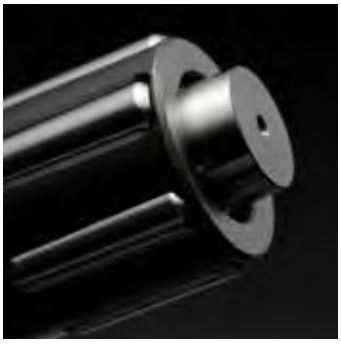
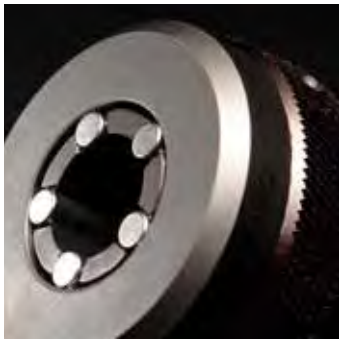
SUGINO

CAT.NO.L2219E

Roller Burnishing Tool

# SUPEROLL®



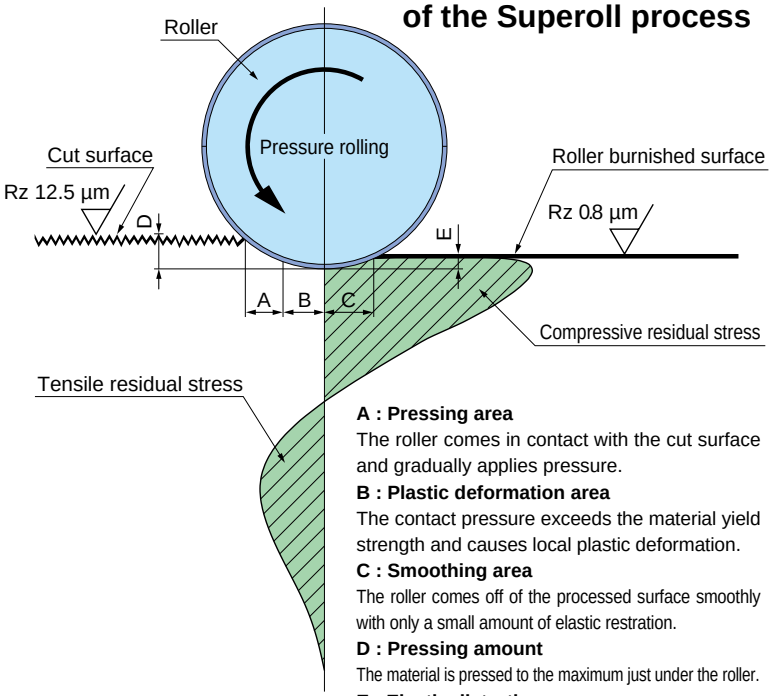
SUGINO MACHINE LIMITED

# Superoll provides ultra-precision micro-plastic work.

## How it works

Superoll is a roller burnishing tool that provides mirror finishing by compressing metal surfaces. Because plastic deformation is limited only to the surface, it allows for surface modification, precise finishing and increases productivity all at the same time.

### Overview of the Superoll process




**A : Pressing area**
The roller comes in contact with the cut surface and gradually applies pressure.

**B : Plastic deformation area**
The contact pressure exceeds the material yield strength and causes local plastic deformation.

**C : Smoothing area**
The roller comes off of the processed surface smoothly with only a small amount of elastic restration.

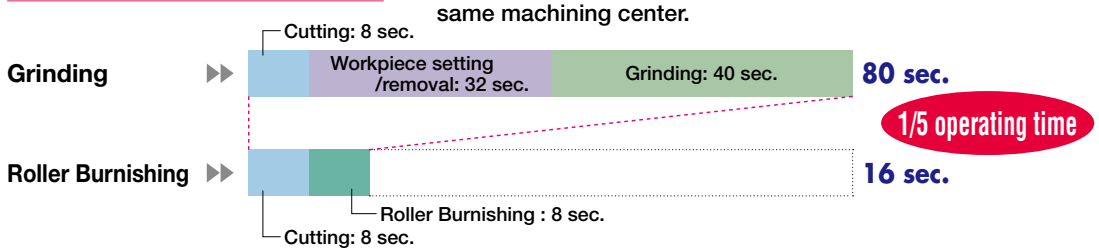
**D : Pressing amount**
The material is pressed to the maximum just under the roller.

**E : Elastic distortion**
After the roller passes over the surface, the material's elasticity is restored.

# Advantages and Benefits

## Save time

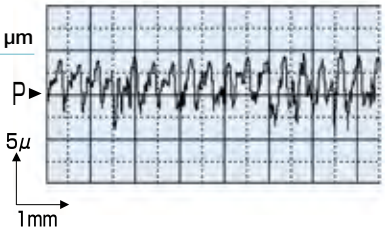
Burnishing allows for a 20%-80% reduction in cycle time when compared to polishing, grinding and honing; and can be often integrated in to the same machining center.



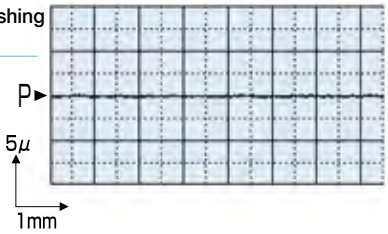

## Hi-Speed finishing

It provides 0.1 to 0.8 μm finishing in one pass. Without any sharp projections, the burnished surface is suitable for sliding or sealing surface.

Before roller burnishing Rz 9.2 μm



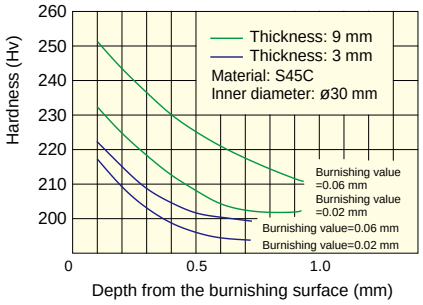

After roller burnishing Rz 0.6 μm



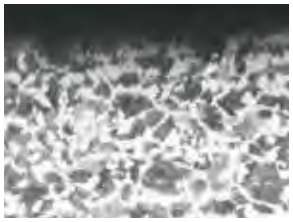

## Improved abrasion resistance (and increased hardness)

Compression of metal structure leads to a hardened surface with improved abrasion resistance.

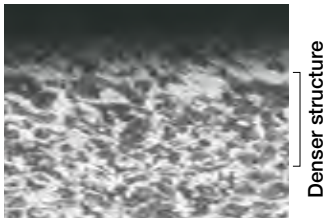
Material hardness after Roller burnishing




Metal structure before burnishing



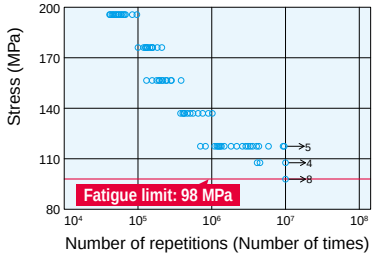

Metal structure after burnishing



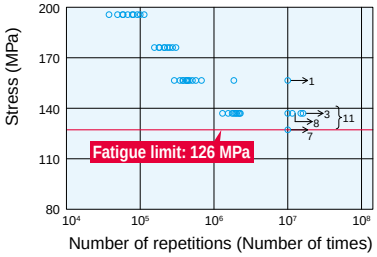

## Improved fatigue strength

Since compressive stresses reside at the surface, fatigue strength is increased more than 30%.

Before burnishing




After burnishing




## No sludge produced

Since burnishing does not produce sludge, it needs no special treatment as industrial waste.

Roller burnishing


Grinding

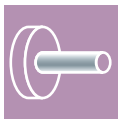
# Superoll's mirror surface finish meets every type of production need.

## Index

Select a Superoll type suitable for the processing part of your work and proceed to the indicated page.

### Internal

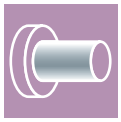
## External



Thin Staged shaft

**Superoll Slim CSA type** Go to: P12

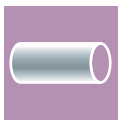
Gear shaft, Pin, Motor shaft, etc.



Staged shaft

**Superoll SA type** P13

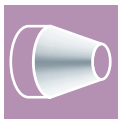
Shaft, Pin, Rod,
Torque converter, etc.



Shaft, Pin

**Superoll Mugen** P26

Printer guide shaft, Piston rod,
Coil, Wire, etc.



External taper

**Superoll SE type** P23

Gas cock, Connector,
Ball stud, Valve, etc.

Spherical

**Superoll SES type** P24

Ball stud (sphere)

## Surface improvement

Internal, External, Flat surface

**Micro-dimple molding tool** P24

Press a micro dimple pattern by machine operations

## Flat surface

Flat surface and End surface

**Superoll SF type** Go to: P22

Connector, flange surface,
Clutch part,
Semiconductor valve, etc.

Flat plate

**Superoll Level** P22

Transmission part mating surface,
Compressor part flat surface,
Sensor connector tip surface, etc.

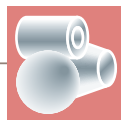
## Radius

R surface

**Superoll FD type** P23

Fittings for semiconductor mfg. units,
Fitting for ultra high vacuum units, etc.

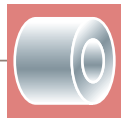
## Multiple



**Single Roller Superoll SR type** P16

**CAT'S EYE** P20

**Barriquan** P25



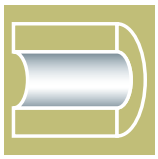
**Single Roller Superoll SR•C type** P18

**Single Roller Superoll SR 16M type** P18



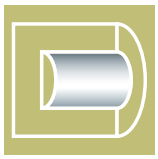
The complete lineup of Superoll tools supports high quality finishing.

SUPEROLL®



## For ID Through Hole .178"Dia.[4.50mm]~

# Superoll SH Series



## For ID of Blind Hole .315"Dia.[8.00mm]~

# Superoll SB Series

These roller-burnishing tools are used for ID processing and allow precision adjustments of 0.0025mm (.0001").
Two model types are available. The SH series for processing through holes and the SB for processing ID blind holes.

SH600 Series SB2400 Series

## Specifications For ID Through Hole Processing Diameter .178"~.299"Dia.[4.50~7.60mm]

〔Standard Type〕

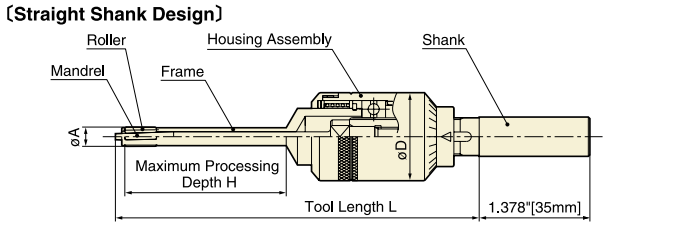
| Model Number | Diameter Adjustment Range A | | Maximum Processing Depth H | Tool Length L | | Housing No. Housing Diameter D | Part Numbers | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Inch | mm | | Straight | Morse Taper | | Roller (No. of rollers) | Mandrel | Shank Straight | Shank Morse Taper |
| SH450 | .176~.188 | 4.45~4.80 | 1.968" [50mm] | 4.528" [115mm] | 4.646" [118mm] | HA1 1.102" [28mm] | R001(4) | M001 | S01R .492"Dia. x 1.378" [ø12.5mm x 35mm] | S01 Morse Taper No.1 |
| SH475 | .186~.198 | 4.70~5.05 | | | | | | M002 | | |
| SH500 | .195~.208 | 4.95~5.30 | | | | | R002(4) | M003 | | |
| SH525 | .205~.218 | 5.20~5.55 | | | | | R003(4) | M002 | | |
| SH550 | .215~.228 | 5.45~5.80 | | | | | | M003 | | |
| SH575 | .225~.238 | 5.70~6.05 | | | | | R004(4) | M004 | S01R050 1/2"Dia.x 1.378" [ø12.7mm x 35mm] | |
| SH600 | .235~.253 | 5.95~6.45 | | | | | | M005 | | |
| SH640 | .250~.269 | 6.35~6.85 | | | | | | M006 | | |
| SH680 | .266~.285 | 6.75~7.25 | | | | | R005(4) | M005 | | |
| SH720 | .282~.301 | 7.15~7.65 | | | | | | M006 | | |
| SH760 | .298~.316 | 7.55~8.05 | | | | | | | | |

〔Long Type〕

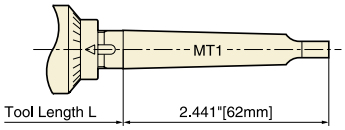
| Model Number | Diameter Adjustment Range A | | Maximum Processing Depth H | Tool Length L | | Housing No. Housing Diameter D | Part Numbers | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Inch | mm | | Straight | Morse Taper | | Roller (No. of rollers) | Mandrel | Shank Straight | Shank Morse Taper |
| SH600L | .235~.253 | 5.95~6.45 | 3.543" [90mm] | 6.102" [155mm] | 6.220" [158mm] | HA1 1.102" [28mm] | R004(4) | M004L | S01R .492"Dia. x 1.378" [ø12.5mm x 35mm] | S01 Morse Taper No.1 |
| SH640L | .250~.269 | 6.35~6.85 | | | | | | M005L | | |
| SH680L | .266~.285 | 6.75~7.25 | | | | | | M006L | | |
| SH720L | .282~.301 | 7.15~7.65 | | | | | R005(4) | M005L | S01R050 1/2"Dia. x 1.378" [ø12.7mm x 35mm] | |
| SH760L | .298~.316 | 7.55~8.05 | | | | | | M006L | | |

## Dimensions

〔Straight Shank Design〕




〔Morse Taper Shank Design〕




### ● When Selecting a Tool

- Match the tool's diameter range to the diameter to be processed.
- Match the maximum processing depth to the processed depth of the component to select either the standard or long variation of the tool.
- When ordering replacement parts, please specify the part number and description.

# Specifications

## For ID Through Hole • For ID of Blind Hole　　Processing Diameter .315"~.570"Dia.[8.0~14.5mm]

〔Standard Type〕

●We can also prepare helix-type for those SH series in this table

| Model Number | | Diameter Adjustment Range A | | Maximum Processing Depth H | Tool Length L | | Housing Assembly & Diameter | Part Numbers | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Roller(No. of rollers) | | Mandrel | Shank | |
| Through Hole | Blind Hole | Inch | mm | | Straight | Morse Taper | | SH Series | SB Series | | Straight | Morse Taper |
| SH800 | SB800 | .313~.336 | 7.95~ 8.55 | 1.968" [50mm] | 4.528" [115mm] | 4.646" [118mm] | HA1 1.102" [28mm] | R006(4) | B006(4) | M007 | S01R .492"Dia. x 1.378" [ø12.5mm x 35mm] | S01 (MT1) |
| SH850 | SB850 | .333~.356 | 8.45~ 9.05 | | | | | | | M008 | | |
| SH900 | SB900 | .353~.375 | 8.95~ 9.55 | | | | | R007(4) | B007(4) | M007 | | |
| SH950 | SB950 | .373~.395 | 9.45~10.05 | | | | | | | M008 | | |
| SH1000 | SB1000 | .392~.415 | 9.95~10.55 | | | | | | | M009 | | |
| SH1050 | SB1050 | .412~.435 | 10.45~11.05 | | | | | R008(4) | B008(4) | M008 | | |
| SH1100 | SB1100 | .432~.454 | 10.95~11.55 | | | | | | | M009 | | |
| SH1150 | SB1150 | .451~.474 | 11.45~12.05 | | | | | | | M010 | | |
| SH1200 | SB1200 | .471~.494 | 11.95~12.55 | | | | | R009(4) | B009(4) | M009 | S01R050 .1/2"Dia. x 1.378" [ø12.7mm x 35mm] | |
| SH1250 | SB1250 | .491~.513 | 12.45~13.05 | | | | | | | M010 | | |
| SH1300 | SB1300 | .510~.533 | 12.95~13.55 | | | | | | | M011 | | |
| SH1350 | SB1350 | .530~.553 | 13.45~14.05 | | | | | R010(4) | B010(4) | M010 | | |
| SH1400 | SB1400 | .550~.572 | 13.95~14.55 | | | | | | | M011 | | |
| SH1450 | SB1450 | .569~.592 | 14.45~15.05 | | | | | | | M012 | | |

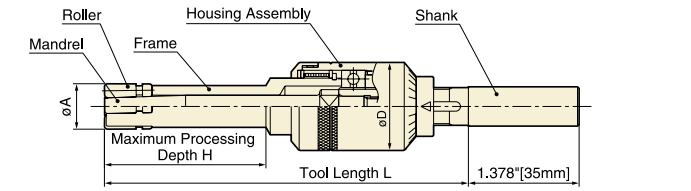
〔Long Type〕

●We can also prepare helix-type for those SH series in this table

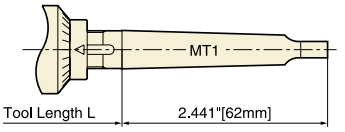
| Model Number | | Diameter Adjustment Range A | | Maximum Processing Depth H | Tool Length L | | Housing Assembly & Diameter | Part Numbers | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Roller(No. of rollers) | | Mandrel | Shank | |
| Through Hole | Blind Hole | Inch | mm | | Straight | Morse Taper | | SH Series | SB Series | | Straight | Morse Taper |
| SH800L | SB800L | .313~.336 | 7.95~ 8.55 | 4.724" [120mm] | 7.283" [185mm] | 7.402" [188mm] | HA1 1.102" [28mm] | R006(4) | B006(4) | M007L | S01R .492"Dia. x 1.378" [ø12.5mm x 35mm] | S01 (MT1) |
| SH850L | SB850L | .333~.356 | 8.45~ 9.05 | | | | | | | M008L | | |
| SH900L | SB900L | .353~.375 | 8.95~ 9.55 | | | | | R007(4) | B007(4) | M007L | | |
| SH950L | SB950L | .373~.395 | 9.45~10.05 | | | | | | | M008L | | |
| SH1000L | SB1000L | .392~.415 | 9.95~10.55 | | | | | | | M009L | | |
| SH1050L | SB1050L | .412~.435 | 10.45~11.05 | | | | | R008(4) | B008(4) | M008L | | |
| SH1100L | SB1100L | .432~.454 | 10.95~11.55 | | | | | | | M009L | | |
| SH1150L | SB1150L | .451~.474 | 11.45~12.05 | | | | | | | M010L | | |
| SH1200L | SB1200L | .471~.494 | 11.95~12.55 | | | | | R009(4) | B009(4) | M009L | S01R050 .1/2"Dia. x 1.378" [ø12.7mm x 35mm] | |
| SH1250L | SB1250L | .491~.513 | 12.45~13.05 | | | | | | | M010L | | |
| SH1300L | SB1300L | .510~.533 | 12.95~13.55 | | | | | | | M011L | | |
| SH1350L | SB1350L | .530~.553 | 13.45~14.05 | | | | | R010(4) | B010(4) | M010L | | |
| SH1400L | SB1400L | .550~.572 | 13.95~14.55 | | | | | | | M011L | | |
| SH1450L | SB1450L | .569~.592 | 14.45~15.05 | | | | | | | M012L | | |

# Dimensions

〔Straight Shank Design〕




〔Morse Taper Shank Design〕




# Processing Parameters

## 〔Processing Parameters〕

| Hole Diameter | | Tool Rotation Speed (RPM) | Feed per Revolution | |
|---|---|---|---|---|
| Inch | mm | min$^{-1}$ | Inch/rev | mm/rev |
| .178~ .299 | 4.5~ 7.6 | 900~1,800 | .004~.012 | 0.1~0.3 |
| .315~ .570 | 8 ~14.5 | 800~1,200 | .004~.016 | 0.1~0.4 |
| .591~ .944 | 15 ~24 | 600~1,000 | .008~.024 | 0.2~0.6 |
| .985~1.732 | 25 ~44 | 400~ 800 | .012~.039 | 0.3~1.0 |
| 1.772~2.913 | 45 ~74 | 300~ 500 | .020~.059 | 0.5~1.5 |

## ●Speeds and Feeds

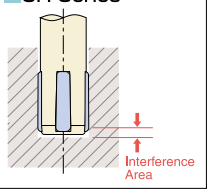
The SH & SB series Superoll tools are designed for clockwise rotation only. These tools can be used in a machine spindle or in a fixed position while rotating the work piece. Please see the standard parameters to the left for speeds and feeds information.

## 〔Tool Processing Limitations〕

When processing blind holes with the SH or SB series, there is a section of the work area that cannot be processed. For the non-processed dimensional area, see the illustration below.

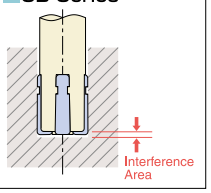
1) Roller Tip Section
2) Distance from the Roller Tip to the Frame Tip.
3) Clearance between the Roller Tip or Frame Tip to the bottom of the processed surface.(.020")

■SH Series




| Processing Diameter | | Interference Area | |
|---|---|---|---|
| Inch | mm | Inch | mm |
| .178~ .224 | 4.5~ 5.7 | .079 | 2.0 |
| .237~ .299 | 6 ~ 7.6 | .083 | 2.1 |
| .315~ .570 | 8 ~14.5 | .099 | 2.5 |
| .591~1.338 | 15 ~34 | .111 | 2.8 |
| 1.378~2.913 | 35 ~74 | .150 | 3.8 |

■SB Series




| Processing Diameter | | Interference Area | |
|---|---|---|---|
| Inch | mm | Inch | mm |
| .315~ .570 | 8~14.5 | .060 | 1.5 |
| .591~1.338 | 15~34 | .071 | 1.8 |
| 1.378~2.913 | 35~74 | | |

Note:To minimize the amount of interference between the bottom of a surface and the tool, the mandrel protrusion may be cut equal to the length of the roller. Interference area can be reduced even further with a special roller set.

## Superoll SH Series／Superoll SB Series

# Specifications

**For ID Through Hole • For ID of Blind Hole** **Processing Diameter .591"~1.339"Dia.[15~34mm]**

〔Standard Type〕

●We can also prepare helix-type for those SH series in this table

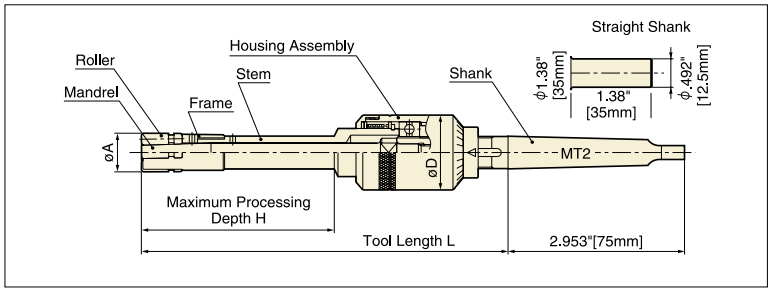
| Model Number | | Diameter Adjustment Range A | | Maximum Processing Depth H | Tool Length L | | Housing Assembly & Diameter | Part Numbers | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Roller(No. of rollers) | | Mandrel | Stem | Shank | | |
| Through Hole | Blind Hole | Inch | mm | | Straight | Morse Taper | | SH Series | SB Series | | | Straight | | Morse Taper |
| | | | | | | | | | | | | Inch | mm | |
| SH1500 | SB1500 | .587~ .633 | 14.9~16.1 | 1.968" [50mm] | 5" [127mm] | 5.118" [130mm] | HA2 1.339" [34mm] | R011(4) | B011(4) | M013 | E1 | S02R050 1/2"Dia. x 1.378" [ø12.7mm x 35mm] | S02R .492"Dia. x 1.378" [ø12.5mm x 35mm] | S02 (MT2) |
| SH1600 | SB1600 | .626~ .673 | 15.9~17.1 | | | | | | | M014 | E2 | | | |
| SH1700 | SB1700 | .666~ .712 | 16.9~18.1 | | | | | | | M015 | E3 | | | |
| SH1800 | SB1800 | .705~ .751 | 17.9~19.1 | | | | | R012(4) | B012(4) | M014 | E2 | | | |
| SH1900 | SB1900 | .745~ .791 | 18.9~20.1 | | | | | | | M015 | E3 | | | |
| SH2000 | SB2000 | .784~ .830 | 19.9~21.1 | | | | | R011(6) | B011(6) | M016 | E4 | S02R075 3/4"Dia. x 1.969" [ø19.5mm x 50mm] | | |
| SH2100 | SB2100 | .823~ .870 | 20.9~22.1 | | | | | | | M017 | E5 | | | |
| SH2200 | SB2200 | .863~ .909 | 21.9~23.1 | | | | | | | M018 | E6 | | | |
| SH2300 | SB2300 | .902~ .948 | 22.9~24.1 | | | | | R012(6) | B012(6) | M017 | E5 | | | |
| SH2400 | SB2400 | .941~ .988 | 23.9~25.1 | | | | | | | M018 | E6 | | | |
| SH2500 | SB2500 | .981~1.027 | 24.9~26.1 | 2.755" [70mm] | — | 5.906" [150mm] | | | | M019 | E7 | — | — | |
| SH2600 | SB2600 | 1.020~1.066 | 25.9~27.1 | | | | | | | M020 | | | | |
| SH2700 | SB2700 | 1.060~1.106 | 26.9~28.1 | | | | | | | M021 | | | | |
| SH2800 | SB2800 | 1.099~1.145 | 27.9~29.1 | | | | | | | M022 | | | | |
| SH2900 | SB2900 | 1.138~1.185 | 28.9~30.1 | | | | | | | M023 | E8 | | | |
| SH3000 | SB3000 | 1.178~1.224 | 29.9~31.1 | | | | | R013(6) | B013(6) | M022 | | | | |
| SH3100 | SB3100 | 1.217~1.263 | 30.9~32.1 | | | | | | | M023 | | | | |
| SH3200 | SB3200 | 1.256~1.303 | 31.9~33.1 | | | | | | | M024 | | | | |
| SH3300 | SB3300 | 1.296~1.342 | 32.9~34.1 | | | | | | | M025 | | | | |
| SH3400 | SB3400 | 1.335~1.381 | 33.9~35.1 | | | | | | | M026 | | | | |

〔Long Type〕

●We can also prepare helix-type for those SH series in this table

| Model Number | | Diameter Adjustment Range A | | Maximum Processing Depth H | Tool Length L | | Housing Assembly & Diameter | Part Numbers | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Roller(No. of rollers) | | Mandrel | Stem | Shank | | |
| Through Hole | Blind Hole | Inch | mm | | Straight | Morse Taper | | SH Series | SB Series | | | Straight | | Morse Taper |
| | | | | | | | | | | | | Inch | mm | |
| SH1500L | SB1500L | .587~ .633 | 14.9~16.1 | 5.905" [150mm] | 8.937" [227mm] | 9.055" [230mm] | HA2 1.339" [34mm] | R011(4) | B011(4) | M013L | E1L | S02R050 1/2"Dia. x 1.378" [ø12.7mm x 35mm] | S02R .492"Dia. x 1.378" [ø12.5mm x 35mm] | S02 (MT2) |
| SH1600L | SB1600L | .626~ .673 | 15.9~17.1 | | | | | | | M014L | E2L | | | |
| SH1700L | SB1700L | .666~ .712 | 16.9~18.1 | | | | | | | M015L | E3L | | | |
| SH1800L | SB1800L | .705~ .751 | 17.9~19.1 | | | | | R012(4) | B012(4) | M014L | E2L | | | |
| SH1900L | SB1900L | .745~ .791 | 18.9~20.1 | | | | | | | M015L | E3L | | | |
| SH2000L | SB2000L | .784~ .830 | 19.9~21.1 | | | | | R011(6) | B011(6) | M016L | E4L | S02R075 3/4"Dia. x 1.969" [ø19.5mm x 50mm] | | |
| SH2100L | SB2100L | .823~ .870 | 20.9~22.1 | | | | | | | M017L | E5L | | | |
| SH2200L | SB2200L | .863~ .909 | 21.9~23.1 | | | | | | | M018L | E6L | | | |
| SH2300L | SB2300L | .902~ .948 | 22.9~24.1 | | | | | R012(6) | B012(6) | M017L | E5L | | | |
| SH2400L | SB2400L | .941~ .988 | 23.9~25.1 | | | | | | | M018L | E6L | | | |
| SH2500L | SB2500L | .981~1.027 | 24.9~26.1 | | — | | | | | M019L | E7L | — | — | |
| SH2600L | SB2600L | 1.020~1.066 | 25.9~27.1 | | | | | | | M020L | | | | |
| SH2700L | SB2700L | 1.060~1.106 | 26.9~28.1 | | | | | | | M021L | | | | |
| SH2800L | SB2800L | 1.099~1.145 | 27.9~29.1 | | | | | | | M022L | | | | |
| SH2900L | SB2900L | 1.138~1.185 | 28.9~30.1 | | | | | | | M023L | E8L | | | |
| SH3000L | SB3000L | 1.178~1.224 | 29.9~31.1 | | | | | R013(6) | B013(6) | M022L | | | | |
| SH3100L | SB3100L | 1.217~1.263 | 30.9~32.1 | | | | | | | M023L | | | | |
| SH3200L | SB3200L | 1.256~1.303 | 31.9~33.1 | | | | | | | M024L | | | | |
| SH3300L | SB3300L | 1.296~1.342 | 32.9~34.1 | | | | | | | M025L | | | | |
| SH3400L | SB3400L | 1.335~1.381 | 33.9~35.1 | | | | | | | M026L | | | | |

# Dimensions




- For SH&SB model Superoll tools with a diameter over .591"[15mm], the frame and stem are separable.
- Special Superoll tools with special shank requirements or processing lengths not listed are available by special order.
- For Superolls less than SH & SB3400, straight shank is also possible.To check shank length, please see specification table above.

## Specifications

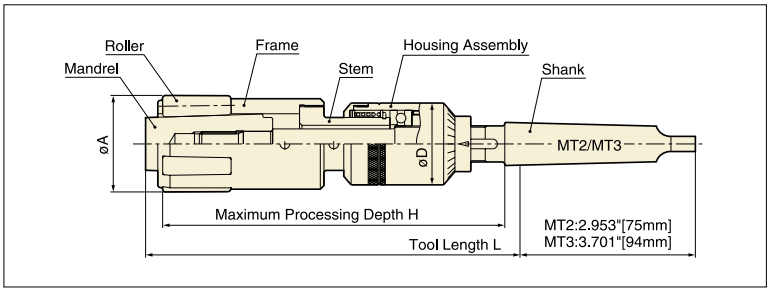
**For ID Through Hole • For ID of Blind Hole** **Processing Diameter 1.378"~2.913"Dia.[35~74mm]**

〔Standard Type〕

●We can also prepare helix-type for those SH series in this table

| Model Number | | Diameter Adjustment Range A | | Maximum Processing Depth H | Tool Length L | Housing Assembly & Diameter | Part Numbers | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Roller(No. of rollers) | | Mandrel | Stem | Shank |
| Through Hole | Blind Hole | Inch | mm | | | | SH Series | SB Series | | | |
| SH3500 | SB3500 | 1.375~1.421 | 34.9~36.1 | 5" [127mm] or more | 5.906" [150mm] | HA2 1.339" [34mm] | R014(6) | B014(6) | M027 | E9 | S02P (MT2) |
| SH3600 | SB3600 | 1.414~1.460 | 35.9~37.1 | | | | | | M028 | | |
| SH3700 | SB3700 | 1.453~1.500 | 36.9~38.1 | | | | | | M029 | | |
| SH3800 | SB3800 | 1.493~1.539 | 37.9~39.1 | | | | | | M030 | | |
| SH3900 | SB3900 | 1.532~1.578 | 38.9~40.1 | | | | | | M031 | | |
| SH4000 | SB4000 | 1.571~1.618 | 39.9~41.1 | | | | R015(6) | B015(6) | M030 | E10 | |
| SH4100 | SB4100 | 1.611~1.657 | 40.9~42.1 | | | | | | M031 | | |
| SH4200 | SB4200 | 1.650~1.696 | 41.9~43.1 | | | | | | M032 | | |
| SH4300 | SB4300 | 1.689~1.736 | 42.9~44.1 | | | | | | M033 | | |
| SH4400 | SB4400 | 1.729~1.775 | 43.9~45.1 | | | | | | M034 | | |
| SH4500 | SB4500 | 1.768~1.814 | 44.9~46.1 | 5.669" [144mm] or more | 6.614" [168mm] | HA3 1.654" [42mm] | R014(8) | B014(8) | M035 | E11 | S03 (MT3) |
| SH4600 | SB4600 | 1.808~1.854 | 45.9~47.1 | | | | | | M036 | | |
| SH4700 | SB4700 | 1.847~1.893 | 46.9~48.1 | | | | | | M037 | | |
| SH4800 | SB4800 | 1.886~1.933 | 47.9~49.1 | | | | | | M038 | | |
| SH4900 | SB4900 | 1.926~1.972 | 48.9~50.1 | | | | | | M039 | | |
| SH5000 | SB5000 | 1.965~2.011 | 49.9~51.1 | | | | R015(8) | B015(8) | M038 | | |
| SH5100 | SB5100 | 2.004~2.051 | 50.9~52.1 | | | | | | M039 | | |
| SH5200 | SB5200 | 2.044~2.090 | 51.9~53.1 | | | | | | M040 | E12 | |
| SH5300 | SB5300 | 2.083~2.129 | 52.9~54.1 | | | | | | M041 | | |
| SH5400 | SB5400 | 2.123~2.169 | 53.9~55.1 | | | | | | M042 | | |
| SH5500 | SB5500 | 2.162~2.208 | 54.9~56.1 | | | | R016(8) | B016(8) | M041 | | |
| SH5600 | SB5600 | 2.201~2.248 | 55.9~57.1 | | | | | | M042 | | |
| SH5700 | SB5700 | 2.241~2.287 | 56.9~58.1 | | | | | | M043 | | |
| SH5800 | SB5800 | 2.280~2.326 | 57.9~59.1 | | | | | | M044 | | |
| SH5900 | SB5900 | 2.319~2.366 | 58.9~60.1 | | | | | | M045 | | |
| SH6000 | SB6000 | 2.359~2.405 | 59.9~61.1 | | | | | | M046 | E13 | |
| SH6100 | SB6100 | 2.398~2.444 | 60.9~62.1 | | | | | | M047 | | |
| SH6200 | SB6200 | 2.438~2.484 | 61.9~63.1 | | | | | | M048 | | |
| SH6300 | SB6300 | 2.477~2.523 | 62.9~64.1 | | | | | | M049 | | |
| SH6400 | SB6400 | 2.516~2.562 | 63.9~65.1 | | | | | | M050 | | |
| SH6500 | SB6500 | 2.556~2.602 | 64.9~66.1 | | | | R017(8) | B017(8) | M047 | | |
| SH6600 | SB6600 | 2.595~2.641 | 65.9~67.1 | | | | | | M048 | | |
| SH6700 | SB6700 | 2.634~2.681 | 66.9~68.1 | | | | | | M049 | | |
| SH6800 | SB6800 | 2.674~2.720 | 67.9~69.1 | | | | | | M050 | E14 | |
| SH6900 | SB6900 | 2.713~2.759 | 68.9~70.1 | | | | | | M051 | | |
| SH7000 | SB7000 | 2.752~2.799 | 69.9~71.1 | | | | | | M052 | | |
| SH7100 | SB7100 | 2.792~2.838 | 70.9~72.1 | | | | | | M053 | | |
| SH7200 | SB7200 | 2.831~2.877 | 71.9~73.1 | | | | | | M054 | | |
| SH7300 | SB7300 | 2.871~2.917 | 72.9~74.1 | | | | | | M055 | | |
| SH7400 | SB7400 | 2.910~2.956 | 73.9~75.1 | | | | | | M056 | | |

## Dimensions




- Superoll tools with a processing diameter of 1.378" to 2.913"[35 to 74mm] have an extended processing length because the diameter of the housing is smaller than the roller set diameter.
- SH&SB series Superoll tools are available for processing diameters larger than 75mm by special order.

For Small Diameter ID Hole .119"~.551"Dia.[3~14mm]

# Superoll Slim CSL Series

The CSL series Superoll will adapt to most CNC lathes; and are available in .007" (0.2mm) increments from .090"-.557+" (2.3mm-14mm+). The CSL series Superoll shank size is standardized to fit most standard CNC lathes.

CSL300B75 type CSL400B75 type CSL1200B75 type

## Specifications

### Processing Diameter .119~.551"Dia.[3~14mm]

| Model Number | | Diameter Adjustment Range A | | Maximum Processing Depth H | | Shank Diameter E | Shank Length F | Tool Length G | | Overall Length L | | Tool Number | | | | | Dimensions |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | Roller (No. of rollers) | Mandrel | | Frame | | |
| Standard | Long | Inch | mm | Standard | Long | | | Standard | Long | Standard | Long | | Standard | Long | Standard | Long | |
| CSL 300□□ | CSL 300□□L | .117~.124 | 2.95~ 3.15 | 1.181" [30mm] | 1.968" [50mm] | .75" [19.05mm] or .787" [20mm] or .866" [22mm] | 2.953" [75mm] or 4.528" [115mm] | 1.772" [45mm] | 2.559" [65mm] | 4.724" [120mm] Shank length is 2.953" [75mm] or 6.299" [160mm] Shank length is 4.528" [115mm] | 5.512" [140mm] Shank length is 2.953" [75mm] or 7.087" [180mm] Shank length is 4.528" [115mm] | R01S(3) | CM01 | CM01L | FL300 | FL300L | Fig.1 |
| CSL 350□□ | CSL 350□□L | .136~.143 | 3.45~ 3.65 | | | | | | | | | R02S(3) | CM03 | CM03L | FL350 | FL350L | |
| CSL 400□□ | CSL 400□□L | .156~.163 | 3.95~ 4.15 | | | | | | | | | R03S(3) | CM05 | CM05L | FL400 | FL400L | |
| CSL 450□□ | CSL 450□□L | .176~.183 | 4.45~ 4.65 | | | | | | | | | R001(4) | CM10 | CM10L | FL450 | FL450L | |
| CSL 500□□ | CSL 500□□L | .195~.202 | 4.95~ 5.15 | | | | | | | | | | CM15 | CM15L | FL500 | FL500L | |
| CSL 550□□ | CSL 550□□L | .215~.222 | 5.45~ 5.65 | | | | | | | | | R002(4) | CM20 | CM20L | FL550 | FL550L | |
| CSL 600□□ | CSL 600□□L | .235~.242 | 5.95~ 6.15 | | | | | | | | | R004(4) | CM21 | CM21L | FL600 | FL600L | |
| CSL 650□□ | CSL 650□□L | .254~.261 | 6.45~ 6.65 | | | | | | | | | | CM26 | CM26L | FL650 | FL650L | |
| CSL 700□□ | CSL 700□□L | .274~.281 | 6.95~ 7.15 | | | | | | | | | | CM31 | CM31L | FL700 | FL700L | |
| CSL 750□□ | CSL 750□□L | .294~.301 | 7.45~ 7.65 | | | | | | | | | R005(4) | CM28 | CM28L | FL750 | FL750L | |
| CSL 800□□ | CSL 800□□L | .313~.320 | 7.95~ 8.15 | | | | | | | | | B006R(4) | CM33 | CM33L | FL800 | FL800L | Fig.2 |
| CSL 850□□ | CSL 850□□L | .333~.340 | 8.45~ 8.65 | | | | | | | | | | CM38 | CM38L | FL850 | FL850L | |
| CSL 900□□ | CSL 900□□L | .353~.360 | 8.95~ 9.15 | | | | | | | | | B007R(4) | CM33 | CM33L | FL900 | FL900L | |
| CSL 950□□ | CSL 950□□L | .373~.379 | 9.45~ 9.65 | | | | | | | | | | CM38 | CM38L | FL950 | FL950L | |
| CSL1000□□ | CSL1000□□L | .392~.399 | 9.95~10.15 | | | | | | | | | | CM43 | CM43L | FL1000 | FL1000L | |
| CSL1050□□ | CSL1050□□L | .412~.419 | 10.45~10.65 | | | | | | | | | B008R(4) | CM38 | CM38L | FL1050 | FL1050L | |
| CSL1100□□ | CSL1100□□L | .432~.438 | 10.95~11.15 | | | | | | | | | | CM43 | CM43L | FL1100 | FL1100L | |
| CSL1150□□ | CSL1150□□L | .451~.458 | 11.45~11.65 | | | | | | | | | | CM48 | CM48L | FL1150 | FL1150L | |
| CSL1200□□ | CSL1200□□L | .471~.478 | 11.95~12.15 | | | | | | | | | B009R(4) | CM43 | CM43L | FL1200 | FL1200L | |
| CSL1250□□ | CSL1250□□L | .491~.498 | 12.45~12.65 | | | | | | | | | | CM48 | CM48L | FL1250 | FL1250L | |
| CSL1300□□ | CSL1300□□L | .510~.517 | 12.95~13.15 | | | | | | | | | | CM53 | CM53L | FL1300 | FL1300L | |
| CSL1350□□ | CSL1350□□L | .530~.537 | 13.45~13.65 | | | | | | | | | B010R(4) | CM48 | CM48L | FL1350 | FL1350L | |
| CSL1400□□ | CSL1400□□L | .550~.557 | 13.95~14.15 | | | | | | | | | | CM53 | CM53L | FL1400 | FL1400L | |

Note: Tools requiring a special shank diameter or processing diameter not shown above are available by special order.

**How to select a tool.** ▶▶ CSL 300 □ □ L
- Shank Length F / 2.953" or 4.528"[75 or 115mm]
- Processing Length H/Standard:Blank, Long;L
- Shank Diameter E / A: .75", B: .787", F: .866"[A:19.05mm, B:20mm, F:22mm]

## Dimensions

Milled Flat Dimension A: .185" (4.7mm), B: .193" (4.9mm), F: .201" (5.1mm)

**Fig.1**

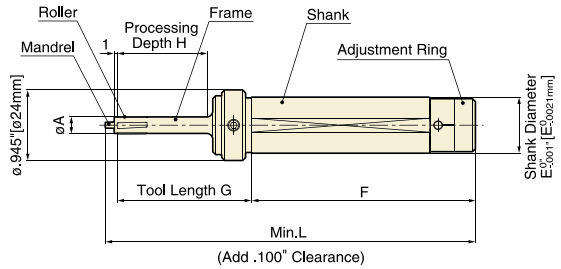
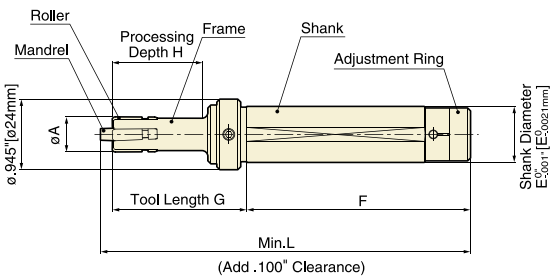
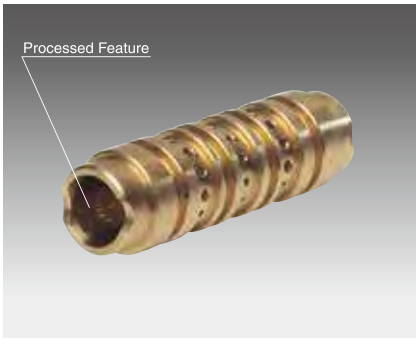



**Fig.2**



## Processing Example

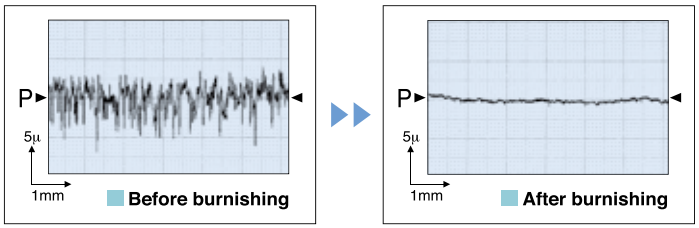
### Pneumatic Valve Component




### 〔Machining Parameters〕

| | | | | | | |
|---|---|---|---|---|---|---|
| Model Number | CSL900A75L | | | | | |
| Material | C3604 | | | | | |
| Processing Diameter | Inch | ø.354 x 1.850L | | mm | | ø9 x 47L |
| Surface Roughness | Ry μ inch | Before | 173.22 | Ry μ m | Before | 4.4 |
| | | After | 23.63 | | After | 0.6 |
| Rotation Speed(RPM) | $min^{-1}$ | 1,000 | | | | |
| Feed Rate | Inch/rev | .032 | | mm/rev | | 0.8 |
| Cycle Time | Sec. | 4.6 | | | | |

### 〔Surface Finish Comparison〕




## Processing Parameters

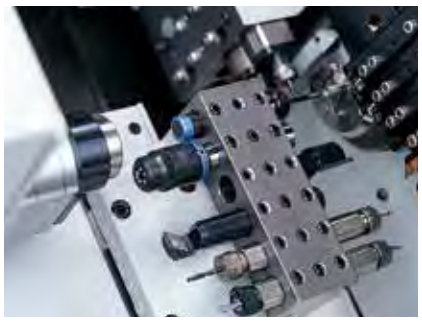
### 〔Description of Operation〕

1) Select the proper Superoll tool for the particular application.
2) Select the proper speeds and feeds to operate the tool.
3) After processing to depth, reverse the spindle rotation to counter clockwise and rapid reverse the tool out of the work piece.

Vertical Application

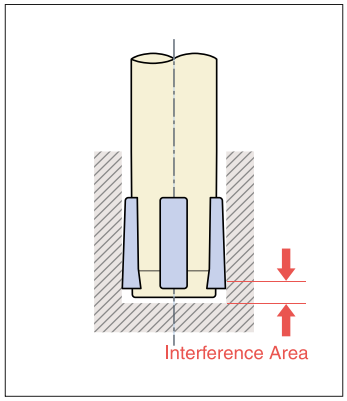
### 〔Machining Parameters〕

| Processing Diameter | | Rotation Speed(RPM) | Feed | |
|---|---|---|---|---|
| Inch | mm | $min^{-1}$ | Inch/rev | mm/rev |
| .119~.157 | 3 ~ 4 | 1,200~2,200 | .008~.023 | 0.2~0.6 |
| .178~.295 | 4.5~ 7.5 | 900~1,800 | .016~.031 | 0.4~0.8 |
| .315~.591 | 8 ~15 | 800~1,200 | .020~.047 | 0.5~1.2 |



Fixed Tool Application

### 〔Tool Processing Limitations〕




| Processing Diameter | | Interference Area | |
|---|---|---|---|
| Inch | mm | Inch | mm |
| .119~.311 | 3~ 7.9 | .079 | 2.0 |
| .315~.551 | 8~14 | .032 | 0.8 |

Note1. There is a .020"[0.5mm] interference area that will not be processed by the tool. Please see the illustration above.
2. To minimize the amount of interference between the bottom of a surface and the tool, the mandrel extrusion may be cut to the length of the roller protrusion.

Automatic Turret Application

For OD Processing of Two or more Diameters .119"~.551"Dia.[3~14mm]

# Superoll Slim CSA Series

The CSA series Superoll will adapt to most CNC lathes. Various processing lengths are obtainable with out the use of a special tool.

CSA1200C type

Head front

## Specifications

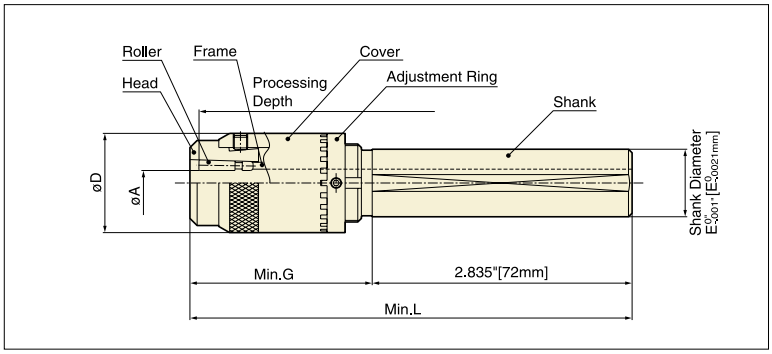
**Processing Diameter .119"~551"Dia.[3~14mm]**

| Model Number | Diameter Adjustment Range A | | Maximum Processing Depth H | Tool Diameter D | Shank Diameter E | Tool Length G | Overall Tool Length L | Part Numbers | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Inch | mm | | | | | | Roller (No. of rollers) | Head | Frame |
| CSA 300□ | .120~.113 | 3.05~ 2.85 | Not limited. | 1.102" [28mm] | .75" [19.05mm] | 1.890" [48mm] | 4.724" [120mm] | B007R(4) | CH300 | FA300 |
| CSA 350□ | .139~.132 | 3.55~ 3.35 | | | | | | | CH350 | FA350 |
| CSA 400□ | .159~.152 | 4.05~ 3.85 | | | | | | | CH400 | FA400 |
| CSA 450□ | .179~.172 | 4.55~ 4.35 | | | | | | | CH450 | FA450 |
| CSA 500□ | .198~.191 | 5.05~ 4.85 | | | | | | B007R(5) | CH500 | FA500 |
| CSA 550□ | .218~.211 | 5.55~ 5.35 | | | | | | | CH550 | FA550 |
| CSA 600□ | .238~.231 | 6.05~ 5.85 | | | | | | | CH600 | FA600 |
| CSA 650□ | .257~.250 | 6.55~ 6.35 | | | | | | | CH650 | FA650 |
| CSA 700□ | .277~.270 | 7.05~ 6.85 | | | .787" [20mm] | | | | CH700 | FA700 |
| CSA 750□ | .297~.290 | 7.55~ 7.35 | | 1.496" [38mm] | .866" [22mm] | | | B009R(5) | CH750 | FA750 |
| CSA 800□ | .316~.310 | 8.05~ 7.85 | | | | | | | CH800 | FA800 |
| CSA 850□ | .336~.329 | 8.55~ 8.35 | | | | | | | CH850 | FA850 |
| CSA 900□ | .356~.349 | 9.05~ 8.85 | | | | | | | CH900 | FA900 |
| CSA 950□ | .375~.369 | 9.55~ 9.35 | | | | | | | CH950 | FA950 |
| CSA1000□ | .395~.388 | 10.05~ 9.85 | | | | | | | CH1000 | FA1000 |
| CSA1050□ | .415~.408 | 10.55~10.35 | | | | | | | CH1050 | FA1050 |
| CSA1100□ | .435~.428 | 11.05~10.85 | | | | | | | CH1100 | FA1100 |
| CSA1150□ | .454~.447 | 11.55~11.35 | | 1.614" [41mm] | 1" [25.4mm] | 2.087" [53mm] | 4.921" [125mm] | | CH1150 | FA1150 |
| CSA1200□ | .474~.467 | 12.05~11.85 | | | | | | | CH1200 | FA1200 |
| CSA1250□ | .494~.487 | 12.55~12.35 | | | | | | | CH1250 | FA1250 |
| CSA1300□ | .513~.506 | 13.05~12.85 | | | .984" [25mm] | | | | CH1300 | FA1300 |
| CSA1350□ | .533~.526 | 13.55~13.35 | | | | | | | CH1350 | FA1350 |
| CSA1400□ | .553~.546 | 14.05~13.85 | | | | | | | CH1400 | FA1400 |

1) Tools are available with a .007" (.85mm) diameter adjustment range from .120" to .546" dia (3.05 - 14.05 mm dia.)
2) Note: Tools requiring a special shank diameter or processing diameter not shown above are available by special order. (However, the processing depth may be restricted.)

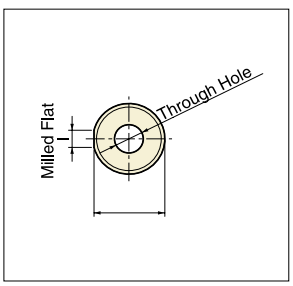
**How to select a tool.** ▶▶ CSA 300 □ — Shank Diameter E / A: .75", B: .787", F: .866", C: .984",D: 1" [A:19.05mm, B:20mm, F:22mm, C:25mm, D:25.4mm]

## Dimensions

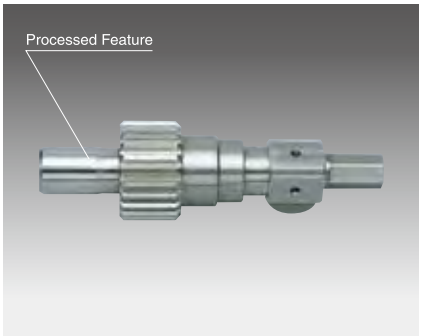



Shank Milled Flat A: .185", B: .193", F: .201" C: .213", D: .217" [A: 4.7mm, B: 4.9mm, F: 5.1mm, C: 5.4mm, D: 5.5mm]

Shank through hole diameter: A,B,F: .315"~.472" (8~12mm) C,D: .591" (15mm)



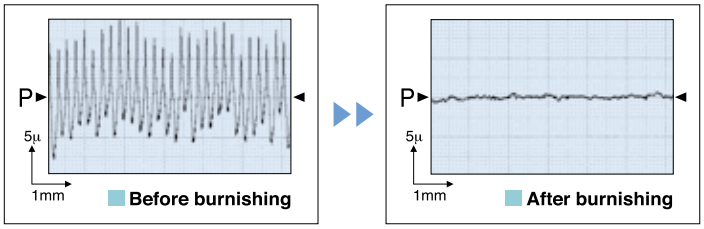
## Processing Example — Gear Shaft




### 〔Machining Parameters〕

| | | | | | | |
|---|---|---|---|---|---|---|
| Model Number | CSA1200D | | | | | |
| Material | SUS303 | | | | | |
| Processing Diameter | Inch | | ø.472 x .551L | mm | | ø12 x 14L |
| Surface Roughness | Ry μ Inch | Before | 287.40 | Ry μ m | Before | 7.3 |
| | | After | 23.63 | | After | 0.6 |
| Rotation Speed(RPM) | $min^{-1}$ | | 710 | | | |
| Feed Rate | Inch/rev | | .016 | mm/rev | | 0.4 |
| Cycle Time | Sec. | | 3.3 | | | |

### 〔Surface Finish Comparison〕




## Processing Parameters

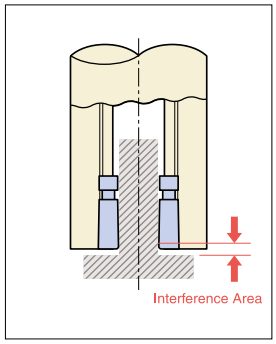
### 〔Description of Operation〕

1) Select the proper Superoll tool for the particular application.
2) Select the proper speeds and feeds to operate the tool.
3) After processing to depth, rapid reverse the tool out of the work piece.

### 〔Machining Parameters〕

| Processing Diameter | | Rotation Speed(RPM) | Feed | |
|---|---|---|---|---|
| Inch | mm | $min^{-1}$ | Inch/rev | mm/rev |
| .119~.275 | 3 ~ 7 | 800~1,200 | .008~.015 | 0.2~0.4 |
| .296~.551 | 7.5~14 | 600~ 800 | .008~.023 | 0.2~0.6 |

### 〔Tool Processing Limitations〕

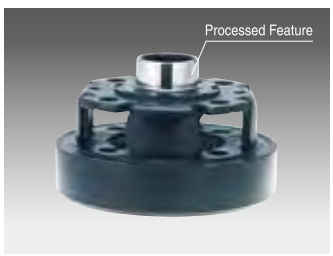



| Processing Diameter | | Interference Area | |
|---|---|---|---|
| Inch | mm | Inch | mm |
| .119~.311 | 3~7.9 | .032 | 0.8 |
| .315~.551 | 8~14 | | |

Note 1. There is a .032" [0.8 mm] interference area that will not be processed by the tool. Please see the illustration above.
2. To minimize the amount of interference between the bottom of a surface and the tool, the head protrusion may be cut to the length of the roller protrusion.

## Superoll SA Series ▸▸ For OD Processing of Two or more Diameters

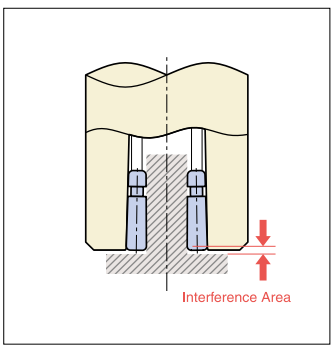
For processing a diameter range of .591"~2.512" (15~64mm)




Torque Converter

### 〔Tool Processing Limitations〕

When processing O/D with the SA series, there is a section of the work area that can not be processed. For the non-processed dimensional area, see the illustration to the right.




| Processing Diameter | | Interference Area | |
|---|---|---|---|
| Inch | mm | Inch | mm |
| .591~2.520 | 15~64 | .071 | 1.8 |

Note 1. There is a .071" [1.8 mm] interference area that will not be processed by the tool. Please see the illustration above.
2. To minimize the amount of interference between the bottom of a surface and the tool, the head protrusion may be cut to the length of the roller protrusion.

## Through- hole　Blind-hole

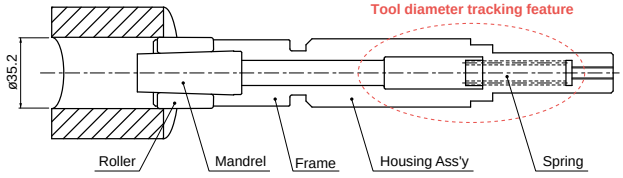
# Superoll MAC

The tool diameter automatically compensates for the pre-hole diameter, enabling uniform finishing surface. This tool is suitable for finishing of works with inconsistent pre-hole diameters and die cast parts with draft angle. Tracking of up to 0.2 mm is possible.

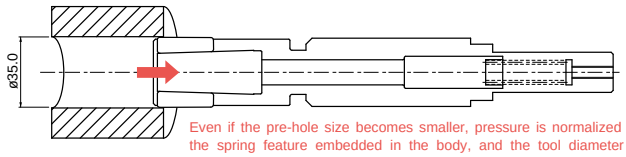
**【 Driving unit 】**
Drilling machine　Drilling unit
Lathe　Machining center


## Principle

■ **In case the pre-hole condition matches the tool diameter.**

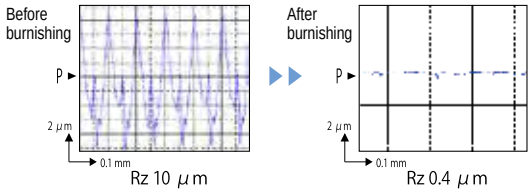


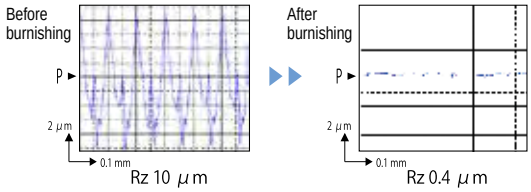

■ **In case the pre-hole is tapered in relation to the tool diameter.**




Even if the pre-hole size becomes smaller, pressure is normalized by the spring feature embedded in the body, and the tool diameter is automatically adjusted to the appropriate burnishing value.

**[ Comparison of surface roughness ]**

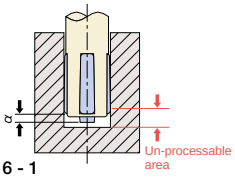



## Un-processable area by Superoll MAC

■ **Through- hole**

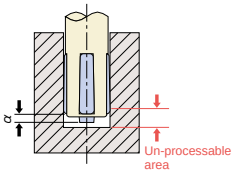
| Hole size | Un-processable area |
|---|---|
| mm | mm |
| 4.5 ~ 5.7 | 2.0+α |
| 6.0 ~ 7.6 | 2.1+α |




α = Fluctuation in work diameter x 16 - 1
*If α is a negative value, then α = 0.

■ **Blind hole**

| Specifications | Hole size | Un-processable area |
|---|---|---|
| | mm | mm |
| Standard | 8.0 ~ 14.5 | 1.5+α |
| | 15.0 ~ 44.0 | 1.8+α |
| Special | All sizes | 0.8+α |

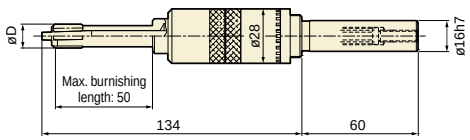



α = Fluctuation in work diameter x 16

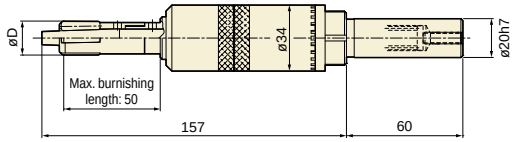
Note: To minimize the un-processable area by Superoll, grind off the extrusion of the mandrel but leave α.

## Dimensions (mm)

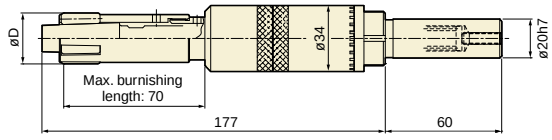
① **Tool diameter D ø4.5 - 14.5 mm**



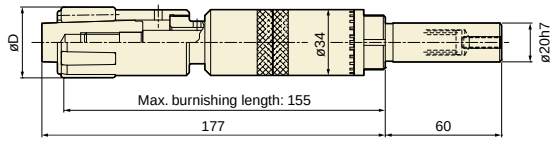

② **Tool diameter D ø15 - 24 mm**




③ **Tool diameter D ø25 - 34 mm**




④ **Tool diameter D ø35 - 44 mm**



## How to use

1. Use the tool with the diameter approximately 0.05 mm bigger than the expected maximum hole diameter.
2. Set the spring load. Have a test turn and adjust to a proper load by checking the finished condition.

| Hole size | Rotation speed | Feed rate | Spring load | |
|---|---|---|---|---|
| | | | Steel | Aluminum |
| mm | $min^{-1}$ | mm/rev | N | |
| 4.5 ~ 7.6 | 900 ~ 1,800 | 0.1 ~ 0.3 | 10 ~ 60 | 3 ~ 30 |
| 8.0 ~ 14.5 | 800 ~ 1,200 | 0.1 ~ 0.4 | 20 ~ 120 | 4 ~ 40 |
| 15.0 ~ 19.0 | 700 ~ 1,000 | 0.2 ~ 0.5 | 35 ~ 210 | 7 ~ 70 |
| 20.0 ~ 24.0 | 600 ~ 800 | 0.3 ~ 0.6 | 60 ~ 360 | 12 ~ 120 |
| 25.0 ~ 34.0 | 500 ~ 700 | 0.3 ~ 1.0 | 80 ~ 480 | 16 ~ 160 |
| 35.0 ~ 44.0 | 400 ~ 600 | 0.3 ~ 1.0 | 90 ~ 540 | 20 ~ 200 |

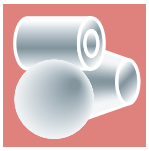
## Specifications

| Tool model No. | | Tool diameter adjusting range A | Part model No. | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Rollers (quantity in one set) | | Mandrel | Frame | | Stem |
| Through-hole | Blind-hole | mm | For through hole | For blind hole | | Through-hole | Blind-hole | |
| SH 450-CAT | — | 4.45 ~ 4.80 | R001(4) | — | M001 | SH 450FR | — | — |
| SH 475-CAT | — | 4.70 ~ 5.05 | | | M002 | SH 475FR | — | — |
| SH 500-CAT | — | 4.95 ~ 5.30 | R002(4) | — | M002 | SH 500FR | — | — |
| SH 525-CAT | — | 5.20 ~ 5.55 | | | M003 | SH 525FR | — | — |
| SH 550-CAT | — | 5.45 ~ 5.80 | R003(4) | — | M002 | SH 550FR | — | — |
| SH 575-CAT | — | 5.70 ~ 6.05 | | | M003 | SH 575FR | — | — |
| SH 600-CAT | — | 5.95 ~ 6.45 | R004(4) | — | M004 | SH 600FR | — | — |
| SH 640-CAT | — | 6.35 ~ 6.85 | | | M005 | SH 640FR | — | — |
| SH 680-CAT | — | 6.75 ~ 7.25 | | | M006 | SH 680FR | — | — |
| SH 720-CAT | — | 7.15 ~ 7.65 | R005(4) | — | M005 | SH 720FR | — | — |
| SH 760-CAT | — | 7.55 ~ 8.05 | | | M006 | SH 760FR | — | — |
| SH 800-CAT | SB 800-CAT | 7.95 ~ 8.55 | R006(4) | B006(4) | M007 | SH 800FR | SB 800FR | — |
| SH 850-CAT | SB 850-CAT | 8.45 ~ 9.05 | | | M008 | SH 850FR | SB 850FR | — |
| SH 900-CAT | SB 900-CAT | 8.95 ~ 9.55 | R007(4) | B007(4) | M007 | SH 900FR | SB 900FR | — |
| SH 950-CAT | SB 950-CAT | 9.45 ~ 10.05 | | | M008 | SH 950FR | SB 950FR | — |
| SH1000-CAT | SB1000-CAT | 9.95 ~ 10.55 | | | M009 | SH1000FR | SB1000FR | — |
| SH1050-CAT | SB1050-CAT | 10.45 ~ 11.05 | R008(4) | B008(4) | M008 | SH1050FR | SB1050FR | — |
| SH1100-CAT | SB1100-CAT | 10.95 ~ 11.55 | | | M009 | SH1100FR | SB1100FR | — |
| SH1150-CAT | SB1150-CAT | 11.45 ~ 12.05 | | | M010 | SH1150FR | SB1150FR | — |
| SH1200-CAT | SB1200-CAT | 11.95 ~ 12.55 | R009(4) | B009(4) | M009 | SH1200FR | SB1200FR | — |
| SH1250-CAT | SB1250-CAT | 12.45 ~ 13.05 | | | M010 | SH1250FR | SB1250FR | — |
| SH1300-CAT | SB1300-CAT | 12.95 ~ 13.55 | | | M011 | SH1300FR | SB1300FR | — |
| SH1350-CAT | SB1350-CAT | 13.45 ~ 14.05 | R010(4) | B010(4) | M010 | SH1350FR | SB1350FR | — |
| SH1400-CAT | SB1400-CAT | 13.95 ~ 14.55 | | | M011 | SH1400FR | SB1400FR | — |
| SH1450-CAT | SB1450-CAT | 14.45 ~ 15.05 | | | M012 | SH1450FR | SB1450FR | — |
| SH1500-CAT | SB1500-CAT | 14.9 ~ 16.1 | R011(4) | B011(4) | M013 | SH1500FR | SB1500FR | E1 |
| SH1600-CAT | SB1600-CAT | 15.9 ~ 17.1 | | | M014 | SH1600FR | SB1600FR | E2 |
| SH1700-CAT | SB1700-CAT | 16.9 ~ 18.1 | | | M015 | SH1700FR | SB1700FR | E3 |
| SH1800-CAT | SB1800-CAT | 17.9 ~ 19.1 | R012(4) | B012(4) | M014 | SH1800FR | SB1800FR | E2 |
| SH1900-CAT | SB1900-CAT | 18.9 ~ 20.1 | | | M015 | SH1900FR | SB1900FR | E3 |
| SH2000-CAT | SB2000-CAT | 19.9 ~ 21.1 | R011(6) | B011(6) | M016 | SH2000FR | SB2000FR | E4 |
| SH2100-CAT | SB2100-CAT | 20.9 ~ 22.1 | | | M017 | SH2100FR | SB2100FR | E5 |
| SH2200-CAT | SB2200-CAT | 21.9 ~ 23.1 | | | M018 | SH2200FR | SB2200FR | E6 |
| SH2300-CAT | SB2300-CAT | 22.9 ~ 24.1 | R012(6) | B012(6) | M017 | SH2300FR | SB2300FR | E5 |
| SH2400-CAT | SB2400-CAT | 23.9 ~ 25.1 | | | M018 | SH2400FR | SB2400FR | E6 |
| SH2500-CAT | SB2500-CAT | 24.9 ~ 26.1 | | | M019 | SH2500FR | SB2500FR | E7 |
| SH2600-CAT | SB2600-CAT | 25.9 ~ 27.1 | | | M020 | SH2600FR | SB2600FR | |
| SH2700-CAT | SB2700-CAT | 26.9 ~ 28.1 | | | M021 | SH2700FR | SB2700FR | |
| SH2800-CAT | SB2800-CAT | 27.9 ~ 29.1 | | | M022 | SH2800FR | SB2800FR | |
| SH2900-CAT | SB2900-CAT | 28.9 ~ 30.1 | | | M023 | SH2900FR | SB2900FR | E8 |
| SH3000-CAT | SB3000-CAT | 29.9 ~ 31.1 | R013(6) | B013(6) | M022 | SH3000FR | SB3000FR | |
| SH3100-CAT | SB3100-CAT | 30.9 ~ 32.1 | | | M023 | SH3100FR | SB3100FR | |
| SH3200-CAT | SB3200-CAT | 31.9 ~ 33.1 | | | M024 | SH3200FR | SB3200FR | |
| SH3300-CAT | SB3300-CAT | 32.9 ~ 34.1 | | | M025 | SH3300FR | SB3300FR | |
| SH3400-CAT | SB3400-CAT | 33.9 ~ 35.1 | | | M026 | SH3400FR | SB3400FR | |
| SH3500-CAT | SB3500-CAT | 34.9 ~ 36.1 | R014(6) | B014(6) | M027 | SH3500FR | SB3500FR | E9 |
| SH3600-CAT | SB3600-CAT | 35.9 ~ 37.1 | | | M028 | SH3600FR | SB3600FR | |
| SH3700-CAT | SB3700-CAT | 36.9 ~ 38.1 | | | M029 | SH3700FR | SB3700FR | |
| SH3800-CAT | SB3800-CAT | 37.9 ~ 39.1 | | | M030 | SH3800FR | SB3800FR | |
| SH3900-CAT | SB3900-CAT | 38.9 ~ 40.1 | | | M031 | SH3900FR | SB3900FR | |
| SH4000-CAT | SB4000-CAT | 39.9 ~ 41.1 | R015(6) | B015(6) | M030 | SH4000FR | SB4000FR | E10 |
| SH4100-CAT | SB4100-CAT | 40.9 ~ 42.1 | | | M031 | SH4100FR | SB4100FR | |
| SH4200-CAT | SB4200-CAT | 41.9 ~ 43.1 | | | M032 | SH4200FR | SB4200FR | |
| SH4300-CAT | SB4300-CAT | 42.9 ~ 44.1 | | | M033 | SH4300FR | SB4300FR | |
| SH4400-CAT | SB4400-CAT | 43.9 ~ 45.1 | | | M034 | SH4400FR | SB4400FR | |

**How to read a tool model No.**

SH 800 - CAT

- This means Superoll MAC
- Burnishing size(ex. 800 → ø8)
- SH: for through hole
  SB: for blind hole



Internal External End surface
Taper R surface Spherical

# Single Roller Superoll SR type

Capable of mirror finishing inner, outer, end, tapered, R, and spherical surfaces of large parts. Single Roller Superoll has great versatility. The Head assembly can be changed according to the user's need.

【 Driving unit 】
Lathe

## SR5AL-S25(20)

**For External/End surface burnishing**

Sample of application

## SR36M45°L-S25(20)

**External/R surface burnishing**

Sample of application

## Applications

For groove bottom

For improving screw thread

Installation on a NC lathe

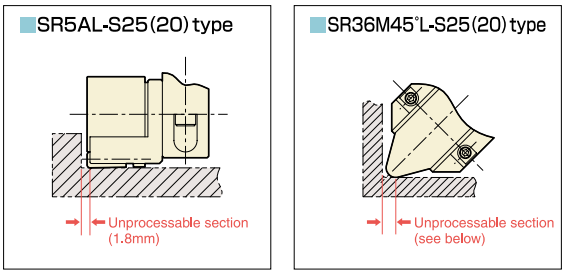
## How to use SR type

1. Attach a Single Roller Superoll to a tool past of a lathe.
2. Set the pressure-control spring with the preload adjusting knob to obtain the optimum surface roughness with 0.1 - 0.5 mm (.004"-.020") roller compression.
3. Apply the predetermined compression to the roller while rotating the work and feed the tool to finish the burnishing surface.

Note: Be sure to use lubricant for burnishing with Single Roller Superoll.

## Un-processable area by SR type

**〔Unprocessable section by Superoll〕**

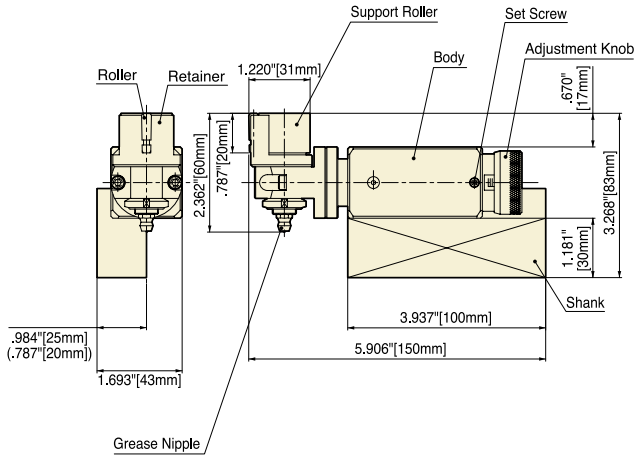



| Roller tip R in/mm | Unprocessable section in/mm |
|---|---|
| .040"/1mm | .060"/1.5mm |
| .100"/2.5mm | .120"/3mm |
| .160"/4mm | .180"/4.5mm |

Note1.The above unprocessable area is approximately .020" (0.5mm) to prevent a tool crash plus the roller tip radius dimension.

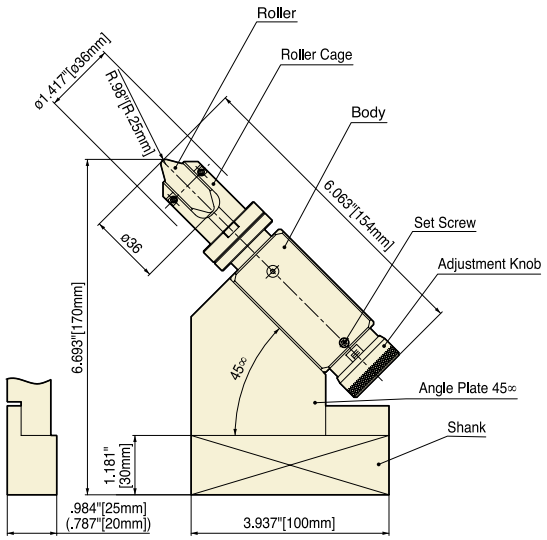
## Dimensions

**SR5AL-S25(20)type**




weight: 3.9lb (1.8kg)

**SR36M45∞L-S25(20)type**




weight: 5.3lb (2.4kg)

Note: Special design rollers are available.

### 〔Machining Parameters〕

| Material | Surface Speed | | Feed Rate | | | | Work Load | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | SR5/SR36M | | SR5 | | SR36M | | SR5 | | SR36M | |
| | ft/min | m/min | Inch/rev | mm/rev | Inch/rev | mm/rev | Lbf | N | Lbf | N |
| Carbon & Alloy steel | 164~328 | 50~100 | .004~.019 | 0.1 ~0.5 | .002~.011 | 0.05~0.3 | 112.4 ~337.2 | 500~1,500 | 44.96~112.4 | 200~500 |
| Stainless steel | | | | | | | | | | |
| Cast iron | | | | | | | | | | |
| Aluminum & Cooper alloy | 328~656 | 100~200 | .002~.011 | 0.05~0.3 | | | 22.48~ 89.92 | 100~ 400 | 11.24~33.72 | 50~150 |

Note: Use the table above as a guideline for processing. Conditions such as pre-burnish tolerance, material and material hardness will affect the surface finish. Make adjustments accordingly.

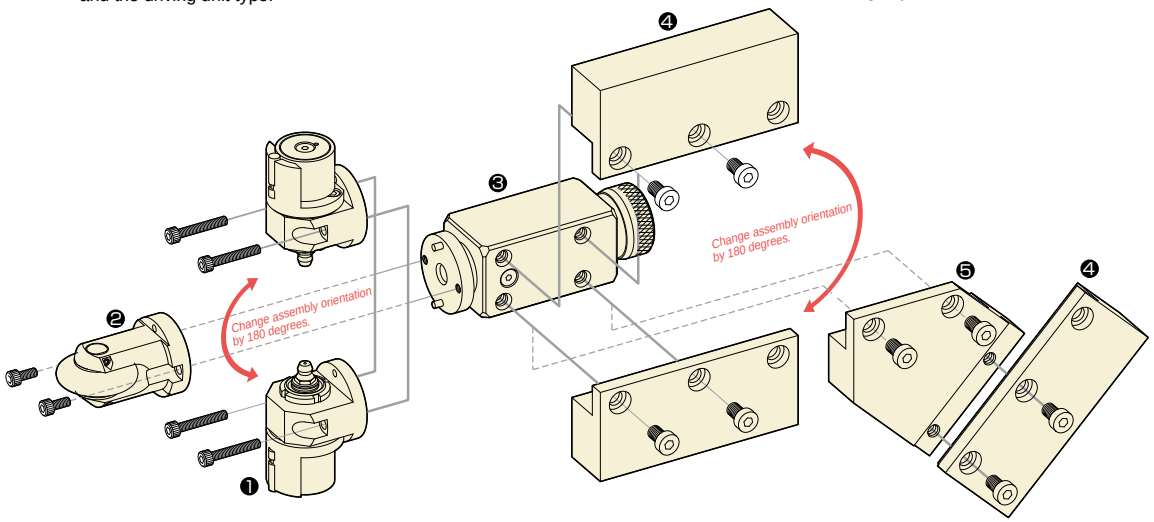
## Head assembly and shank assembly

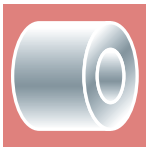
### 〔 Example of assembly 〕

| | |
|---|---|
| SR5AL-S25 (For External/End surface burnishing) | ❶ + ❸ + ❹ |
| SR36M45°R-S25 type (R surface burnishing) | ❷ + ❸ + ❺ + ❹ |

Note: Other types of assemblies are available depending on parts to be burnished and the driving unit type.

❶ SR5 type head assembly
❷ SR36M type head assembly
❸ Body Ass'y
❹ Shank
❺ Angle plate





## Internal External For end surface

## Single Roller Superoll SR·C type

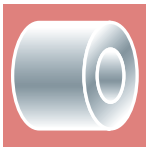
Single Roller Superoll is an excellent light and compact burnishing tool capable of completing mirror finishing on inner, outer, and end surfaces.

【 Driving unit 】
Lathe


### Samples of application

Roller burnishing sample

Installation on a NC lathe



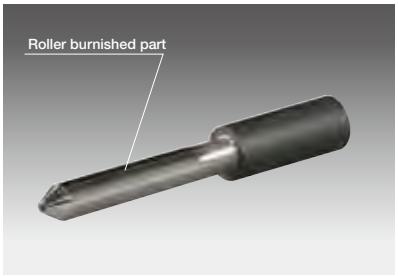
## External End surface

## Single Roller Superoll SR16M type

This is a burnishing tool that can be installed to an automatic CNC lathe.

【 Driving unit 】
Automatic lathe


### Applications




Roller burnishing sample

Installation on a CNC lathe

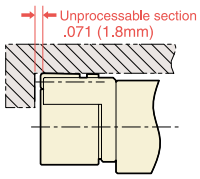
### How to use SR·C type and SR16M type

1. Install a Single Roller Superoll to a tool post (holder) of equipment such as a CNC lathe.
2. Set the pressure-control spring with the preload adjusting knob to obtain the optimum surface roughness.
3. Apply the predetermined compression to the roller while rotating the work and feed the tool to finish the burnishing surface.

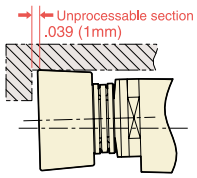
Note: Only SR26C100 type can be used to inner, outer, and edge surface burnishing without changing the orientation.

## Un-processable area by SR5C100 type, SR26C100 type

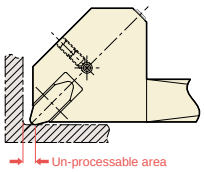
SR5C100 type




SR26C100 type




SR16M

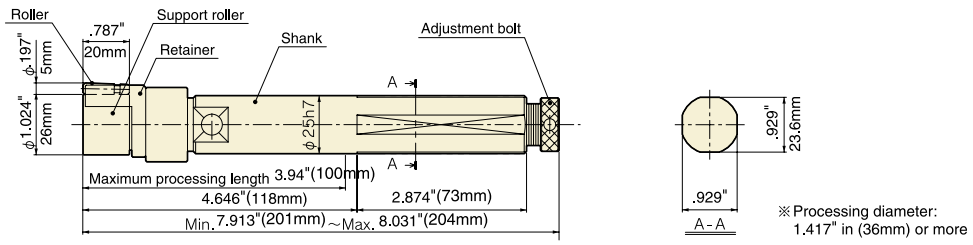



| Roller tip R | Un-processable area |
|---|---|
| mm | mm |
| R0.5 | 0.039" |
| R1.5 | 0.079" |
| R3 | 0.138" |

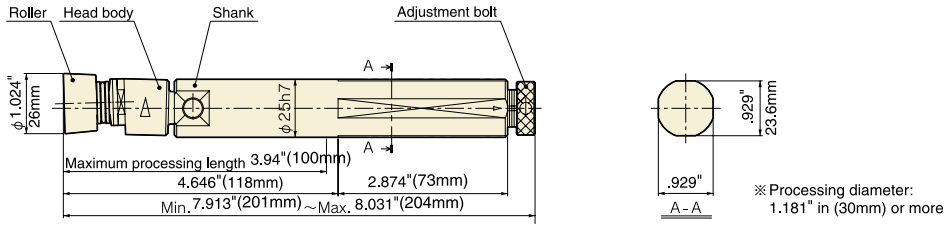
Note: The un-processable areas above are values when the clearance of 0.5 mm is retained between the roller and the work end surface.

## Dimensions

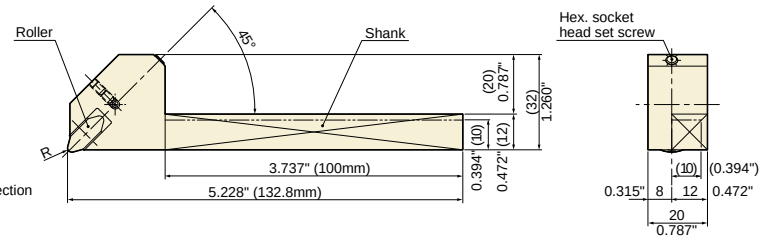
SR5C100 type




SR26C100 type




〔SR16MR**R-45°-S12〕
(**=R)




R=0.5 · 1.5 · 3

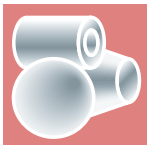
## 〔Specifications and ref.parameters for SR·C type〕

| Tool model No. | Shank size | Maximum burnishing length | Work piece | | Work piece material | Peripheral speed | Feed rate | Burnishing pressure |
|---|---|---|---|---|---|---|---|---|
| | | | Internal | External | | | | |
| | mm | mm | mm | mm | | m/min | mm/rev | N |
| SR5C100 | ø25h7x100<br>.984x3.940 | 100<br>3.940" | ø36 or more<br>1.420" or more | Unlimited | Carbon steel | 50 ~ 100 | 0.05 ~ 0.2 | 300 ~ 400 |
| | | | | | Stainless steel | | | |
| | | | | | Cast iron | | | 200 ~ 300 |
| | | | | | Aluminum/Light alloy | 100 ~ 200 | 0.05 ~ 0.4 | 200 ~ 400 |
| SR26C100 | ø25h7x100<br>.984x3.940 | 100<br>3.940" | ø36 or more<br>1.420" or more | Unlimited | Carbon steel | 50 ~ 100 | 0.05 ~ 0.1 | 400 ~ 500 |
| | | | | | Stainless steel | | | |
| | | | | | Cast iron | | 0.05 | 200 ~ 500 |
| | | | | | Aluminum/Light alloy | 100 ~ 200 | 0.05 ~ 0.1 | 300 ~ 500 |

## 〔Ref.parameters for SR16M type〕

| Tool model No. | Work piece material | Peripheral speed | Feed rate | Embedded spring rate |
|---|---|---|---|---|
| | | m/min | mm/rev | N/mm |
| SR16MR1.5R-45°-S10 | Steel alloy | 100~200 | 0.05~0.1 | 42.5<br>·<br>166 |
| SR16MR1.5R-45°-S12 | | | | |
| SR16MR1.5L-45°-S10 | | | | |
| SR16MR1.5L-45°-S12 | | | | |

Note1. Special roller shape and attachment angle is available upon request.
2. An embedded spring is selected from two standard types according to the material.



For outer surface | For end surface | For tapered surface | For R surface | For spherical surface

# CAT'S EYE

Diamond tip type burnishing tool, CAT"S EYE can be applied to hard materials up to HRC 60. Indexable tip enables quick and easy replacement.

CEH-4D1-R25 type　CEO-4D1R-S25 type　CEF-4D1R-S25 type

## Specifications

| Tool type and number | Processing section | Minimum processing diameter in | Shank diameter in | Maximum processing length in | Tip type and number |
|---|---|---|---|---|---|
| CEH-2D1-R25 | Inner surface | ϕ.512" (13mm) | ϕ.984" (25mm) | 1.772" (45mm) | DT2D1 |
| CEH-4D1-R25 | | ϕ.787" (20mm) | | 2.362" (60mm) | DT4D1 |

Note:Upon your request, 25.4mm (1") dia. shank is also available.

| Tool type and number | Processing section | Shank size in | Handed direction | Tip type and number |
|---|---|---|---|---|
| CEO-4D1R-S25 | Outer surface | □.984" (25mm) | Right handed | DT4D1 |
| CEO-4D1L-S25 | | | Left handed | |
| CEF-4D1R-S25 | End surface | | Right handed | |
| CEF-4D1L-S25 | | | Left handed | |

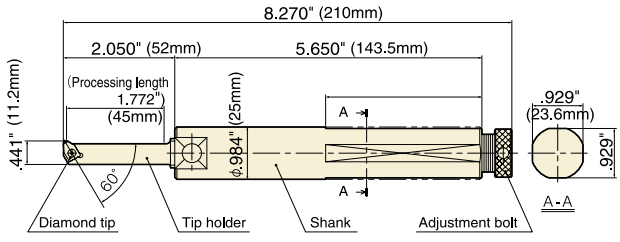
Note: Upon your request, .630" (16mm) or .790" (20mm) square shank is also available.

## Dimensions

(in)

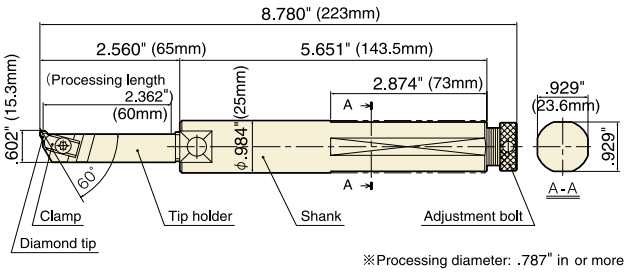
**For inner surface**

CEH-2D1-R25 type




※Processing diameter: .512" in or more

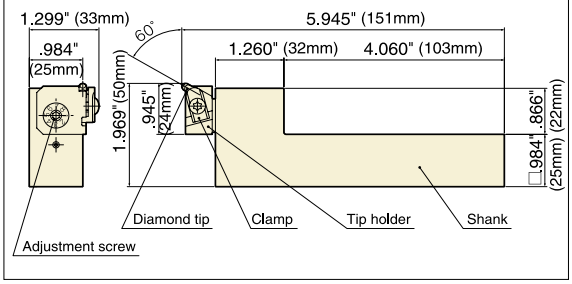
CEH-4D1-R25 type




※Processing diameter: .787" in or more

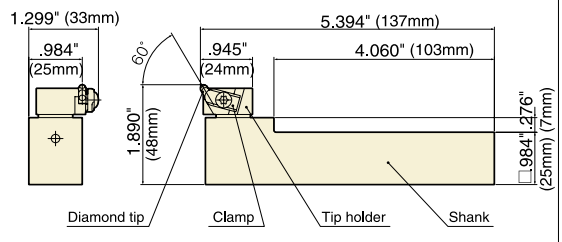
**For outer surface**

CEO-4D1L-S25 type




**For end surface**

CEF-4D1L-S25 type



## Example of processing

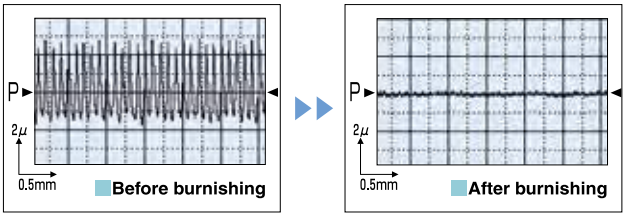
Outer surface processing

Attaching to NC lathe

### 〔Machining conditions〕

| | | |
|---|---|---|
| Tool type and number | | CEO-4D1L-S25 |
| Work piece material | | SUJ2(HRC60) |
| Work piece inner diameter | in | .512" |
| Surface roughness | Ryμinch | Before burnishing 15.48 Ry 4.0 Rz |
| | | After burnishing 15.74 Ry 0.4 Rz |
| Peripheral velocity | ft/min | 325 |
| Feed | in/rev | .002 |
| Spring load | lbs | 200 |

### 〔Comparison of surface roughness〕



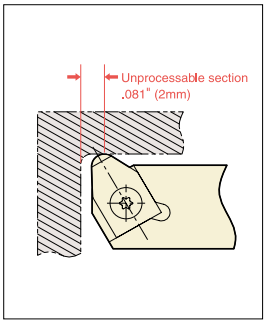

## Processing conditions

### 〔How to use〕

1.Attach CAT'S EYE, to the turret of lathe.
2.Set preload (spring tension built in the body).
3.Rotate the work piece and feed the tool with correct processing parameters.
*Set tool pressing amount.
· For outer and end surface:.004"-.012" in from the work piece surface.
· For inner: .012-.021 in from the work piece surface.
4.When tool reaches to the burnishing end point, stop the feed and separate the tool from the work piece to finish burnishing.

Note 1. Tool rotation is not possible.
2. Be sure to use lubricants while burnishing.
Do not stop rotating the work piece until the tool is separated from it.
3. One chuck processing is recommended from pre-burnishing to burnishing.
*One chuck processing = burnishing WITHOUT UNCHUCKING the work piece after pre-burnishing process.

### 〔Unprocessable section by SuperoII〕




Note: As illustrated (left) a .081"(2 mm) clearance area is necessary to prevent a potential tool crash.

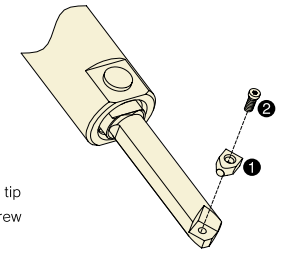
### 〔Machining conditions〕

| Tool type and number | Processing section | Work piece hardness HRC | Peripheral velocity ft /min | Feed in/rev | Spring load lbs | Surface roughness Before burnishing |
|---|---|---|---|---|---|---|
| CEH-4D1-R25 | Inner surface | 45 | 165～650 | .002 | 40 | ≃ 4.0 (Rz) ≃ 157 (Ry) |
| | | 60 | | | 200 | |
| CEO-4D1R-S25 | Outer surface | 45 | | | 9 | |
| CEF-4D1R-S25 | End surface | 60 | | | 45 | |

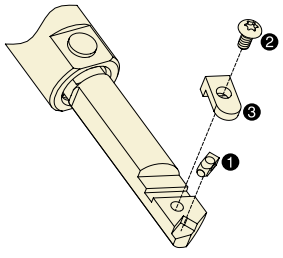
Note: The processing conditions above are for Steel alloy.

## Assembled drawing

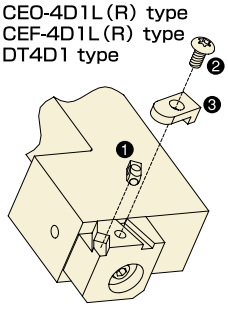
Tool type : CEH-2D1 type
Tip type : DT2D1 type



Tool type : CEH-4D1 type
Tip type : DT4D1 type



Tool type : CEO-4D1L(R) type
CEF-4D1L(R) type
Tip type : DT4D1 type



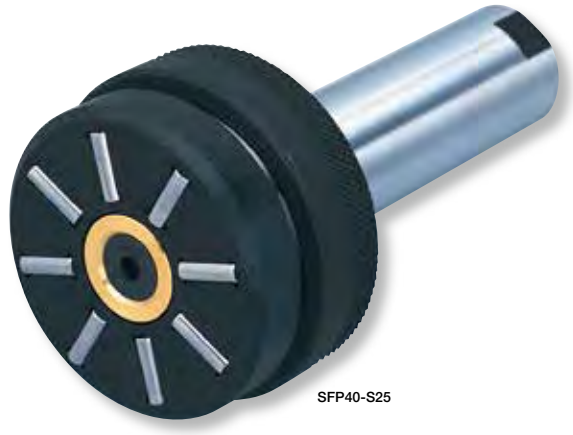
❶ Diamond tip
❷ TORX screw
❸ Clamp

## Flat surface

### Superoll Level

This tool enables mirror finishing on flat surface in a similar procedure as face milling operation (crosscut milling). With unlimited burnishing range, this method is optimal for mating or seal surface of transmission parts.

**【 Driving unit 】**
Machining center　Milling center


SFP40-S25

## How to use Superoll Level

1. Attach a Superoll Level to a machining center or milling center.
2. Set the Axis Z of the driving unit properly so that the roller compression is appropriated (stroke control).
3. Move the Superoll Level horizontally while rotating to press the work surface.


Attached to a milling center

### 〔 Ref. parameter 〕

| Tool model No. | Rotation speed | Feed rate | Compression |
|---|---|---|---|
| | $min^{-1}$ | mm/rev | mm |
| SFP20-S20 | 900 ~ 3,000 | 0.1 ~ 0.5 | 0.02 ~ 0.04 |
| SFP40-S25 | 500 ~ 1,600 | 0.2 ~ 0.7 | 0.02 ~ 0.05 |
| SFP60-S32 | 300 ~ 1,000 | 0.3 ~ 1.4 | 0.02 ~ 0.05 |

## Dimensions (mm)

Fig.1

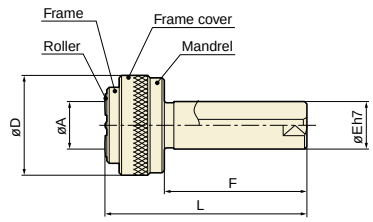
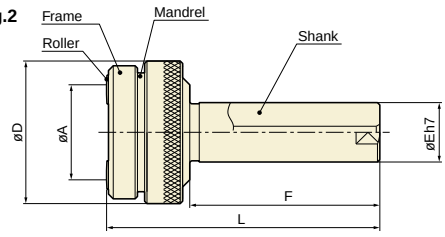



Fig.2




## Specifications

| Tool model No. | Effective burnishing range A | Tool outer diameter D | Shank length F | Shank diameter E | Overall length L | Number of rollers | Dimensions |
|---|---|---|---|---|---|---|---|
| | mm | mm | mm | mm | mm | pcs. | |
| SFP20-S20 | 20 | 42 | 60 | 20 | 85 | 4 | Fig.1 |
| SFP40-S25 | 40 | 60 | 80 | 25 | 115 | 8 | Fig.2 |
| SFP60-S32 | 60 | 82 | 80 | 32 | 120 | 12 | Fig.2 |

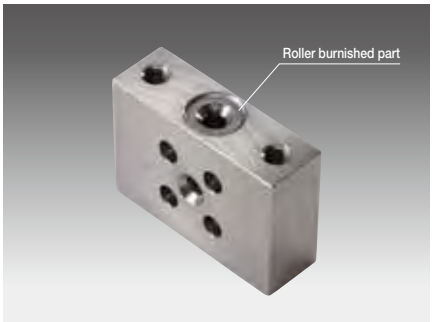
Note. The mandrel and the shank are integrated on SFP20-S20.

# For other types of surface burnishing

## Flat surface and End surface

### Superoll SF type

The tool is suitable for mirror finishing of spline hubs, connector flanges, clutch parts, and semiconductor valves. The minimum diameter of flat surface applicable is 2 mm.




**〔 Sample of application 〕**
Body (joint for semiconductor manufacturing device)

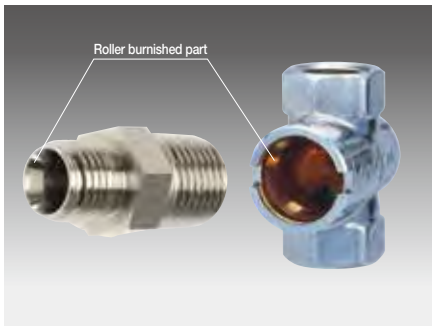
## 〔 Special Superoll series 〕

Special Superolls are designed and manufactured on your specifications.

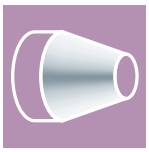
### Internal taper

#### Superoll ST type

This tool is best-suited for mirror-like finishing of sealing surface such as valve seats. The minimum diameter of taper applicable is 3 mm.



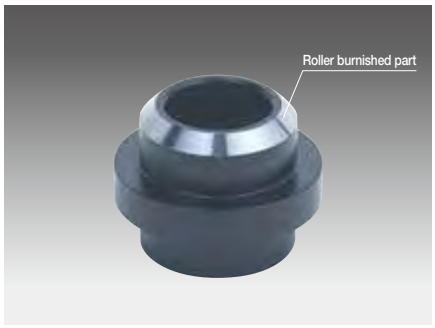

〔 Sample of application 〕
Left: Body (stainless steel tube joint)
Right: Gas cock



### External taper

#### Superoll SE type

This tool is best-suited for mirror-like finishing of sealing surface such as joints and valves. The minimum diameter of taper applicable is 1 mm.

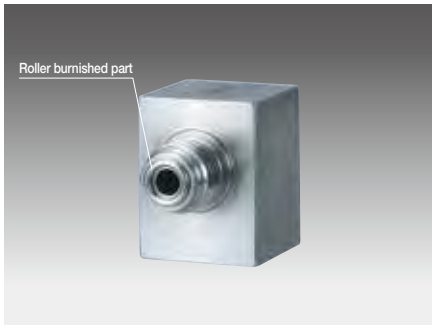



〔 Sample of application 〕 Joint

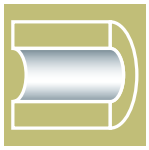
### R surface

#### Superoll FD type

This tool is best-suited for mirror-like finishing of R seat surface of piping joint, etc.




〔 Sample of application 〕 Semiconductor joint

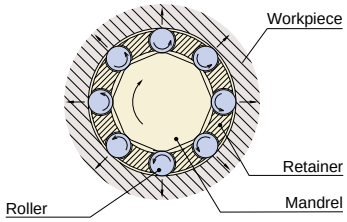


### Internal through hole

#### Bearingizer

This tool is best-suited for inner finishing of wrist pin holes, etc. With the polygon cross section of the mandrel, the hardness of burnished surface is increased by peening and rolling effects. Highly precise and durable surface is achieved.

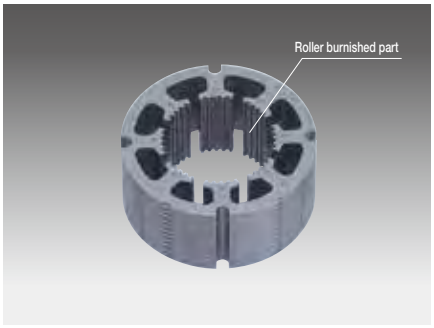
〔 Mechanism 〕



## Internal through hole

### Superoll ME type

Designed for processing the ID of a motor stator. Improves size, tolerance, and cylindricity of workpiece, improving motor efficency.




〔 Sample of application 〕 Motor stator

## Spherical

### Superoll SES type

This is a Superoll with a motor that can burnish spherical works such as ball studs and tie rods.
Spherical figures are processed by rotating both the work and the tool that is installed in a lathe.

〔 Sample of application 〕 Ball stud

## Molding micro dimples

### Micro dimple molding tool

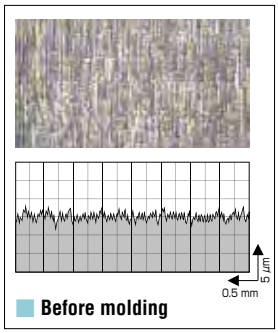
US.PAT.8931320

This is a tool designed to mold minute dimples (dents) a few μm depth on surface. There are many types including inner, outer, and flat surfaces.

Internal

Flat surface

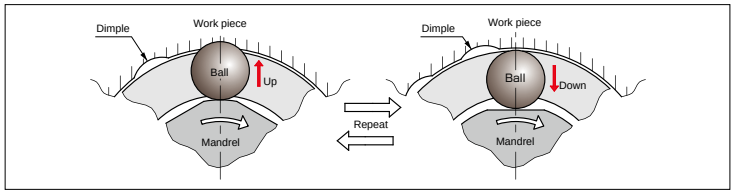
External



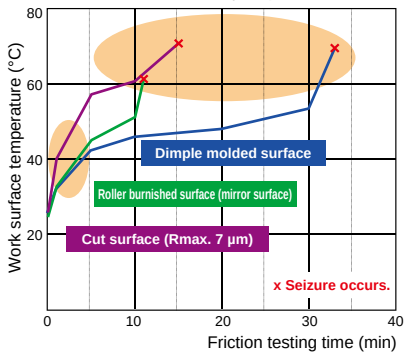

〔 condition 〕 Internal of aluminum materials
Driving unit : Milling machine Work material: A2017
Rotation speed: 1,000 min-1, Feed rate: 1.5 mm/rev

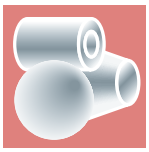
## Principle

This technique molds desired minute dimples (dents) on the metal surface. The molded surface has high abrasion resistance, seize resistance, and sliding property due to the oilpot effect. The balls embedded in the micro-dimple tool project regularly by the specified rotation and feed rate, enabling the molding of dimples at high speed.




〔 Results of friction & durability test per finished surface 〕



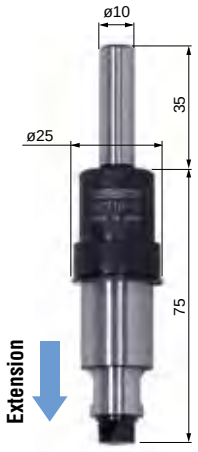


# Tool Holder for Deburring

## Barriquan™

Featuring a built-in floating mechanism, the Barriquan is a tool holder specifically designed for deburring. You can easily program the holder to remove burrs from die-cast, molded, and other intricate parts.

## Product type

| Pressing force adjustable type | Short type | Back side deburring type |
|---|---|---|
|  BC10-20 |  BC10-10 |  BCT10-10 |

## Specifications

| Models | Weight | Pressing force adjustment | The permission number of rotations | Floating amount | Shank size |
|---|---|---|---|---|---|
| BC10-20 | 280 g | Hand adjustment (16 stages) | 5000 $min^{-1}$ | 10 mm | ø20×40L |
| BC10-10 | 140 g | Exchange Spring | 8000 $min^{-1}$ | | ø10×35L |
| BCT10-10 | 180 g | Exchange Spring | | | |

## Characteristics

**Before**

**After**


Without Barriquan


With Barriquan

**Recommended tool shape**


For front side


For back side

## Samples of application

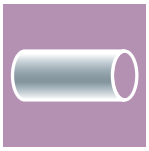

For cross hole (back)


For cross hole (front)


Contour deburring


Help brush tool


With Robot



# Shaft, Pin

## ø1 mm~ Superoll Mugen

This is a center-less roller burnishing unit used for mirror surface finishing for items such as pins, shafts and rods. Compared with grinding, or polishing and ultra-finishing, it provides high abrasion resistance in a short operating time.

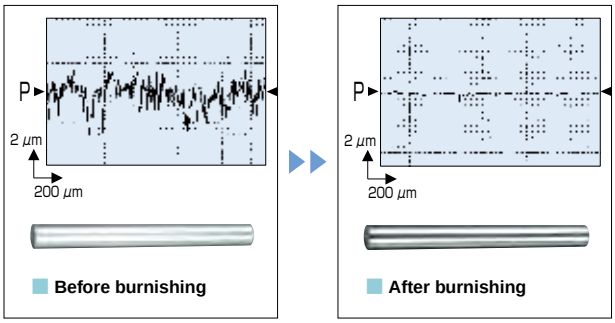

## Sample of application

- Printer guide shaft
- Copier's photosensitive drum
- Guide roller for video tape recorder.
- Hydraulic cylinder piston rod
- Automobile brake piston
- Electric motor shaft
- Various types of coils and wires, etc.

### 〔 Ref. parameters 〕

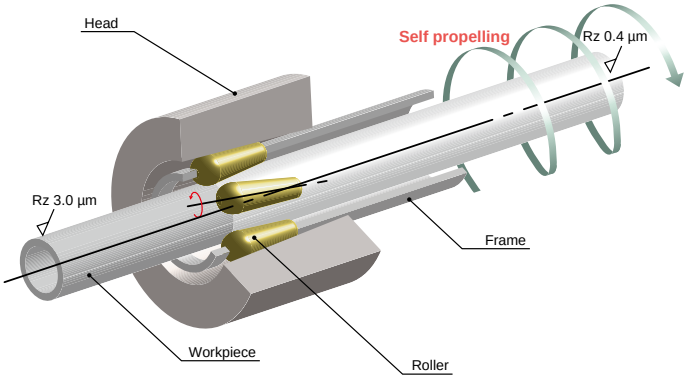
| | | |
|---|---|---|
| Work piece name | | Printer shaft |
| Work piece material | | SUM23L |
| Work piece size | mm | ø9×340 |
| Surface roughness | Rz µm | Before burnishing 2.0 |
| | | After burnishing 0.3 |
| Machining time | sec. | 9 |

### 〔 Comparison of surface roughness 〕




## Principle

Rollers installed in the frame are pitched so that the work turns like a screw and discharges backward when the frame is rotated. (self-feeding the work).
The Superoll Mugen requires no special feeder. In principle, outer surface burnishing of unlimited length is possible.



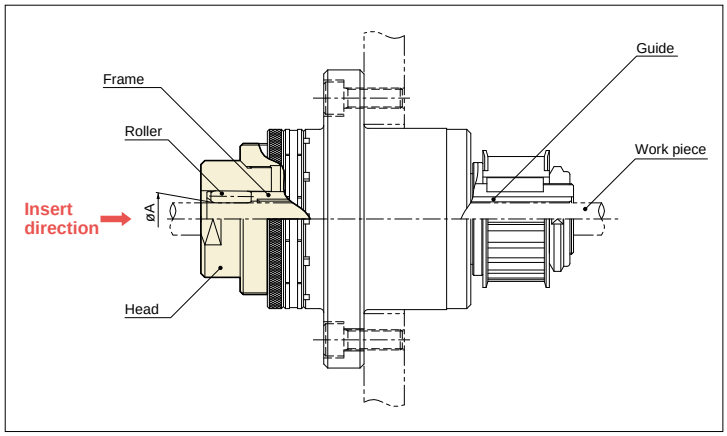

## Specifications

| | | | |
|---|---|---|---|
| Unit model No. | | | SMH-2601 |
| Work size | | mm | ø1 ~ ø26 |
| Feed speed | | mm/sec | 20 ~ 40 |
| Superoll head | Motor | kW | 0.75 ( AC200V ) |
| | Rotation speed | $min^{-1}$ | Variable 500 - 1,200 (inverter controlled) |
| Total weight | | kg | 400 |

# Superoll head

This tool is equipped with a micro-adjustment mechanism by 0.0025 mm increments. Best-suited Superoll heads can be selected according to the work size.

## Names of Superoll head components




## Specifications of Superoll head

| Model No. | Tool diameter adjusting range A | Roller | | Head model No. | Frame model No. | Guide model No. |
|---|---|---|---|---|---|---|
| | mm | Models | Quantity | | | |
| SO 300-∞LE | 3.05 ~ 2.75 | SPMR4X15 | 3 | SPMH 300 | SPMF 300 | SPMG 300 |
| SO 325-∞LE | 3.30 ~ 3.00 | | | SPMH 325 | SPMF 325 | SPMG 325 |
| SO 350-∞LE | 3.55 ~ 3.25 | | | SPMH 350 | SPMF 350 | SPMG 350 |
| SO 375-∞LE | 3.80 ~ 3.50 | | | SPMH 375 | SPMF 375 | SPMG 375 |
| SO 400-∞LE | 4.05 ~ 3.75 | | | SPMH 400 | SPMF 400 | SPMG 400 |
| SO 425-∞LE | 4.30 ~ 4.00 | | | SPMH 425 | SPMF 425 | SPMG 425 |
| SO 450-∞LE | 4.55 ~ 4.25 | | | SPMH 450 | SPMF 450 | SPMG 450 |
| SO 475-∞LE | 4.80 ~ 4.50 | | | SPMH 475 | SPMF 475 | SPMG 475 |
| SO 500-∞LE | 5.05 ~ 4.75 | | | SPMH 500 | SPMF 500 | SPMG 500 |
| SO 525-∞LE | 5.30 ~ 5.00 | | | SPMH 525 | SPMF 525 | SPMG 525 |
| SO 550-∞LE | 5.55 ~ 5.25 | | | SPMH 550 | SPMF 550 | SPMG 550 |
| SO 575-∞LE | 5.80 ~ 5.50 | | | SPMH 575 | SPMF 575 | SPMG 575 |
| SO 600-∞LE | 6.05 ~ 5.75 | | 5 | SPMH 600 | SPMF 600 | SPMG 600 |
| SO 625-∞LE | 6.30 ~ 6.00 | | | SPMH 625 | SPMF 625 | SPMG 625 |
| SO 650-∞LE | 6.55 ~ 6.25 | | | SPMH 650 | SPMF 650 | SPMG 650 |
| SO 675-∞LE | 6.80 ~ 6.50 | | | SPMH 675 | SPMF 675 | SPMG 675 |
| SO 700-∞LE | 7.05 ~ 6.75 | | | SPMH 700 | SPMF 700 | SPMG 700 |
| SO 725-∞LE | 7.30 ~ 7.00 | | | SPMH 725 | SPMF 725 | SPMG 725 |
| SO 750-∞LE | 7.55 ~ 7.25 | | | SPMH 750 | SPMF 750 | SPMG 750 |
| SO 775-∞LE | 7.80 ~ 7.50 | | | SPMH 775 | SPMF 775 | SPMG 775 |
| SO 800-∞LE | 8.05 ~ 7.75 | SPMR5X20 | 5 | SPMH 800 | SPMF 800 | SPMG 800 |
| SO 825-∞LE | 8.30 ~ 8.00 | | | SPMH 825 | SPMF 825 | SPMG 825 |
| SO 850-∞LE | 8.55 ~ 8.25 | | | SPMH 850 | SPMF 850 | SPMG 850 |
| SO 875-∞LE | 8.80 ~ 8.50 | | | SPMH 875 | SPMF 875 | SPMG 875 |
| SO 900-∞LE | 9.05 ~ 8.75 | | | SPMH 900 | SPMF 900 | SPMG 900 |
| SO 925-∞LE | 9.30 ~ 9.00 | | | SPMH 925 | SPMF 925 | SPMG 925 |
| SO 950-∞LE | 9.55 ~ 9.25 | | | SPMH 950 | SPMF 950 | SPMG 950 |
| SO 975-∞LE | 9.80 ~ 9.50 | | | SPMH 975 | SPMF 975 | SPMG 975 |
| SO1000-∞LE | 10.05 ~ 9.75 | | | SPMH1000 | SPMF1000 | SPMG1000 |
| SO1025-∞LE | 10.30 ~ 10.00 | | | SPMH1025 | SPMF1025 | SPMG1025 |

| Model No. | Tool diameter adjusting range A | Roller | | Head model No. | Frame model No. | Guide model No. |
|---|---|---|---|---|---|---|
| | mm | Models | Quantity | | | |
| SO1050-∞LE | 10.55 ~ 10.25 | SPMR5X20 | 5 | SPMH1050 | SPMF1050 | SPMG1050 |
| SO1075-∞LE | 10.80 ~ 10.50 | | | SPMH1075 | SPMF1075 | SPMG1075 |
| SO1100-∞LE | 11.05 ~ 10.75 | | | SPMH1100 | SPMF1100 | SPMG1100 |
| SO1125-∞LE | 11.30 ~ 11.00 | | | SPMH1125 | SPMF1125 | SPMG1125 |
| SO1150-∞LE | 11.55 ~ 11.25 | | | SPMH1150 | SPMF1150 | SPMG1150 |
| SO1175-∞LE | 11.80 ~ 11.50 | | | SPMH1175 | SPMF1175 | SPMG1175 |
| SO1200-∞LE | 12.05 ~ 11.75 | SPMR6X20 | 5 | SPMH1200 | SPMF1200 | SPMG1200 |
| SO1225-∞LE | 12.30 ~ 12.00 | | | SPMH1225 | SPMF1225 | SPMG1225 |
| SO1250-∞LE | 12.55 ~ 12.25 | | | SPMH1250 | SPMF1250 | SPMG1250 |
| SO1275-∞LE | 12.80 ~ 12.50 | | | SPMH1275 | SPMF1275 | SPMG1275 |
| SO1300-∞LE | 13.05 ~ 12.75 | | | SPMH1300 | SPMF1300 | SPMG1300 |
| SO1325-∞LE | 13.30 ~ 13.00 | | | SPMH1325 | SPMF1325 | SPMG1325 |
| SO1350-∞LE | 13.55 ~ 13.25 | | | SPMH1350 | SPMF1350 | SPMG1350 |
| SO1375-∞LE | 13.80 ~ 13.50 | | | SPMH1375 | SPMF1375 | SPMG1375 |
| SO1400-∞LE | 14.05 ~ 13.75 | | | SPMH1400 | SPMF1400 | SPMG1400 |
| SO1425-∞LE | 14.30 ~ 14.00 | | | SPMH1425 | SPMF1425 | SPMG1425 |
| SO1450-∞LE | 14.55 ~ 14.25 | | | SPMH1450 | SPMF1450 | SPMG1450 |
| SO1475-∞LE | 14.80 ~ 14.50 | | | SPMH1475 | SPMF1475 | SPMG1475 |
| SO1500-∞LE | 15.05 ~ 14.75 | | 7 | SPMH1500 | SPMF1500 | SPMG1500 |
| SO1525-∞LE | 15.30 ~ 15.00 | | | SPMH1525 | SPMF1525 | SPMG1525 |
| SO1550-∞LE | 15.55 ~ 15.25 | | | SPMH1550 | SPMF1550 | SPMG1550 |
| SO1575-∞LE | 15.80 ~ 15.50 | | | SPMH1575 | SPMF1575 | SPMG1575 |
| SO1600-∞LE | 16.05 ~ 15.75 | | | SPMH1600 | SPMF1600 | SPMG1600 |
| SO1625-∞LE | 16.30 ~ 16.00 | | | SPMH1625 | SPMF1625 | SPMG1625 |
| SO1650-∞LE | 16.55 ~ 16.25 | | | SPMH1650 | SPMF1650 | SPMG1650 |
| SO1675-∞LE | 16.80 ~ 16.50 | | | SPMH1675 | SPMF1675 | SPMG1675 |
| SO1700-∞LE | 17.05 ~ 16.75 | | | SPMH1700 | SPMF1700 | SPMG1700 |
| SO1725-∞LE | 17.30 ~ 17.00 | | | SPMH1725 | SPMF1725 | SPMG1725 |
| SO1750-∞LE | 17.55 ~ 17.25 | | | SPMH1750 | SPMF1750 | SPMG1750 |
| SO1775-∞LE | 17.80 ~ 17.50 | | | SPMH1775 | SPMF1775 | SPMG1775 |

Note: Superoll heads of up to ø26 mm are available.

# Before using Superoll

## About pre-burnishing

### Pre-burnishing surface roughness

Superoll is a roller burnishing tool that creates mirror-like surface by compressing metal surface. Pre-burnishing surface condition is important to obtain excellent finished surface. A surface with consistant feed pattern: single point turning, reaming or boring is able to obtain improved surface finish. However, the process which leaves deep cuts is not ideal (e.g. drilling). Deep cuts are impossible to be compressed completely.

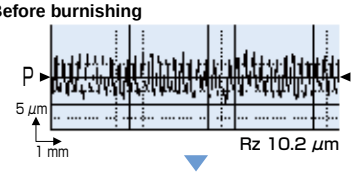
### Pre-burnishing dimensions

In inner surface Superoll burnishing, the inner diameter of each work increases for the amount that the metal surface is deformed. (It decreases in outer surface burnishing.)
In order to finish within the required dimensional tolerance, it is necessary to set the pre-burnishing dimension with this change taken into consideration. It varies depending on material, hardness, and burnishing amount. Test with the first few pieces to define the optimum value before starting consecutive burnishing.

| Work size mm | Estimated inner diameter increase range mm |
|---|---|
| 4.5 ~ 7.6 | 0.005 ~ 0.020 |
| 8.0 ~ 14.5 | 0.007 ~ 0.025 |
| 15.0 ~ 24.0 | 0.015 ~ 0.035 |
| 25.0 ~ 44.0 | 0.020 ~ 0.040 |
| 45.0 ~ 74.0 | 0.025 ~ 0.045 |
| 75.0 ~ 200.0 | 0.030 ~ 0.060 |

〔 Pre-processing by boring 〕

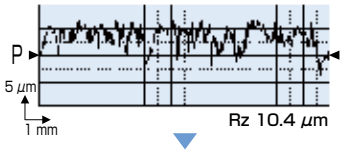
Before burnishing



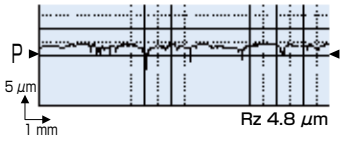

After burnishing


〔 Pre-processing by drill 〕

Before burnishing




After burnishing




## Drive unit and lubricant

### Driving device

Superoll can be used with any machine that can provide specified rotation speed and feed and does not require a special driving unit. Unlike cutting, small power is required for the driving unit as high torque is not required. It can be attached to and easily used on equipment such as universal drilling machine, lathe, turret machine, boring machine, and drilling unit. If performing Superoll consecutively with cutting by NC lathe, automatic CNC lathe, or machining center, cutting chips must be removed completely by washing with coolant, etc.

### Lubrication and washing

Roller burnishing generates a small amount of metal powder. Thus, use a high-fluidity lubricant for washing.
We offer exclusive Superoll Oil. The cleanliness of the lubricant affects finished roughness and Superoll lifetime. Use of a filter is recommended if using lubricant in circulation. Select filter accuracy in a range of 5 - 40 μm according to the finished surface roughness.

## Superoll Oil

This lubricant with high fluidity prevents wear on consumables and extends Superoll service life. A 1-liter can and 18-liter can are available.

### Superoll Oil (oil-based)

Add this oil to kerosene or light oil to constitute 5%. With phosphoric ester as the main component, it offers excellent oil film strength as well as rust prevention.

1-litter can

### Superoll Oil (water-soluble)

Dilute this solution-type soluble oil to 5% for use. It has excellent permeability, coolability, washability, separation of mixed oil, and anti-corrosiveness. EP agents (chlorine, sulfur) are not used.

18-litter can

# Burnishing area

## Hardness

In general, HRC40 is the limit of work hardness that can be burnished with Superoll. CAT'S EYE (pages 20 & 21) is recommended for harder works heat-treated by induction hardening or carbonizing treatment. Use the Superoll Inquiry Sheet on page 31 to ask us about other special usage.

## Thickness

Burnished section must have sufficient thickness to tolerate pressure by Superoll (20% or more of the inner diameter.)
If not thick enough, the section may be deformed or its roundness is affected. The following are some measures:

1. Burnish with a special Superoll with additional rollers. Use the Superoll Inquiry Sheet on page 31.
2. Improve pre-burnishing surface roughness to reduce the burnishing amount.
3. Perform Superoll burnishing before reducing the wall thickness.

## Configuration

When there is a large cross hole or key groove on the burnishing area, fine surface finish may not be obtained. In such a case, a special Superoll with additional rollers can be applied.

## Specials

Superoll with special specifications, such as those listed below, may also be available. Use the Superoll Inquiry Sheet on page 31 to contact us.

1. Burnishing with a special driving unit
2. Special shank shape
3. Coolant-through type
4. Burnishing of thin works
5. Intermittent or multi-step simultaneous burnishing

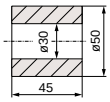
## Relationship between burnishing amount and surface roughness/expansion of inner diameter

The graphs on the right show relationships of burnishing amount with surface roughness and that with expansion of inner diameter on various metals.
Surface roughness improves with burnishing amount. The optimum burnishing amount and expansion of inner diameter vary among materials. Refer to the figures on the right to set the optimum conditions.

**Burnishing Value = [ Tool diameter ] - [ Pre-burnishing inner diameter ]**
**Expansion of inner diameter**
**= [ Past-burnishing inner diameter ] - [ Pre-burnishing inner diameter ]**

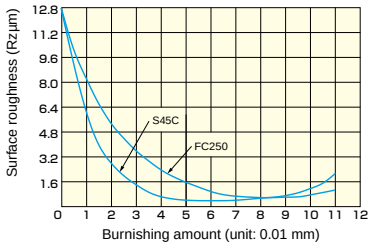
### 〔 Burnishing conditions 〕

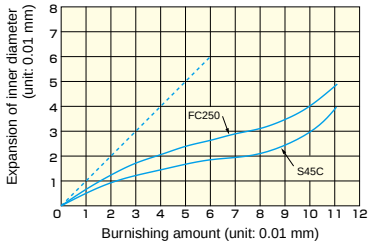
Dimensions:
O.D. 50 x I.D. 30 - length 45 (mm)
Pre-processing: Boring
Tool: SH3000 SUPEROLL
Rotation speed: 530 $min^{-1}$
Feed rate: 0.5 mm/rev




■ **Iron-based**

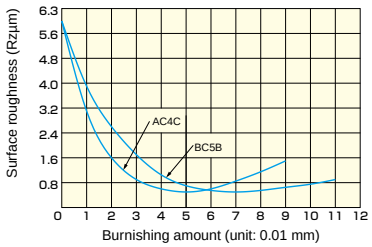
**Materials: S45C, FC250**

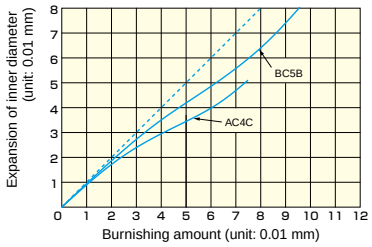



■ **Non-iron based**

**Materials: AC4C, BC5B**



# Replacement of consumable parts ( SH/SB type )

The following are procedures to replace consumable parts of the SH and SB type Superoll.
For other Superoll types, refer to the relevant Instruction Manual.

## 1. Replacement of rollers

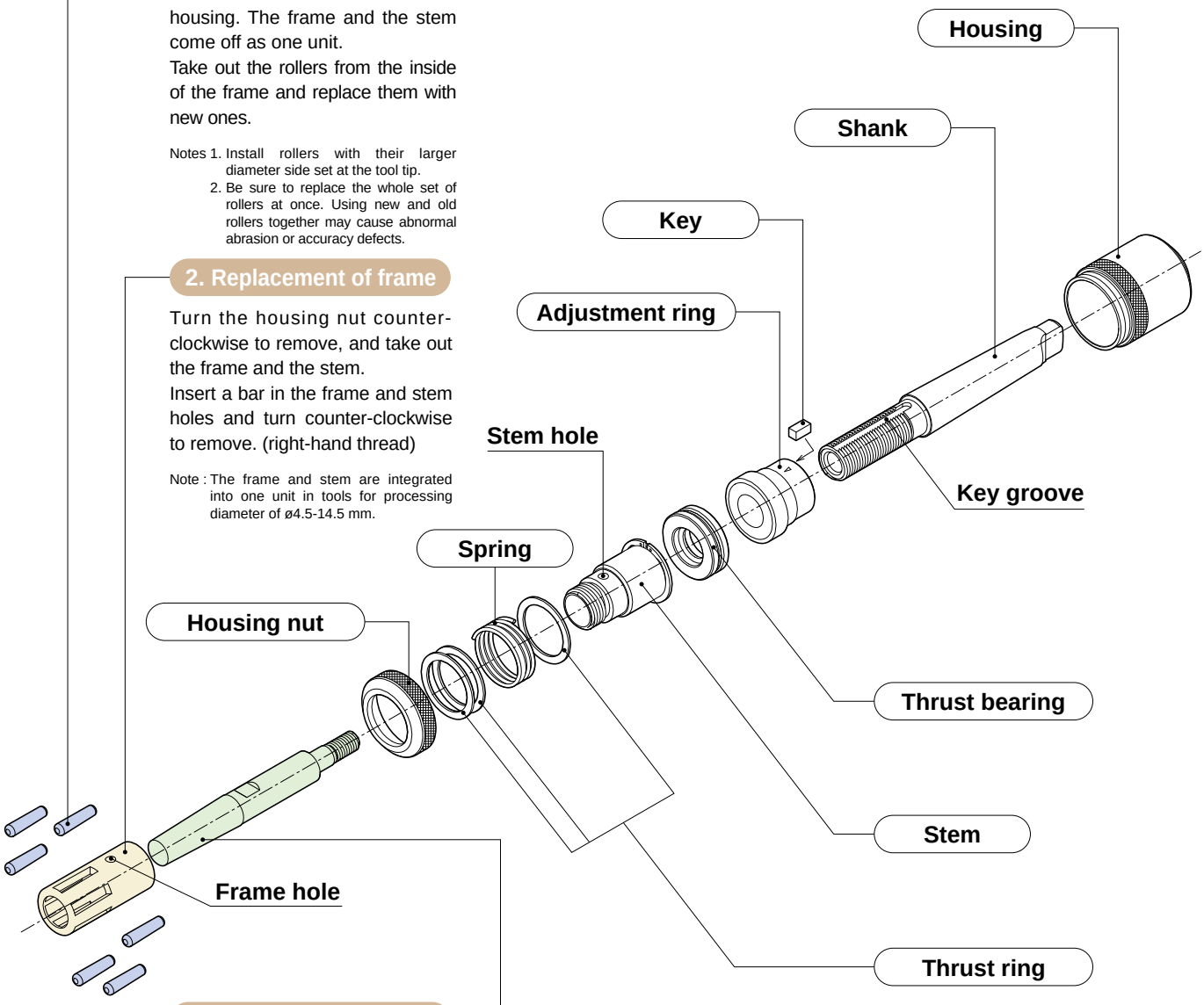
Turn the housing nut counter-clockwise to remove it from the housing. The frame and the stem come off as one unit.
Take out the rollers from the inside of the frame and replace them with new ones.

Notes 1. Install rollers with their larger diameter side set at the tool tip.
2. Be sure to replace the whole set of rollers at once. Using new and old rollers together may cause abnormal abrasion or accuracy defects.

## 2. Replacement of frame

Turn the housing nut counter-clockwise to remove, and take out the frame and the stem.
Insert a bar in the frame and stem holes and turn counter-clockwise to remove. (right-hand thread)

Note : The frame and stem are integrated into one unit in tools for processing diameter of ø4.5-14.5 mm.




## 3. Replacement of mandrel

The mandrel is screwed into the shank.
Hold the shank and turn the parallel flat part of the mandrel counter-clockwise with a wrench to remove it from the shank. (right-hand thread)

# Superoll Inquiry Sheet

## Send to: Sugino Corporation FAX 630-250-8665

Requested response due date:

● **Contact information ( Fields with ＊ are required. )**

| | |
|---|---|
| ＊Name | |
| ＊Company Name | |
| Division | |
| ＊Company Address | |

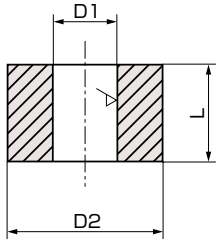
| | |
|---|---|
| ＊Phone | |
| Fax | |
| E-mail Address | |

● **Fill in the following contents.**

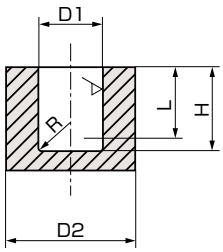
| | | |
|---|---|---|
| Workpiece name | | |
| Workpiece material | | |
| Workpiece hardness | | ( HRC, Hv, HB, Others ) |
| Workpiece form ( Circle one. ) | ① ② ③ ④ ⑤ ⑥ | ▶▶ Work configuration |
| Diameter øD1 | $\phi$ | Tolerance |
| Diameter øD2 | $\phi$ | Tolerance |
| Length L | | Tolerance |
| Interference height H | | Tolerance |
| Corner R | | |
| Angle $\theta$° | degree | Tolerance |
| Required shank form | | |
| Tool length limitation ( shank length not included ) | | |
| Driving unit in use | | |
| Purpose of use ( Circle one or more. ) | ·Improvement of surface roughness<br>·Hardness improvement<br>·Dimensional correction<br>·Others | |

Special tools for work configurations not shown below can be produced.

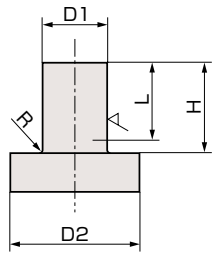
① Through-hole



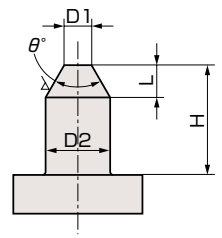

② Blind-hole



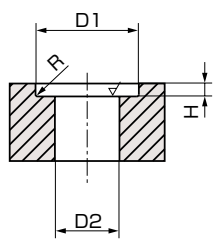

③ External



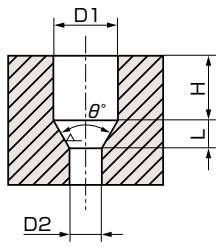

④ External taper




⑤ Flat surface




⑥ Internal taper

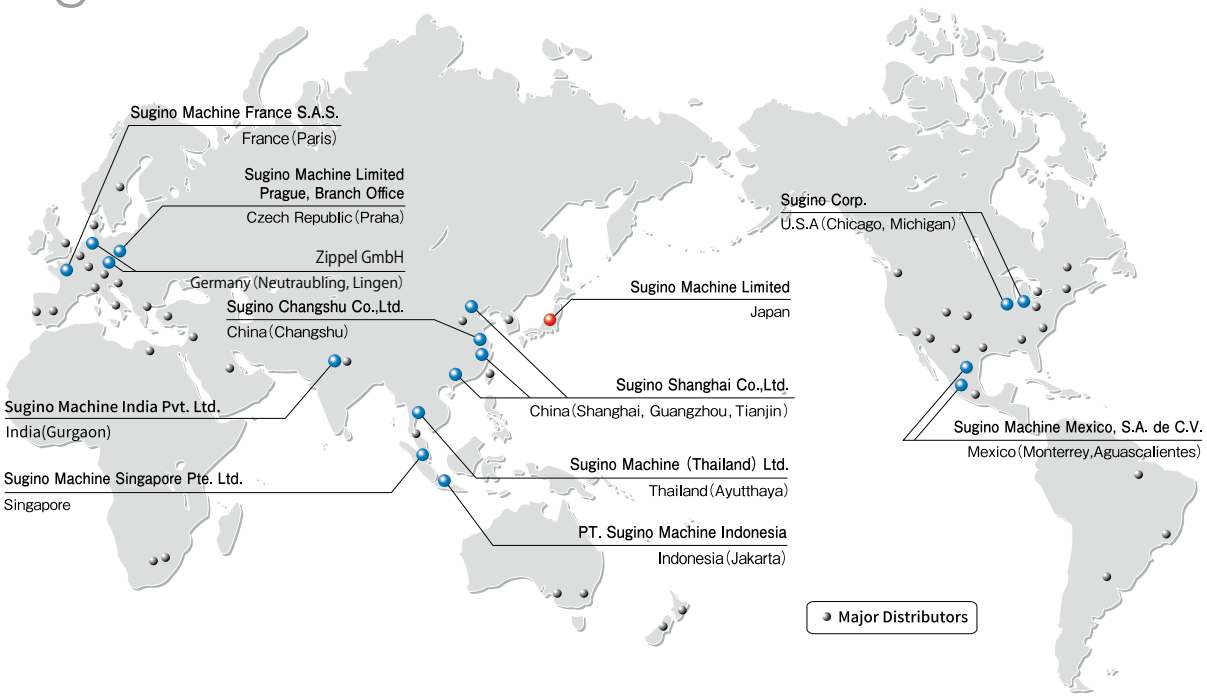



● **Clarify the unit. ( e.g., µm, mm, Rz, HRC, Hv, HB )**

| | | |
|---|---|---|
| Surface roughness | Before burnishing | After burnishing |
| Hardness improvement | Before burnishing | After burnishing |
| Dimensional correction | Before burnishing | After burnishing |
| Other accuracy | Before burnishing | After burnishing |
| Work piece drawing ( Please attach a drawing of the work in order to check interference between the tool and the work. ) | Attached / Not attached | |
| Remarks | | |

☐ Visit by our salesperson (Check here if requesting.)

# Sugino Global Network




SUGINO MACHINE LIMITED



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  All the relevant forms must be completed and submitted to the Japanese government, including the application to export technology.
- The content of this catalogue is as of November 2015.
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