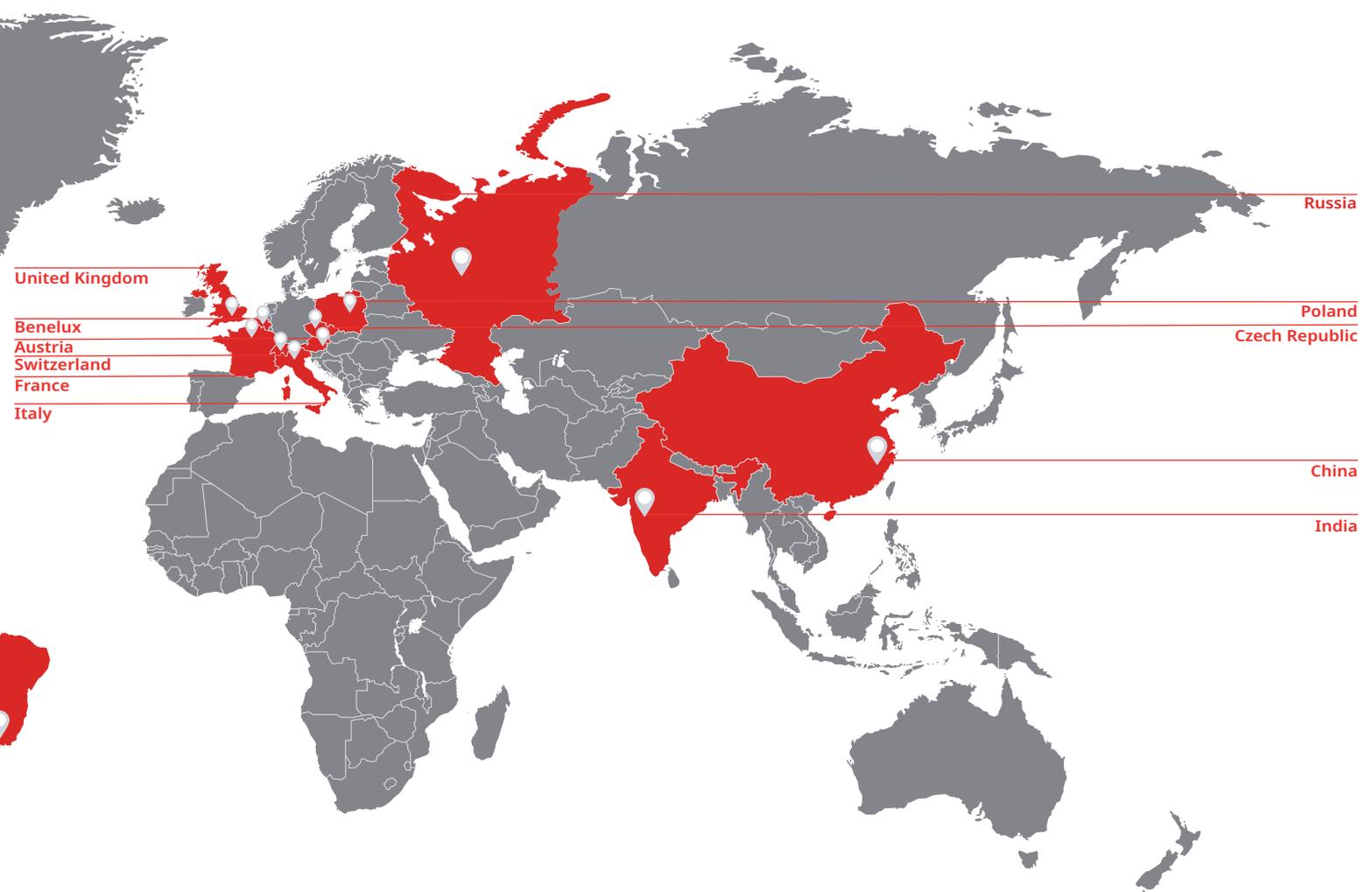
Sunnen is the leader in precision bore sizing systems worldwide. When you choose the “Sunnen Solution”, you get the honing machines together with best cutting abrasives, high performance honing oils, coolants, toolings and precision bore gages. Either as manual stand-alone machine or fully automated, the Sunnen solution fits best into high demanding production processes – working to satisfy your specific production needs.

With over 90 years of experience, Sunnen provides precision bore honing solutions for an incredibly wide range of industries and applications. Our global network and the industry’s largest selection of honing machines – horizontal or vertical, single or multi-spindle, standard or customized – allows us to be close to you and provide the appropriate solution in every country worldwide.

As the largest integrated honing systems supplier, we maintain advanced technology centers around the globe with a workforce of over 650. Our outstanding support is provided through our 3 production plants and 10 subsidiaries and our sales and service network in more than 50 countries around the globe.

No matter what your bore sizing challenge may be, anywhere in the world, we have the “Sunnen Solution” for you!





Russia

Poland

Czech Republic

China

India

United Kingdom

Benelux

Austria

Switzerland

France

Italy



All-inclusive supplier



Consulting



Service & support



Customized solutions



Automation

Sunnen complete solutions

Your partner for turn-key systems

Harmonized combination between machine, tool, abrasive, coolant and gaging is crucial for cost effective honing and optimal bore quality.

Process analyses and cost calculations are the basis for supplying the complete Sunnen solution.

All basic bore sizing parameters and quality requirements are developed in our customer technology centers in the U.S. and Switzerland.

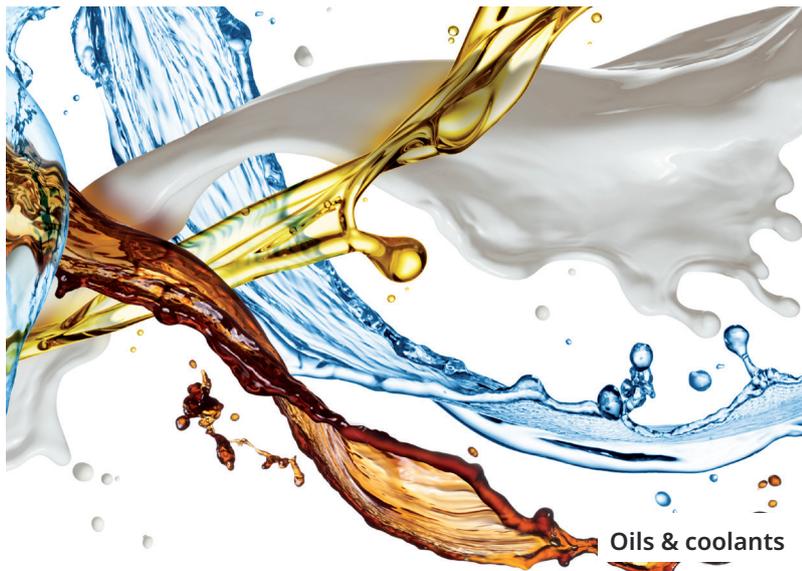
As experts, Sunnen takes full responsibility for your entire honing process.



Installation & training



Toolings & abrasives



Oils & coolants



Precision gages

Honing process

Unique bore sizing trough honing

An abrasive stone is generally used for stock removal. The abrasive stone consists of several layers of bound abrasive grains (Fig. 1). Each of the many abrasive points act as a cutting tool and break off as soon as it is blunt (Fig. 2). This exposes a new, sharper grain.

The honing process produces optimal bores within a very short time. This is a cost effective and strong alternative to:

- Internal grinding
- Precision and hard turning
- Reaming
- Roller burnishing

Why to use honing

Cost savings and low amortization time due to:

- Easier and faster part holding concepts; part doesn't need to be centered (especially compared to ID grinding)
- High stock removal (short cycle time) due to cutting action of hundreds of abrasive points (turning only 1 point cutting action ...)
- High force / expansion of tooling (short cycle time) due to centric force balance (especially at long bores, tooling is bending during ID grinding)
- Long life time of abrasive / tooling (not often the time consuming sharpening process)
- Low investment cost compared to other processes with similar precision
- Highest surface quality; < Rz 1 without changing of surface structure due to little heat production

The honing process (Fig. 3) achieves a high cutting capacity, excellent geometrical accuracies (< 0.001 mm), a high surface finish (down to Rz 0.3) and corrects a wide variety of bore conditions (Fig. top right).



Geometry correction through honing



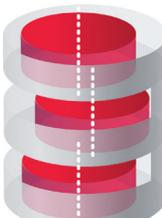
Barrel



Bell mouth



Boring marks



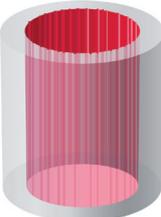
Tandem



Out-of-round



Rainbow



Reamer marks



Taper



Undersize



Waviness

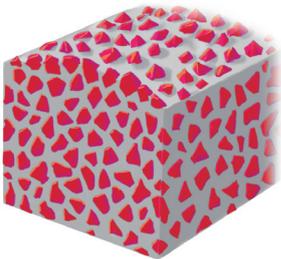


Figure 1:
The abrasive coating consists of several grain layers used one after the other.

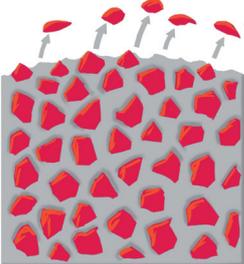


Figure 2:
Each grain breaks out of its bond precisely when the grain point is blunt.

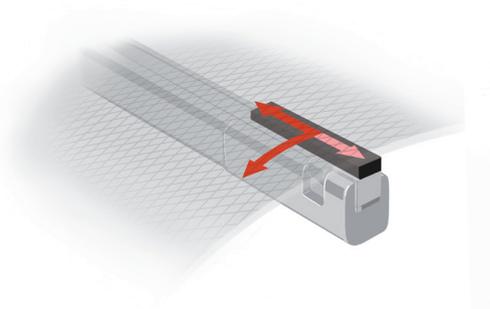


Figure 3:
A surface structure with crosswise serration is produced by a combination of rotary and linear movement.



Hydraulics

Typical hydraulic applications

Axial piston pumps, hydraulic blocks, valves, hydraulic cylinders

Typical requirements

Blocks and valves: Tol. +/- 0.001 mm, σ 0.0005, φ 0.001 mm - 0.003 mm, surface Ra 0.2 - 0.4

Hydraulic cylinders: H7 / H8 tolerances

Advantages of honing

Piston pumps: improved life time, safe airplanes

Blocks and valves: higher pressure operation / efficiency due to high precision, no leakage

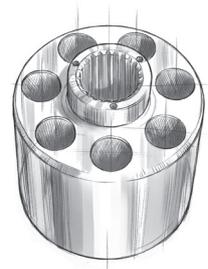
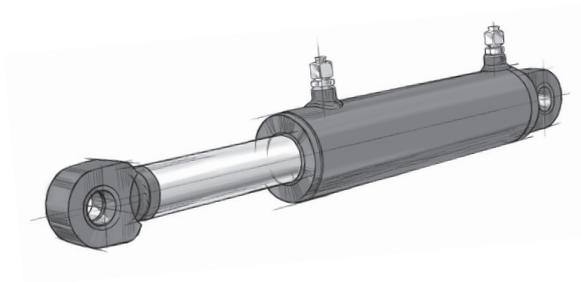
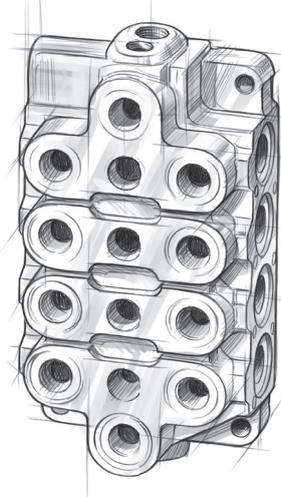
Hydraulic cylinders: high precision, long seal life

Sunnen solution

Blocks: VSS2xx, SV20xx

Valves: SH series, VSS2xx, SV2010/5

Hydraulic Cylinders: HT series





Energy production

Typical energy applications

Oil and gas components, wind mills, turbines

Typical requirements

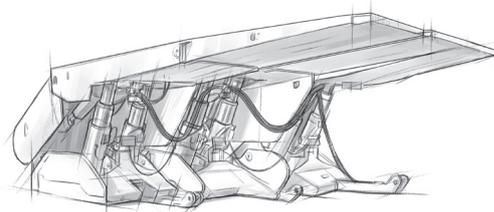
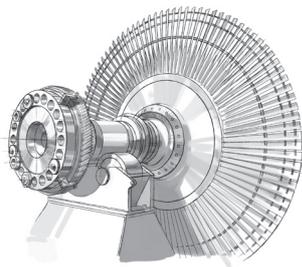
H7 / H8 tolerances, surface Ra 0.2 - 0.4, directly honing of rough cold drawn, plasma and powder coated tubes

Advantages of honing

Improved life time, provides higher pressure operation / efficiency due to high precision, no vibration due to temperature changes, flexible due to low number of tools for large diameter range

Sunnen solution

HT series, SV24xx, SV25xx



Aviation

Typical aviation applications

Landing gears, turbines, pressure reservoirs, shaft for jet fans, helicopter-blade control shafts

Typical requirements

H7 / H8 tolerances, blind-bores

Advantages of honing

Crosshatch pattern characteristic, outstanding bore quality leads tribology values, no influencing of heat to material structure of the surface, no white layer

Sunnen solution

HT series, SV24xx, SV25xx





Car & engine components

Typical car & engine components applications

Motor blocks, small engines, injectors, turbo charger housings, common rail parts, servo steering components, brake drums, liners, gears, rocker arms, connecting rods

Typical requirements

Liners: constant crosshatch angle

Small engines: nikasil & chromium plated, blind-bore

Injectors: tolerances < 0.001 mm, Rz < 1

Brake drums: constant surface texture, $\sigma < 0.015$ mm, blind-bore

Gears: $\sigma < 0.003 - 0.004$ mm, surface Ra 0.2 - 0.3, perpendicularity

Connecting rods: bore parallelism, roundness, surface texture

Advantages of honing

Improved life time, better operation, replacing of lapping, improves energy efficiency, lower emission rate, excellent tribology values

Sunnen solution

Liners / Blocks: SV24xx, SV25xx

Small engines / gears: SV24xx, SH series, SV2010/5

Turbo charger housings: SV2010/5, VSS2xx, SH series

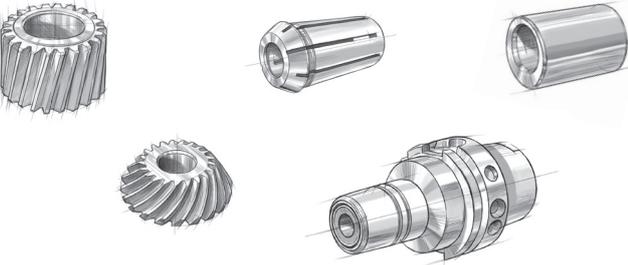
Housings: SV2010/5

Fuel injectors: SV2015 multispindle

Common rail parts: SV2010/5, SH series

Brake drums: SV25xx





Machinery & components

Typical machinery & components applications

Gears, machine tool components, tool holding devices, bearings, collets, carbide bushings, ceramics / compound material parts, measuring equipments, compressor components

Typical requirements

Gears: perpendicularity, special shape (e.g. must not be concave)

Tool holding devices: $\lambda < 0.002$ mm, surface $Rz < 1$ crosshatch angle

Turbo chargers: $\lambda < 0.004$ mm, surface $Ra 0.2$

Advantages of honing

Improved life time, higher holding torque (tool holding devices), quiet running of gear boxes, quality improvement

Sunnen solution

SV25xx, SV2010/5, VSS2xx, SH series

Large gears: SV24xx, SV25xx, SV2010/5

Injection mold & die production

Typical injection mold & die production applications

Extruder (twin- and single screw), cavities for PET-bottle production, manifolds, punching dies, carbide dies for screw manufacturing

Typical requirements

Cavity: Conical shape, high surface finish (polished)

Advantages of honing

Improved life time, brilliant surface finish $< Ra 0.03$ → replacing of lapping, cost reduction due to quality improvement, most economical manufacturing of carbide bushings

Sunnen solution

SV2010/5, HT series, SH series



Sunnen SV20xx & SV21xx series hold the industry's tightest tolerances far superior to any other production processes. The PC control features easy to use dropdown menus and the ability to save job setups guaranteeing optimized process control. The perfect solution for mid- to high-production manufacturers demanding the tightest tolerances.

Sunnen SVL2115 lapping machine lapping machine is designed for extremely tight tolerances and is based on the same machine platform as the popular SV20xx/SV21xx honing systems. The world's first automated bore lapping machine achieves increased productivity and part repeatability previously only achievable through manual labor.



Sunnen VSS2xx series is a single pass multiple spindle system (4 or 6 spindles) that delivers high precision bore geometries in medium and high production batches. It is very easy to set up and operate. Reliability, speed and repeatability are benchmarks for this series.



Sunnen special systems are created to customize and/or automate your machining process. We develop systems that include adapted machine housing, fixturing, part handling, loading/unloading, process development, measuring systems with process feedback and more.



Sunnen SV24xx / SV25xx series

incorporates a patent-pending stroke system that provides true vertical stroke and is capable of short stroke in any part of the bore, producing high straightness and roundness. A PC control panel simplifies the honing process. An additional traverse axis, which allows honing of offset parts in one line, can be provided.



Sunnen SV15 / SV30 series

are very universal machines with a straightforward way to set up and control the honing process. The easy to use touch screen control ensures short setup time. Also particularly suitable for larger cubic work pieces.



Sunnen SH series

builds on the heritage of the successful ML series. This generation of power stroked horizontal machines takes honing to the next level. Low investment and high profit through proven simple mechanics and electronics. Also available as an automated performance package.



Sunnen Tube Hone series is the result of more than 30 years experience in tube hone design and manufacturing. Most of the systems are custombuilt and have enough power and sensibility to work from diameter 4 mm up to 1'000 mm.



Sunnen External Hone has been developed to meet the continuously increasing demands of the industry. Workpieces in the offshore, energy production and aviation sectors are exposed to extreme environments. Therefore electroplated hardchrome or plasma-spray coated surfaces are in operation. The new HES machine cuts nearly all advanced materials without trouble.



Sunnen Deep Hole Drilling and Skiving & Roller burnishing systems are cost effective bore sizing solutions for hydraulic cylinders and other high production applications. Sunnen is unique in offering single-source turnkey solutions for your deep hole drilling and skiving and roller burnishing applications, including machines, tools, inserts, cutting oils and filtration units.



Sunnen tooling represent the most comprehensive range of tools in the honing industry. This range is critical to achieving the most out of your drilling process and subsequent economic advantages. Sunnen also manufactures the widest selection of abrasives, bond types and stone configurations. The range extends from standard and portable hand-honing tools to customized solutions for high-volume and μm -applications.



Oils and coolants are specially formulated and tested to optimize the bore sizing performance of both plated and abrasive stone tools. Special and matched formulations help to utilize the honing tool used in its technical and economic optimum.



Measuring instruments are mechanically stable, reliable and comply with the required measuring accuracy at its best. The range starts with easy-to-use hand-held instruments up to fully integrated systems with feedback and statistical process control.



A LEGACY OF EXCELLENCE SINCE 1924
SUNNEN WORLDWIDE

Your local distributor

SUNNEN PRODUCTS COMPANY

World Headquarters
St. Louis - USA
+1 314 781 2100
sunnen@sunnen.com
www.sunnen.com

AUSTRIA

Sunnen Austria GmbH
Hohenems - Austria
+43 5576 74194
sales@sunnen.eu
www.sunnen.at

BELGIUM

Sunnen Benelux BVBA
Eke - Belgium
+32 38 80 2800
info@sunnen.be
www.sunnen.be

BRAZIL

Sunnen do Brasil LTDA
São Paulo - Brasil
+55 11 4368 4900
sunnen@sunnen.com.br
www.sunnen.com.br

CANADA

Sunnen Products Company
+1 844 356 0006
canadasales@sunnen.com
www.sunnen.com/canada

CHINA

Shanghai Sunnen Mechanical Co. Ltd.
Shanghai - China
+86 21 5813 3990
shsunnen@sunnensh.com
sunnensh.com

CZECH REPUBLIC

Sunnen s.r.o.
Strakonice - Czech Republic
+420 383 376 317
sunnen@sunnen.cz
www.sunnen.cz

FRANCE

Sunnen SAS
Saclay - France
+33 01 69 30 0000
info@sunnen.fr
www.sunnen.fr

INDIA

Sunnen India Pvt. Ltd.
Navi Mumbai - India
+91 223 913 6055
sales@sunnen.in
www.sunnen.in

ITALY

Sunnen Italia S.r.l
Arese - Italy
+39 02 383 417 1
sunnen@sunnenitalia.com
www.sunnenitalia.com

POLAND

Sunnen Polska Sp. z o. o.
Warszawa - Poland
+48 22 814 34 29
sunnen@sunnen.pl
www.sunnen.pl

RUSSIA

Sunnen RUS LLC
Moscow - Russia
+7 495 258 43 43
+7 495 258 91 75
sunnen@sunnen-russia.ru
www.sunnen.ru

SWITZERLAND

Sunnen AG
Ennetaach - Switzerland
+41 71 649 33 33
sales@sunnen.eu
www.sunnen.eu

UNITED KINGDOM

Sunnen Products Ltd.
Hempstead Herts - UK
+44 1442 39 39 39
hemel@sunnen.co.uk

