

New and Unique Swiss Tooling

| | |
|---|------------|
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| NEW SPLASH series | 004 |
| Direct gang coolant connection "OH3" | |
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Specialized for



LFV is a registered trademark of
Citizen Watch Co., Ltd.

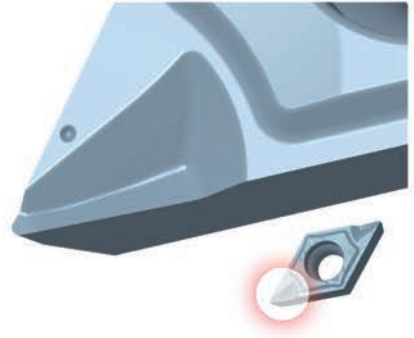
New and Unique
Swiss Tooling

TMV Chipbreaker

For Front Turning | Designed for Vibration Cutting on Swiss CNC Machines

Reliably long tool life and stable chip evacuation during vibration cutting

New and Unique
Swiss Tooling



Performance

- **Dramatic reduction in cutting edge wear**
Extended tool life even machining difficult-to cut materials
- **Stable chip removal with dramatic reduction in cutting edge wear**
Stable chip formation during vibration cutting

Applications

Front turning operations on swiss cnc using vibration cutting function

Machining conditions

| Grade | Work materials | Operation | Cutting conditions | | | Vibration condition (LFV) | | |
|---|---|---------------|-----------------------|---------------|------------------|-----------------------------|-----|-----|
| | | | Cutting speed (m/min) | Feed (mm/rev) | D.O.C. (ap) (mm) | P | Q | D |
| ST4 | Austenitic stainless steel (SUS304 / SUS316 etc) | Front turning | 40 - 100 | 0.02 - 0.06 | 0.5 - 2.0 | Mode 1 | 0.5 | 0.5 |
| DM4 NEW | Carbon steel / Alloy steel (S45C / SCM435) | Front turning | 50 - 120 | 0.02 - 0.06 | | | | |
| TM4 NEW | Non-ferrous (Aluminum / Titanium etc) | Front turning | 60 - 150 | 0.02 - 0.06 | | | | |

⚠ The cutting edges are designed with lower height than our standard ISO inserts. Please correct the center height before using it.

⚠ * When using an **R0.08** insert, set the feed 0.02mm/rev or less. [Mode 2 / E4.0 / R0.5] is recommended when feed rate is higher than 0.02mm/rev.

Case Study

| | | Conventional tool | TMV Chipbreaker |
|---------------------|--------------------------------------|-------------------|-----------------|
| CNC Lathe | Cincom L20-LFV | | |
| Work material | SUS316L | | |
| Cutting speed | 80 m/min | | |
| Feed | 0.05 mm/rev | | |
| D.O.C. (ap) | 1.0 mm | | |
| Coolant | WET | | |
| Vibration condition | Mode 1 Q0.5 D0.5 | | |
| | Edge image Machining range 8km | | |
| | Chip images | | |

Construction machine parts

| | | |
|----------------------------|---|--|
| Work material | SGD material (SS polishing material) Machining dia. φ8 / 10.8 / 12 | |
| RPM | 2,500 | |
| Feed (mm/rev) | 0.03 | |
| D.O.C (mm) | 2.0/2.6/4.0 | |
| Vibration condition (LFV) | Mode 1 / Q1.0 / D0.5 | |
| DM4 DCGT11T302MRTMV | | |
| Competitor's PVD carbide | | |

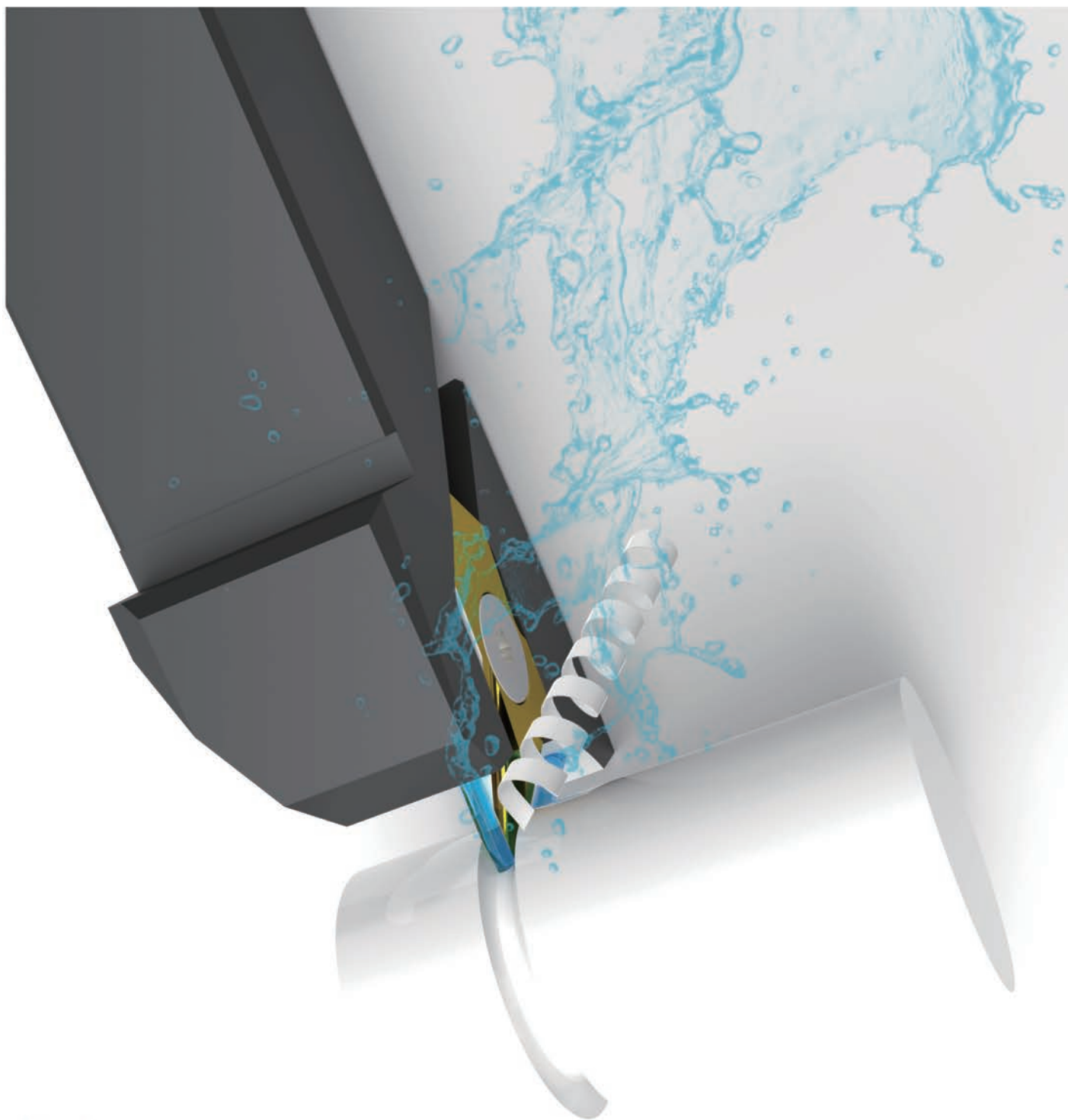
Valve parts

| | | |
|----------------------------|-------------------------------|--|
| Work material | SUS304 Machining dia. φ3.8 | |
| RPM | 2,263 | |
| Feed (mm/rev) | 0.02 | |
| D.O.C (mm) | 3.1 | |
| Vibration condition (LFV) | Mode 2 / E3.0 / R0.5 / I0.02 | |
| ST4 DCGT11T302MRTMV | | |
| Competitor's PVD carbide | | |

SPLASH SERIES

Coolant Through Holders | For Swiss CNC Lathes

New and Unique
Swiss Tooling



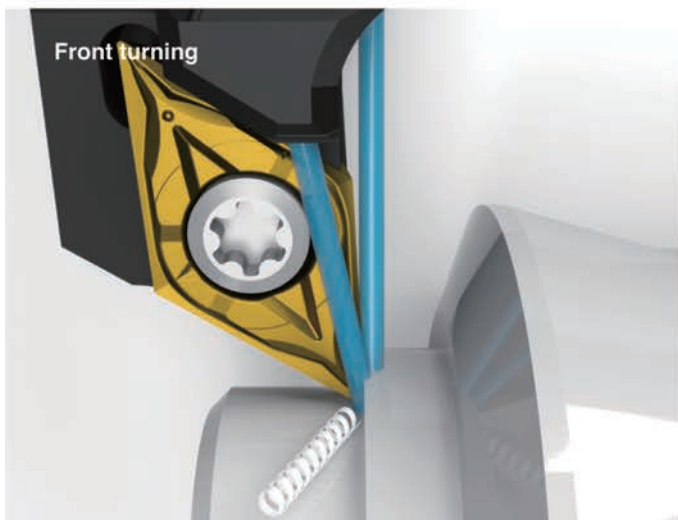
New Line up

Direct connect type "OH3"

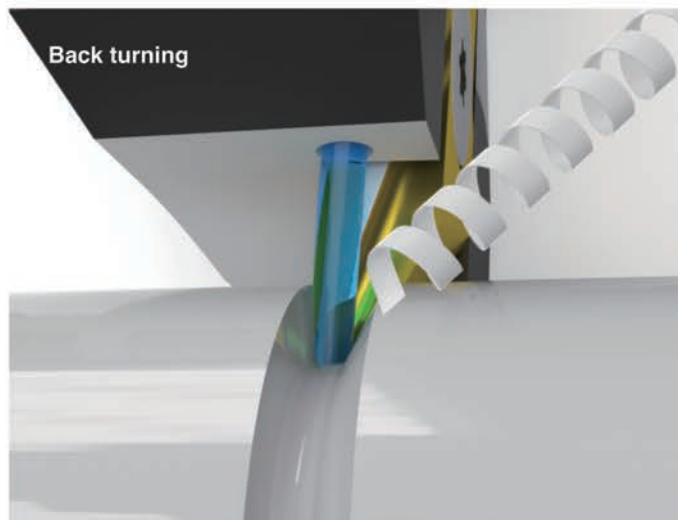
Expanded tooling options



Solve chip issues with coolant focused on chip evacuation



Coolant flow from two locations (12mm and 16mm shank) directs the chips away from the guide bushing.



By focusing coolant to cutting edge chips are flushed away from the machined surface to achieve an excellent surface finish.

SPLASH SERIES

Coolant Through Holders | For Swiss CNC Lathes

Utilizing coolant through tools eliminates chip issues and realizes stable machining

Effectively cools the cutting edge and extends tool life

Features

- Curling and breaking chips with coolant pressure
- Coolant is focused on the cutting edge to suppress heat and edge wear
- Variety of coolant connection options



Tooling operations

Front turning / Back turning / Grooving / Threading / Cut-off / ID boring

| Application | Type | Coolant hose connection | Coolant directly from gang plate | Machine models with coolant directly from gang plate | |
|--|--------------|-------------------------|----------------------------------|---|----------------|
| Front turning Back turning Grooving Threading Cut-off ID boring | NEW ! | | | L12, L20, D25, M32 | Citizen-Cincom |
| | | | | SB-16III, SD-26type S | STAR |
| | OH3 | ● | ● | B026/32-III Series, BW269/329ZJ SS267/327-III, SS267/327-III-5AX SS207-III, SS207-III-5AX S205/206-II, S205A/206A-II | TSUGAMI |
| | | | | L12, L20, D25, M32 | Citizen-Cincom |
| | | | | SB-16III, SD-26 type S | STAR |
| | OH | ● | - | - | - |

*Based on information as of September 2022

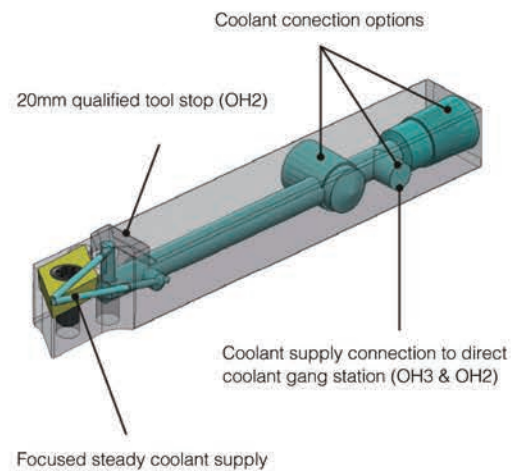
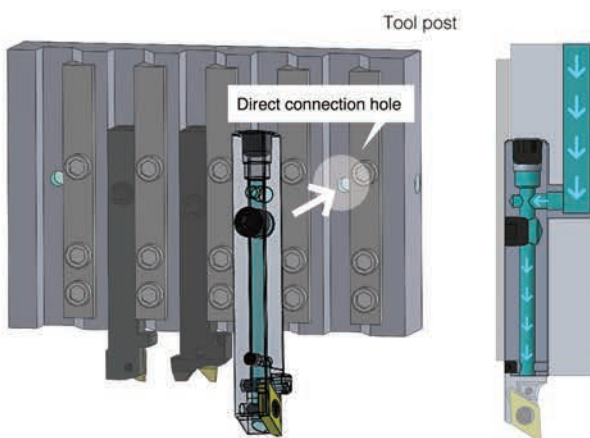
Direct gang coolant connection "OH3"

OH3 Features

- New CTP-SUB cut-off holder lineup
- Lineup expansion of 16mm sq. shank tools with direct connect capability



Coolant is supplied directly from the tool post to the tool



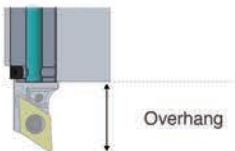
New OH3 tools makes it possible to directly connect to a gang station through coolant system Also supports side and rear coolant hose connections

OH3 Hole Position Reference Chart

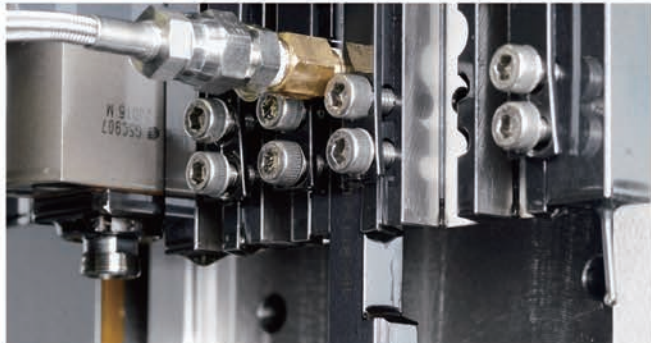
*Based on information from September 2022

| Make* | Model | Tool position** | Shank size | Overhang(mm) | Direct Connect Toolholder Coolant Port |
|----------------|------------------------------------|----------------------------------|-------------|--------------|--|
| Citizen-Cincom | L12 (2M) | T02 - T07 | □10 | 17.5 | B |
| | | T01 | □12 | 24.5 | C |
| | M32 (5M) | T01 - T05 | □16 | 25.0 | C |
| | D25 | T10 - T13 , T30 - T32 | | 30.0 | A |
| | L20 (2M/3M) | T01 | | 30.0 | A |
| STAR | SB-16III | T100 - T500 (T600) | □12 | 22.0 | C |
| | SD-26 type S | T100 | □16 | 30.0 | |
| | | T200 - T700 | | 25.0 | |
| TSUGAMI | B026/32-III Series | T05 - T09 , T11 - T15 , T26, T27 | □16 | 26.0 | B |
| | BW269/329ZJ | T05 - T09 , T26, T27 | | | |
| | SS267/327-III SS267/327-III-5AX | T05 - T09 , T25 - T27 | | | |
| | SS207-III, SS207-III-5AX | T05 - T10 , T26 - T28 | □16(option) | 26.0 | A |
| | S205/206-II S205A/206A-II | | | | |

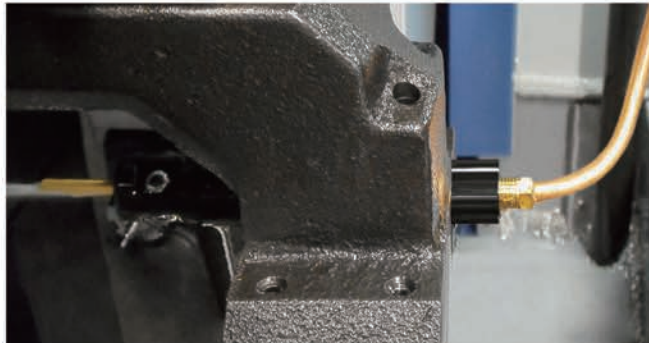
** The tool position varies depending on the option setting. Please confirm in advance.



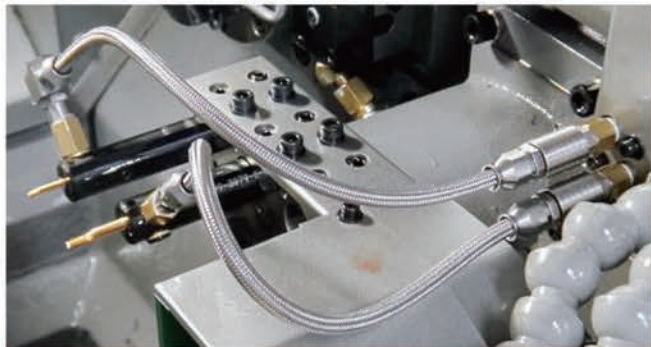
Compatible with various coolant hose connections (OH, OH2, OH3)



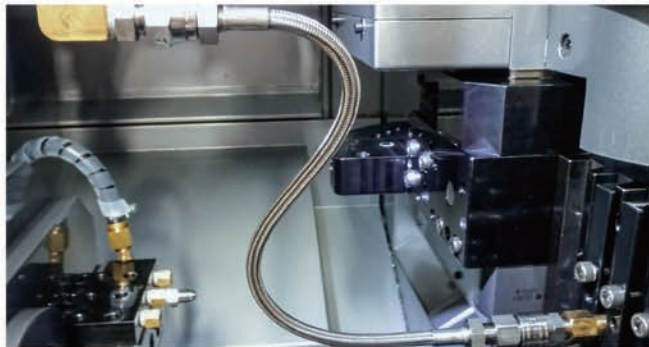
Holder side connection



Holder rear connection



Side connections on I.D. stick tool holders

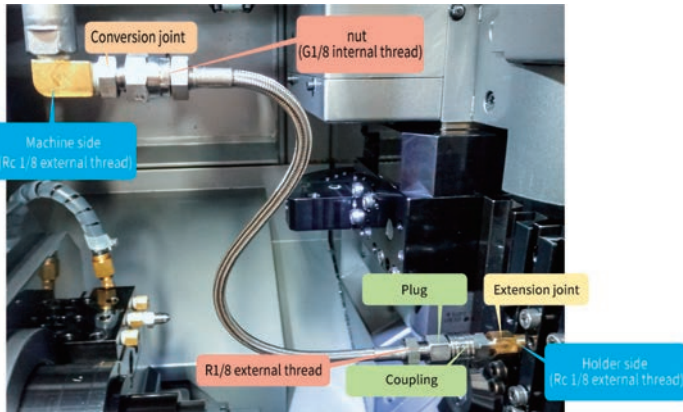


Hose mounting example (vertical gang style)

Coolant parts for hose connection ①.

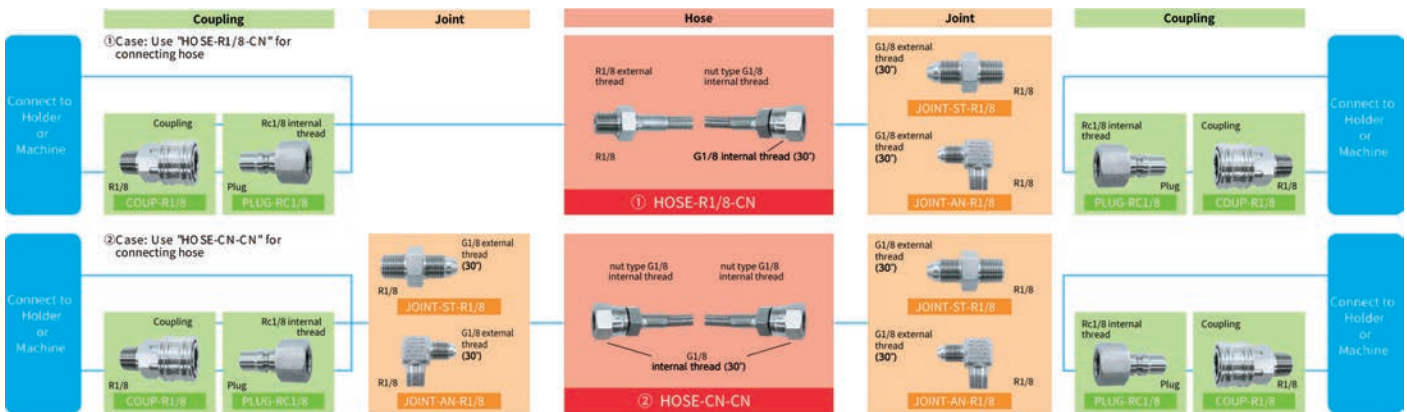
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Coolant connection options



| Name | P/N |
|-----------------|------------------|
| joint | JOINT-ST-R1/8 |
| hose | HOSE-R1/8-CN-400 |
| plug | PLUG-RC1/8 |
| coupling | COUP-R1/8 |
| extension joint | SCJ-R1/8-RC1/8-L |

Connection example

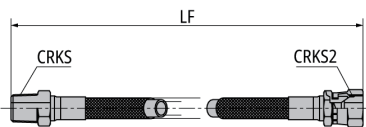


How to use quick change coupling and joint

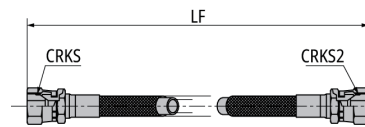
- Frequent hose removal
→ Coupling (Max. coolant pressure 7.5 MPa)
- Less hose removal
→ Joint (Max. coolant pressure 200 MPa)

Hose

No.1



No.2



R1/8 male thread
Rotate hose to secure

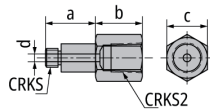


Cap nut G1/8 female thread
Fastening by rotating nut
(No hose rotation required)

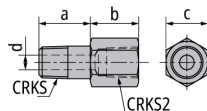
| Figure | EDP | Item Number | Stock | LF mm | CRKS | CRKS2 | CP Max. operating pressure |
|--------|---------|------------------|-------|-------|------|-------|----------------------------|
| 1 | 5923255 | HOSE-R1/8-CN-200 | ● | 200 | R1/8 | G1/8 | 20.6 |
| 1 | 5923263 | HOSE-R1/8-CN-250 | ● | 250 | R1/8 | G1/8 | 20.6 |
| 1 | 5923297 | HOSE-R1/8-CN-300 | ● | 300 | R1/8 | G1/8 | 20.6 |
| 1 | 5923305 | HOSE-R1/8-CN-400 | ● | 400 | R1/8 | G1/8 | 20.6 |
| 1 | 5923313 | HOSE-R1/8-CN-500 | ● | 500 | R1/8 | G1/8 | 20.6 |
| 1 | 5923321 | HOSE-R1/8-CN-800 | ● | 800 | R1/8 | G1/8 | 20.6 |
| 2 | 5923339 | HOSE-CN-CN-200 | ● | 200 | G1/8 | G1/8 | 20.6 |
| 2 | 5923347 | HOSE-CN-CN-250 | ● | 250 | G1/8 | G1/8 | 20.6 |
| 2 | 5923354 | HOSE-CN-CN-300 | ● | 300 | G1/8 | G1/8 | 20.6 |
| 2 | 5923388 | HOSE-CN-CN-400 | ● | 400 | G1/8 | G1/8 | 20.6 |
| 2 | 5923396 | HOSE-CN-CN-500 | ● | 500 | G1/8 | G1/8 | 20.6 |
| 2 | 5923404 | HOSE-CN-CN-800 | ● | 800 | G1/8 | G1/8 | 20.6 |

■ Joints (for screw replacement and extension)

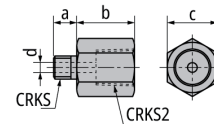
No.1



No.2



No.3

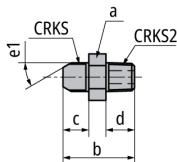


| Figure | EDP | Item Number | Stock | CRKS | CRKS2 | a mm | b mm | c mm | d mm |
|--------|---------|-------------------|-------|------|--------|---------|---------|---------|---------|
| 1 | 5944897 | SCJ-M6-RC1/8-L | ● | M6×1 | Rc1/8 | 16 | 15 | 13 | 2.5 |
| 2 | 5891049 | SCJ-R1/8-M10-L | ● | R1/8 | M10×1 | 16 | 12 | 13 | 4.5 |
| 2 | 5891056 | SCJ-R1/8-RC1/8-L | ● | R1/8 | Rc1/8 | 16 | 15 | 13 | 4.5 |
| 2 | 5891064 | SCJ-R1/8-NPT1/8-L | ● | R1/8 | NPT1/8 | 16 | 15 | 13 | 4.5 |
| 3 | 5892906 | SCJ-M6-M10 | ■ | M6×1 | M10×1 | 6 | 15 | 12 | 2.5 |
| 3 | 5123765 | SCJ-M6-M10-N | ● | M6×1 | M10×1 | 6 | 15 | 12 | 2.5 |
| 3 | 5892914 | SCJ-M6-RC1/8 | ■ | M6×1 | Rc1/8 | 6 | 15 | 13 | 2.5 |
| 3 | 5123773 | SCJ-M6-RC1/8-N | ● | M6×1 | Rc1/8 | 6 | 15 | 13 | 2.5 |
| 3 | 5892922 | SCJ-M6-NPT1/8 | ■ | M6×1 | NPT1/8 | 6 | 15 | 13 | 2.5 |
| 3 | 5123799 | SCJ-M6-NPT1/8-N | ● | M6×1 | NPT1/8 | 6 | 15 | 13 | 2.5 |
| 3 | 5933817 | SCJ-M8-RC1/8 | ■ | M8×1 | Rc1/8 | 6 | 15 | 13 | 3.5 |
| 3 | 5123807 | SCJ-M8-RC1/8-N | ● | M8×1 | Rc1/8 | 6 | 15 | 13 | 3.5 |
| 3 | 5892948 | SCJ-R1/8-M10 | ● | R1/8 | M10×1 | 10 | 15 | 12 | 4.5 |
| 3 | 5892963 | SCJ-R1/8-NPT1/8 | ● | R1/8 | NPT1/8 | 10 | 15 | 13 | 4.5 |

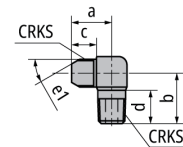
● : without washer

■ Joint (for connection with G1/8 female thread)

No.1



No.2

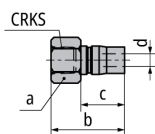


| Figure | EDP | Item Number | Stock | CRKS | CRKS2 | a mm | b mm | c mm | d mm | e1 mm | CP Max. operating pressure |
|--------|---------|---------------|-------|------|-------|---------|---------|---------|---------|----------|-------------------------------|
| 1 | 5918966 | JOINT-ST-R1/8 | ● | G1/8 | R1/8 | HEX:14 | 31 | 13 | 10 | 30 | 20.6 |
| 2 | 5923412 | JOINT-AN-R1/8 | ● | G1/8 | R1/8 | 20 | 21 | 13 | 14 | 30 | 20.6 |

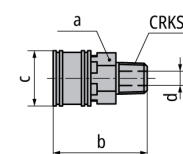
*The threads of the straight and L-shaped joints have different thread standards on both sides.
When connecting to a hose or one-touch coupler, use a combination of the same thread standard.

■ Coupling

No.1



No.2



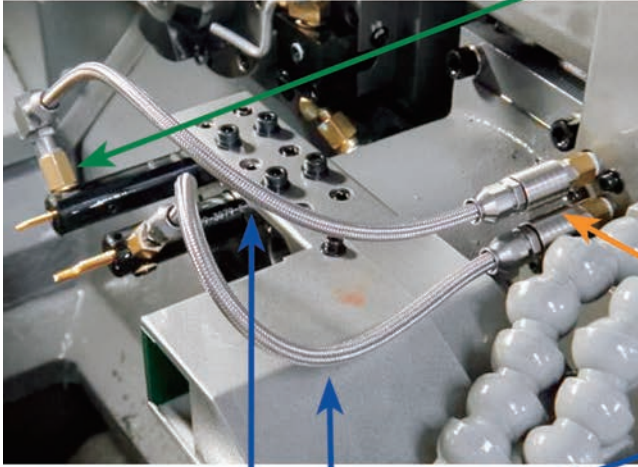
| EDP | Item Number | Stock | CRKS | a mm | b mm | c mm | d mm | CP Max. operating pressure |
|---------|-------------|-------|-------|---------|---------|---------|---------|-------------------------------|
| 5915491 | PLUG-RC1/8 | ● | Rc1/8 | HEX:14 | 26 | 15.5 | 4.5 | 7.5 |
| 5915517 | COUP-R1/8 | ● | R1/8 | HEX:14 | 30 | 17.5 | 4.5 | 7.5 |

Coolant parts for hose connection ②.

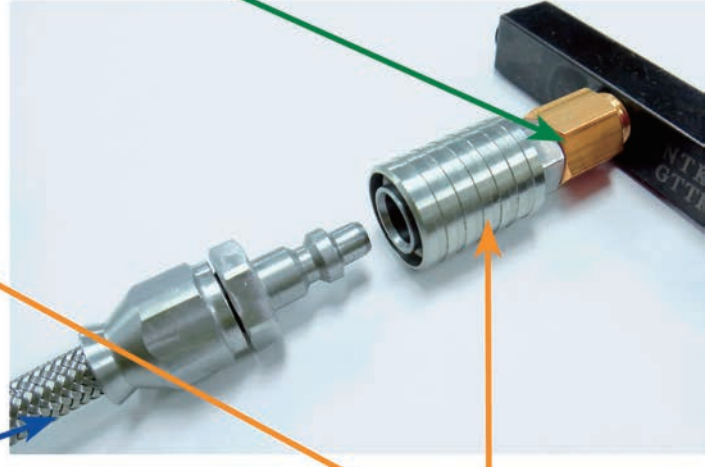
One-touch coupler type made by HEB

Coolant connection example

③ Conversion / Extension Joint

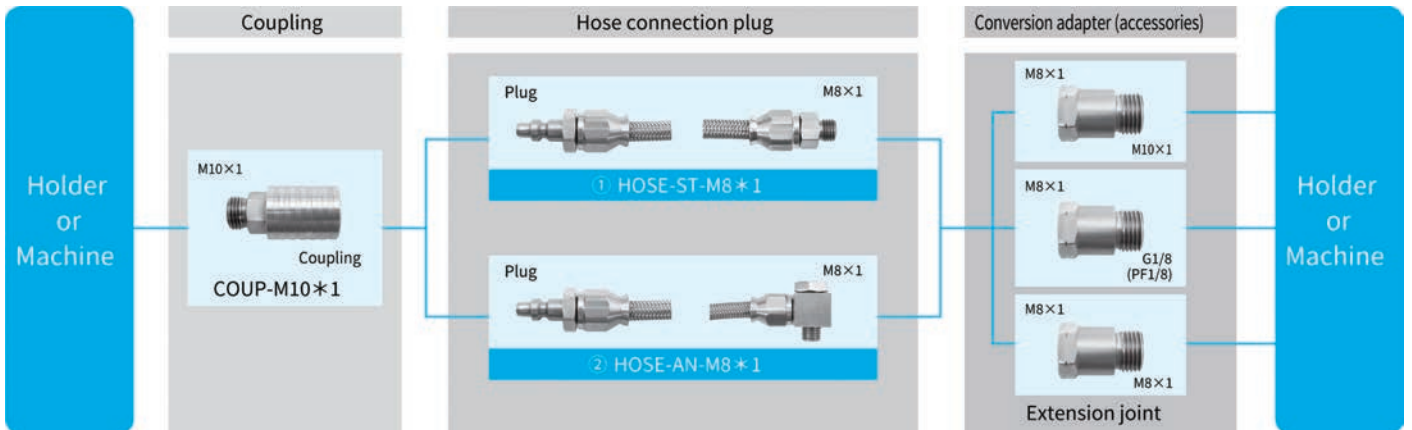


① Plug-in Style Flexible Hose



② Quick Change Coupling

Coolant connection example

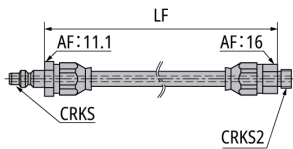


Features

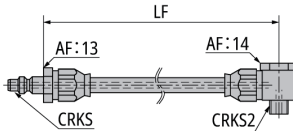
- High quality stainless steel flexible tubing
- Maximum working pressure 20 MPa

Hose with plug (conversion adapter included)

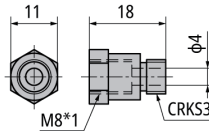
No.1



No.2



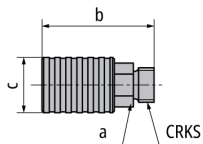
Conversion adapter



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| Figure | EDP | Item Number | Stock | LF mm | CRKS | CRKS2 | CRKS3 Conversion adapters | CP Max. operating pressure |
|--------|---------|--------------|-------|----------|------------------------|-------|---------------------------------|-------------------------------|
| 1 | 5894290 | HOSE-ST-M8*1 | ● | 300 | Quick change connector | M8*1 | ①M8*1→M10*1②M8*1→G1/8 | 20 |
| 2 | 5894282 | HOSE-AN-M8*1 | ● | 302 | Quick change connector | M8*1 | ①M8*1→M10*1②M8*1→G1/8③M8*1→M8*1 | 20 |

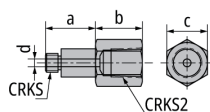
One-touch coupler



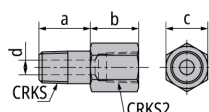
| EDP | Item Number | Stock | CRKS | a mm | b mm | c mm | CP Max. operating pressure |
|---------|-------------|-------|-------|---------|---------|---------|-------------------------------|
| 5894308 | COUP-M10*1 | ● | M10×1 | HEX:11 | 32.5 | 16 | 20 |

Joints (for screw replacement and extension)

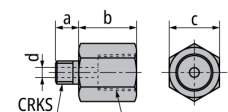
No.1



No.2

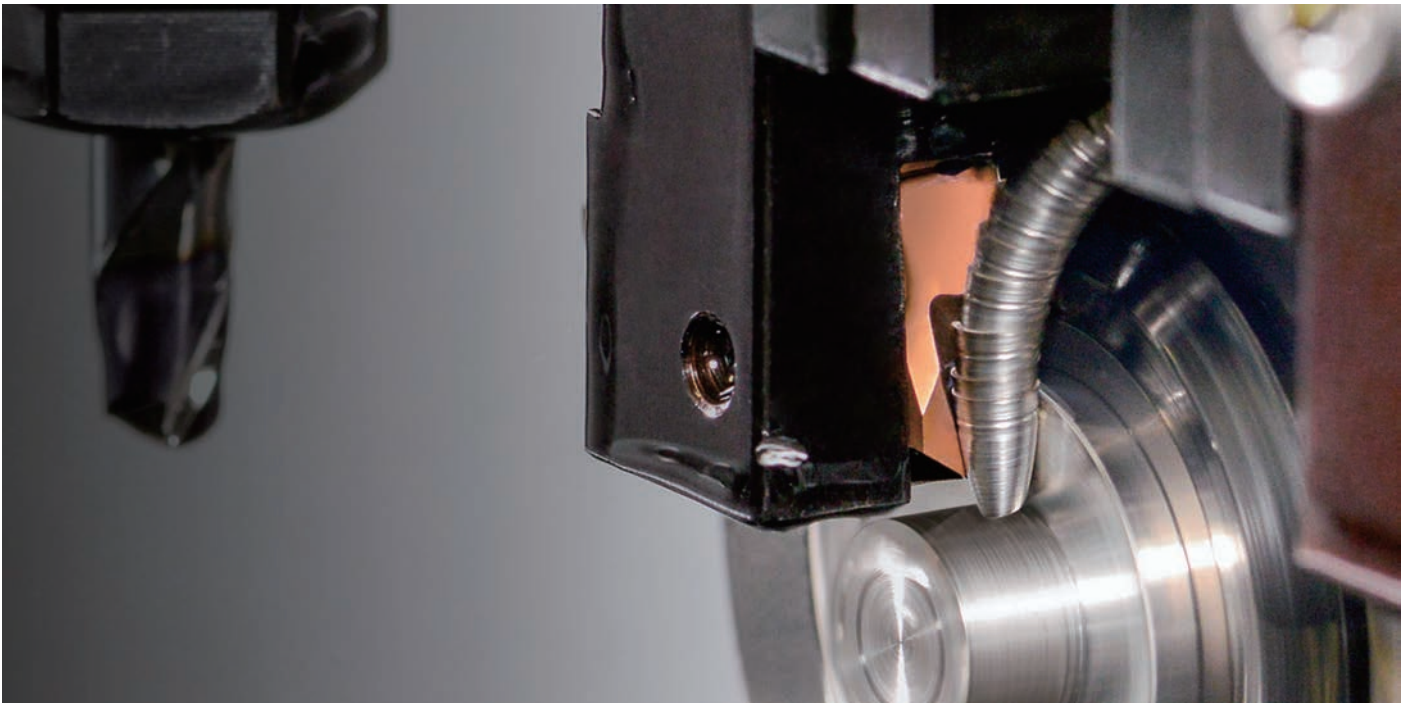


No.3



| Figure | EDP | Item Number | Stock | CRKS | CRKS2 | a mm | b mm | c mm | d mm |
|--------|---------|-------------------|-------|------|--------|---------|---------|---------|---------|
| 1 | 5944897 | SCJ-M6-RC1/8-L | ● | M6×1 | Rc1/8 | 16 | 15 | 13 | 2.5 |
| 2 | 5891049 | SCJ-R1/8-M10-L | ● | R1/8 | M10×1 | 16 | 12 | 13 | 4.5 |
| 2 | 5891056 | SCJ-R1/8-RC1/8-L | ● | R1/8 | Rc1/8 | 16 | 15 | 13 | 4.5 |
| 2 | 5891064 | SCJ-R1/8-NPT1/8-L | ● | R1/8 | NPT1/8 | 16 | 15 | 13 | 4.5 |
| 3 | 5892906 | SCJ-M6-M10 | ■ | M6×1 | M10×1 | 6 | 15 | 12 | 2.5 |
| 3 | 5123765 | SCJ-M6-M10-N | ● | M6×1 | M10×1 | 6 | 15 | 12 | 2.5 |
| 3 | 5892914 | SCJ-M6-RC1/8 | ■ | M6×1 | Rc1/8 | 6 | 15 | 13 | 2.5 |
| 3 | 5123773 | SCJ-M6-RC1/8-N | ● | M6×1 | Rc1/8 | 6 | 15 | 13 | 2.5 |
| 3 | 5892922 | SCJ-M6-NPT1/8 | ■ | M6×1 | NPT1/8 | 6 | 15 | 13 | 2.5 |
| 3 | 5123799 | SCJ-M6-NPT1/8-N | ● | M6×1 | NPT1/8 | 6 | 15 | 13 | 2.5 |
| 3 | 5933817 | SCJ-M8-RC1/8 | ■ | M8×1 | Rc1/8 | 6 | 15 | 13 | 3.5 |
| 3 | 5123807 | SCJ-M8-RC1/8-N | ● | M8×1 | Rc1/8 | 6 | 15 | 13 | 3.5 |
| 3 | 5892948 | SCJ-R1/8-M10 | ● | R1/8 | M10×1 | 10 | 15 | 12 | 4.5 |
| 3 | 5892963 | SCJ-R1/8-NPT1/8 | ● | R1/8 | NPT1/8 | 10 | 15 | 13 | 4.5 |

● : without washer



For front turning | Swiss CNC Lathes

The Front Max

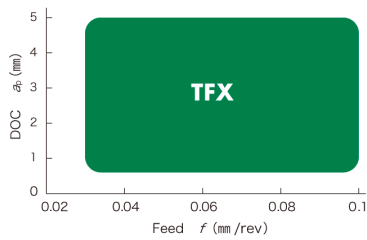


Significant reduction in cycle time due to large depth of cut capability

Chip control at both large DOC and high feed and low DOC and low feed conditions

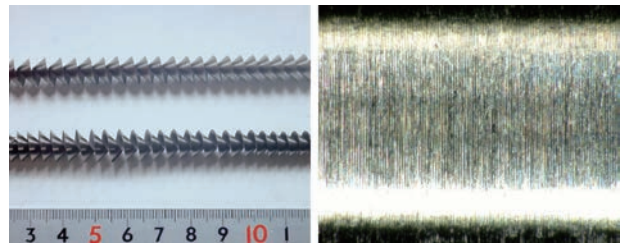
Performance

Capable of a 5.0 mm maximum depth of cut
NTK's unique insert design provides excellent chip control and surface finish.



Performance

Outstanding chip control in any cutting conditions.
NTK's original chipbreaker design provides excellent chip control and a good machined surface.
Coolant through holders are available for TFX inserts to provide further machining stability

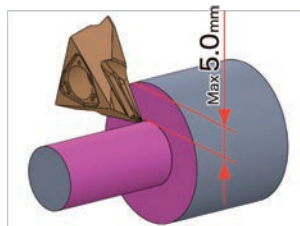


[cutting conditions] DOC : 5.0mm Material: SUS304 Vc=80m/min f=0.03mm/rev WET

Case study

The TFX "Front Max" machined at an increased feed and a large depth of cut, ap=5.0mm, succeeding at extending tool life by more than 3 times compared to the competitor's insert.

| | |
|---------------|------------|
| Work material | SUS304 |
| Cutting speed | 80m/min |
| Feed | 0.03mm/rev |
| Depth of cut | 5.0mm |
| Coolant | WET |



The Front Max

180 pcs/corner

Competitor's tool

50 pcs/corner



For end milling | Swiss CNC lathes

S-MILL

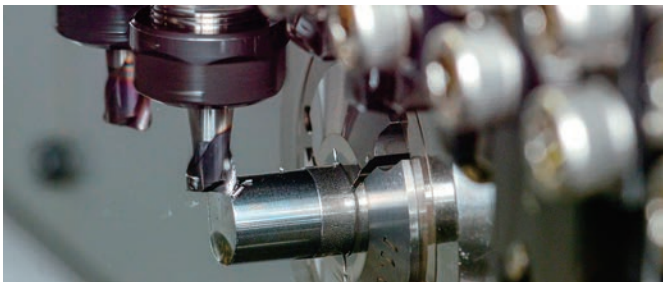


Ideal for small diameter parts that are prone to vibrations

Targets small diameter parts with rigidity issues that benefits from a sharp cutting edge

Performance

Designed with a focus on sharpness
Stable machining of even the smallest workpieces



Part surface finish comparison

The sharp cutting edge design achieves an overwhelmingly good machined surface.

| | NTK(S-MILL) | Competitor's product A | Competitor's product B |
|-------------------------------------|--|------------------------|------------------------|
| Magnified work material (side face) | | | |
| Magnified work material | | | |
| | Excellent finish without chatter marks | Bad surface finish | |

[Cutting conditions]
Material : SUS304 $\Phi 16.0$ $a_p=3.0\text{mm}$ $a_e=1.2\text{mm}$ $S = 3,000\text{rpm}$ $F = 300\text{mm/min}$
[Tools used]
 $\Phi 6.0\text{mm}$ - 2 flute

Case study

The competitor's end mill showed an obvious decrease in surface finish quality as it reached the end of its tool life.
The S-Mill maintained a quality finish throughout the extent of its long tool life.

| | | | | | | | |
|------------------------------|-------------------------------|--|---|--------|-------------------------------|------------------------------|--------------------|
| Work material | SUS416F | | <table border="1"> <tr> <td>S-MILL</td> <td>12,000 pcs./corner + α</td> </tr> <tr> <td>Competitor's solid end mills</td> <td>10,000 pcs./corner</td> </tr> </table> | S-MILL | 12,000 pcs./corner + α | Competitor's solid end mills | 10,000 pcs./corner |
| S-MILL | 12,000 pcs./corner + α | | | | | | |
| Competitor's solid end mills | 10,000 pcs./corner | | | | | | |
| Spindle speed | 3,200 rpm/min | | | | | | |
| Feed | 140mm/min | | | | | | |
| Depth of cut | 0.6mm | | | | | | |
| Coolant | WET | | | | | | |



For high-efficiency thread cutting | Swiss CNC lathes

Thread Whirling





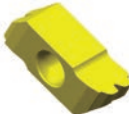
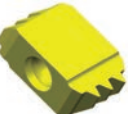
High productivity for precision screw manufacturing, like implant screws and bone screws

Ideal for medical screw thread forms that are becoming more complex

Single pass thread forming reduces cycle time

Features

- NTK's insert design technology creates precise inserts matching even the most complex thread forms
- Sharp cutting edges and PVD coated inserts generate superior surface finishes and achieves long tool life

| | Double-lead threads | Triple-lead threads |
|-----------------------------|--|---|
| Work | Bone screw | Worm screw |
| Work material | Ti-6Al-4V ELI | brass |
| Workpiece |  |  |
| Insert shape |  |  |
| Major Dia. | φ4.0 | φ7.0 |
| Minor Dia. | φ2.4 | φ4.7 |
| Lead [Pitch×No. of Lead] | 3.42mm | 4.9mm |

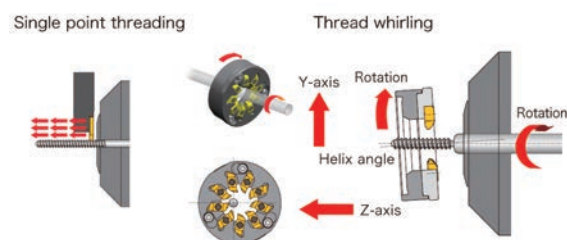
Machining multi-lead thread forms has many process requirements.

So it is important to contact us to discuss: mechanical specifications, spindle specifications, insert specifications, tooling specifications.

Thread whirling process vs. single point threading

In thread whirling, the whirling head is tilted to a specific helix angle, the cutter is rotated at high speed, the bar stock (c axis) is rotated at a low speed, and the pitch (z axis) is the feed.

The inserts shear the material which enables single pass thread forming.



Special Item Capability

- Even though almost all bone screw shapes are special, NTK thread whirling inserts can make the correct shape of thread the first time, without any redesign or remanufacturing
- The combination of a sharp cutting edge and PVD coating achieves an excellent finish and long tool life.

Instructions

1. Refer to our chart and find your machine and spindle model. Select the suitable whirling cutter.
2. Submit the machine , spindle model information, workpiece drawing, material, and bar stock diameter to NTK. NTK calculates the lead angle and insert geometry from the work drawing and manufactures a dedicated insert.
3. Set the whirling cutter at the specified lead angle and set the cutting conditions.

Recommended Cutting Conditions

| Conditions / No. of teeth | | 9 | 6 | 4 | |
|---------------------------|-------|---|-------|------|-----------------------------------|
| Main spindle | min-1 | 10-40 | 10-25 | 7-15 | Faster RPM reduces machining time |
| Whirling cutter | min-1 | 1500-4000 | | | |
| Feed Rate | | Same as thread lead = pitch | | | |
| Bar stock | mm | -φ10 | -φ10 | -φ8 | |
| Work Material | | Ti-6Al-4V EL / SUS316 / 17-4PH / Titanium / brass | | | |

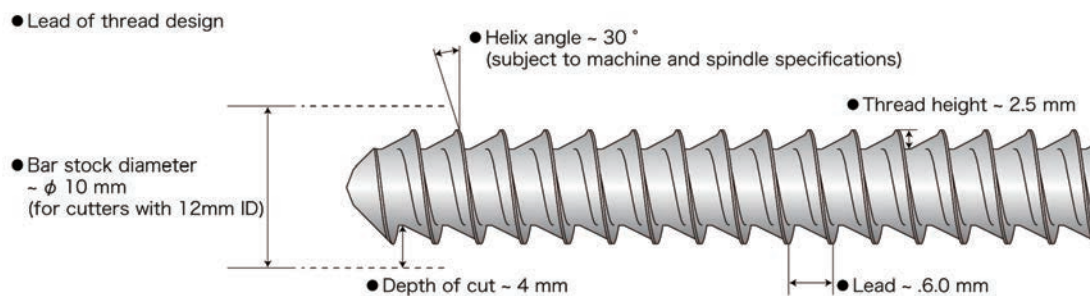
Formula for calculating thread whirling process time

$$T \text{ (Seconds)} = \frac{60 \times \text{Thread length}}{\text{Main spindle rpm} \times \text{Feed rate (Thread lead)}}$$

Ex.) Double lead / 50mm length / 2mm lead (2×1mm pitch) / 30 rpm

$$T \text{ (Seconds)} = \frac{60 \times 50\text{mm}}{30\text{rpm} \times 2\text{mm}} = 40 \text{ Seconds}$$

Applicable Thread Geometry (Approximated)



The geometries shown above are approximated and could vary by actual applications

Double-lead Bone Screw Process Example

1. 1st thread whirl at taper area
2. Rotate the bar 180° and whirl the 2nd thread on same area as 1
3. Thread whirl the straight section
4. To obtain two exits on the screw, back up half a lead (one pitch) and rotate 180 degrees. Additional machining is performed at the exit.

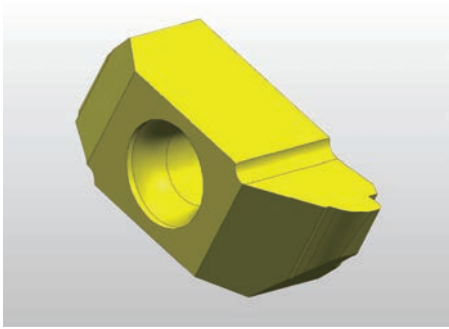


Basic Insert Grade : ZM3

ZM3 is the common grade for NTK thread whirling

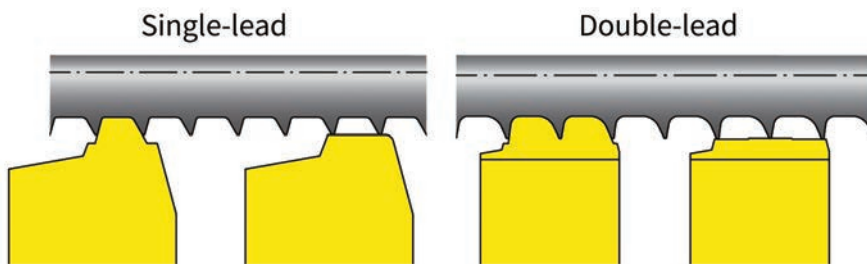
ZM3 offers excellent surface finish

NTK can make inserts with other coatings to meet customers demands



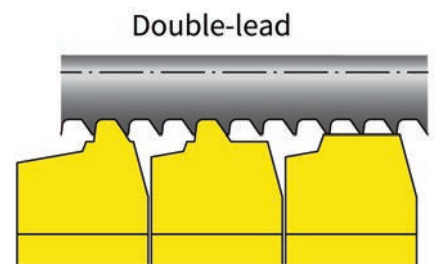
NTK Thread Machining Examples

For absolute flat on OD



Two insert combination brings absolute flat on OD to meet drawing specifications.

For tiny thread



NTK's Thread Whirling system can machine small diameter multi-lead screws to spec, with lower tool pressure, by using several types of specially designed and accurately ground inserts on the cutter.

NTK's Unique Attachment System

NTK's whirling insert holder can be attached and detached without removing mounting screws





① Loosen the Mounting Screws

② Rotate the Insert Holder 10 degrees

③ Detach the Insert Holder without removing the Mounting Screws

Application Examples

| Double-lead Bone Screw | | | |
|---|---|--------------------------------|-------|
| Work Material : Ti -6Al-4v ELI | | | |
| Bar Stock Dia. | φ9.5 | Number of start | 2 |
| Major Dia. | φ4.0 | Helix Angle | 28.5° |
| Minor Dia. | φ2.5 | Hand of thread | Right |
| Cutting condition | | | |
| Main Spindle Speed (rpm) | 15 | Speed of whirling cutter (rpm) | 3,500 |
| Lead = Feed (mm/rev) | 5.5 | Result | OK |
| NTK Thread Whirling | Dramatically improved productivity | | |
| Competitor's Thread Whirling |  Cannot complete with single pass. Requires feeding stock multiple times and two passes for threading each time. | | |
| NTK thread whirling succeeded in double lead screw machining when one of the major thread whirling suppliers has failed many times. | | | |

| Single-lead Bone Screw | | | |
|---|--|--------------------------------|-------|
| Work Material : 316SS | | | |
| Bar Stock Dia. | φ8.0 | Number of start | 1 |
| Major Dia. | φ3.45 | Helix Angle | 7.5° |
| Minor Dia. | φ2.67 | Hand of thread | Right |
| Cutting condition | | | |
| Main Spindle Speed (rpm) | 23 | Speed of whirling cutter (rpm) | 2,000 |
| Pitch = Feed (mm/rev) | 1.24 | Result | OK |
| NTK Thread Whirling | 2600 pcs | | |
| Competitor's Thread Whirling |  1000 pcs | | |
| Some thread whirling manufacturers offer 6-teeth or 12-teeth systems, too many teeth cause chip packing issues and more tool pressure. Fewer teeth means greater cycle time. NTK concluded that 9-teeth is the best configuration. Our customers can run 1.5 times faster and get longer tool life. | | | |

| Triple-lead Worm Gear | | | |
|---|------|--------------------------------|-------|
| Work Material : Brass | | | |
| Bar Stock Dia. | φ8.0 | Number of start | 3 |
| Major Dia. | φ7.0 | Helix Angle | 14.6° |
| Minor Dia. | φ4.7 | Hand of thread | Left |
| Cutting condition | | | |
| Main Spindle Speed (rpm) | 20 | Speed of whirling cutter (rpm) | 3,500 |
| Lead = Feed (mm/rev) | 4.8 | Result | OK |
| Multi-lead threads, common in the Worm Gear industry are made by a forming or cutting process. The large helix angle is difficult to machine with single-point threading. NTK now makes thread whirling inserts for multi-lead threads. Cycle time is reduced with a one pass process and thread form dimensions are stable with the low tool pressure. | | | |



For end milling | Swiss CNC lathes

Indexable insert end mills

Optimum size lineup for CNC automatic lathes

Indexable cutting edges simplifies tool management and reduces the need for re-sharpening and recoating a solid end mill.

PVD coated carbide inserts enable 3 to 5 times higher machining efficiency than HSS endmills.

Use of inserts with center cutting edges enables not only D-cutting, but also slotting and slope milling.

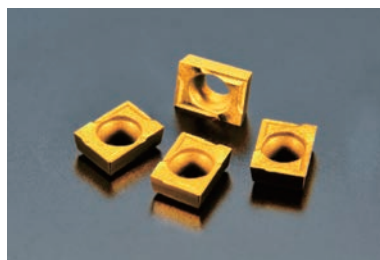
Large head type

Machining close to the guide bushing is possible. Enables stable machining of even small-diameter workpieces. Can be mounted close to the tool post, providing high rigidity and reduced chatter during high-speed machining. Larger cutting edge diameter enables highly efficient machining.



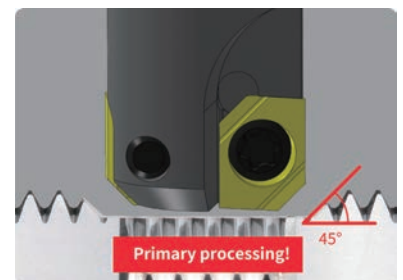
Specialized chip breaker to reduce cutting resistance

Significantly reduced cutting resistance achieves high-precision machining. Wiper shape improves surface finish roughness.



End mill for D-cut 45° machining

45° machining geometry is available with indexable inserts. Contributes to higher efficiency by reducing machining processes.



Case study

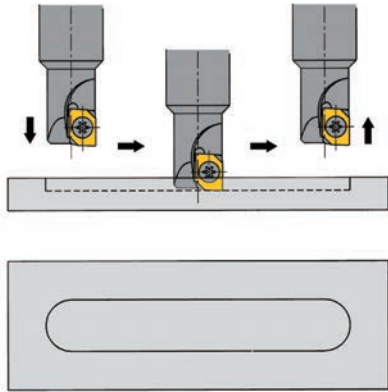
NTK's end mills with chipbreakers have good cutting performance, which reduces machining noise and eliminates surface lines. Machining dimensions were also stable and the tool life extended.

| | | | | |
|---------------|----------|--|---|-------------------------|
| Work material | SUS304 | | TM4 Endmill with chipbreaker | 300 pcs / corner |
| Cutting speed | 75m/min | | Competitor's Endmill without chipbreaker | 200 pcs / corner |
| Feed | 70mm/min | | | |
| Depth of cut | ~1.25 | | | |
| Coolant | WET | | | |

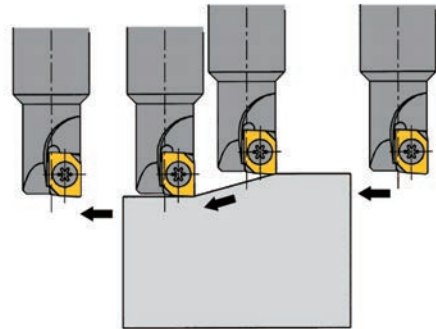
Advantages of installing an insert with a center edge

- Machining example (1): Single flute end mill can be used for infeed and side machining.
- Machining example (2): Slope milling is possible with a single-flute end mill.
- Wiper is provided at the cutting edge corner to obtain a good machined surface.

Machining example (1)



Machining example (2)



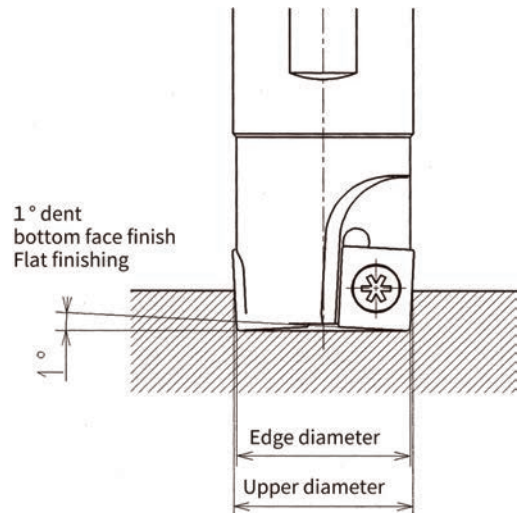
Notes

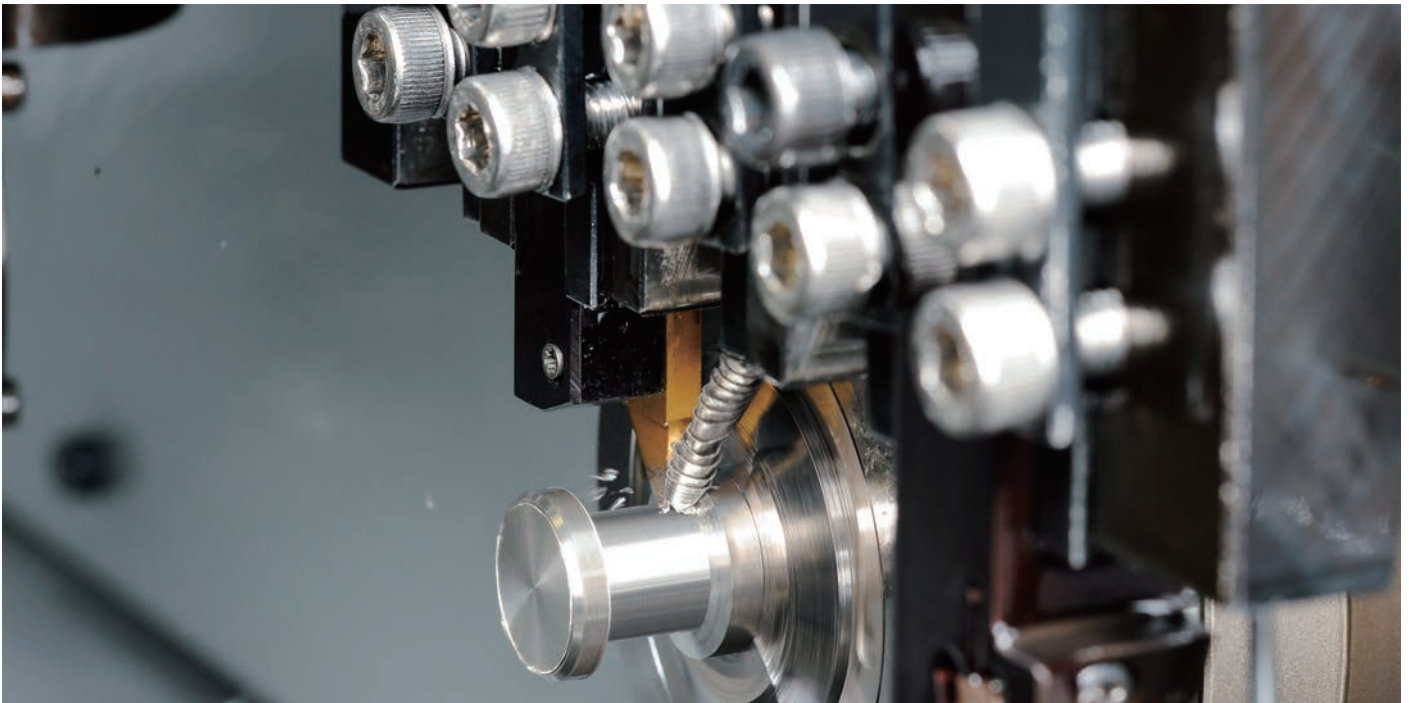
- Center fluted inserts can also be mounted on 2- and 3-flute type end mills, but infeed machining cannot be performed. However, the surface roughness of the machined bottom surface can be improved.
- When performing slope milling with a center-edged insert mounted on a single flute type end mill, the effective cutting edge length (4.0 mm) should be taken into account when setting up the machining program.

Notes on the use of the REL series

When REL type end mills are used, a taper will occur on the machining side of the workpiece. See chart for amount.

| Depth of cut (mm) | (1)Top machining dia. - (2)Bottom machining diameter (mm) |
|-------------------|---|
| 2 | 0.05 |
| 3 | 0.08 |
| 4 | 0.12 |
| 5 | 0.15 |





For back turning | Swiss CNC lathes

TBP/TBPA-BM chipbreaker



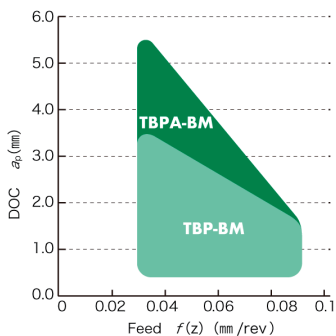
Achieves outstanding surface finish in single pass machining

A traditional 2 pass operation can be completed in a single pass while providing chip control. Dramatically shortens cycle time.

Features

High rigidity with vertically mounted inserts and screw clamps.

Surface finish is stable even under high feed conditions due to the cutting edge wiper.



Cutting performance

Single pass back turning, good machined surface finish.

| Single pass machining | TBP-BM chipbreaker | | Competitor's product | |
|-----------------------|---------------------|------------------------------|----------------------|------------------------------|
| | Shoulder (end face) | OD | Shoulder (end face) | OD |
| | | | | |
| | Excellent finish | Ra : 0.72 μm Rz : 4.46 μm | Rough surface | Ra : 1.65 μm Rz : 6.01 μm |

[Cutting conditions] Material : SUS304 $\phi 16$ $v_c=80\text{m/min}$ $f(x)=0.02\text{mm/rev}$ $f(z)=0.08\text{mm/rev}$ $a_p=3.0\text{mm}$ WET

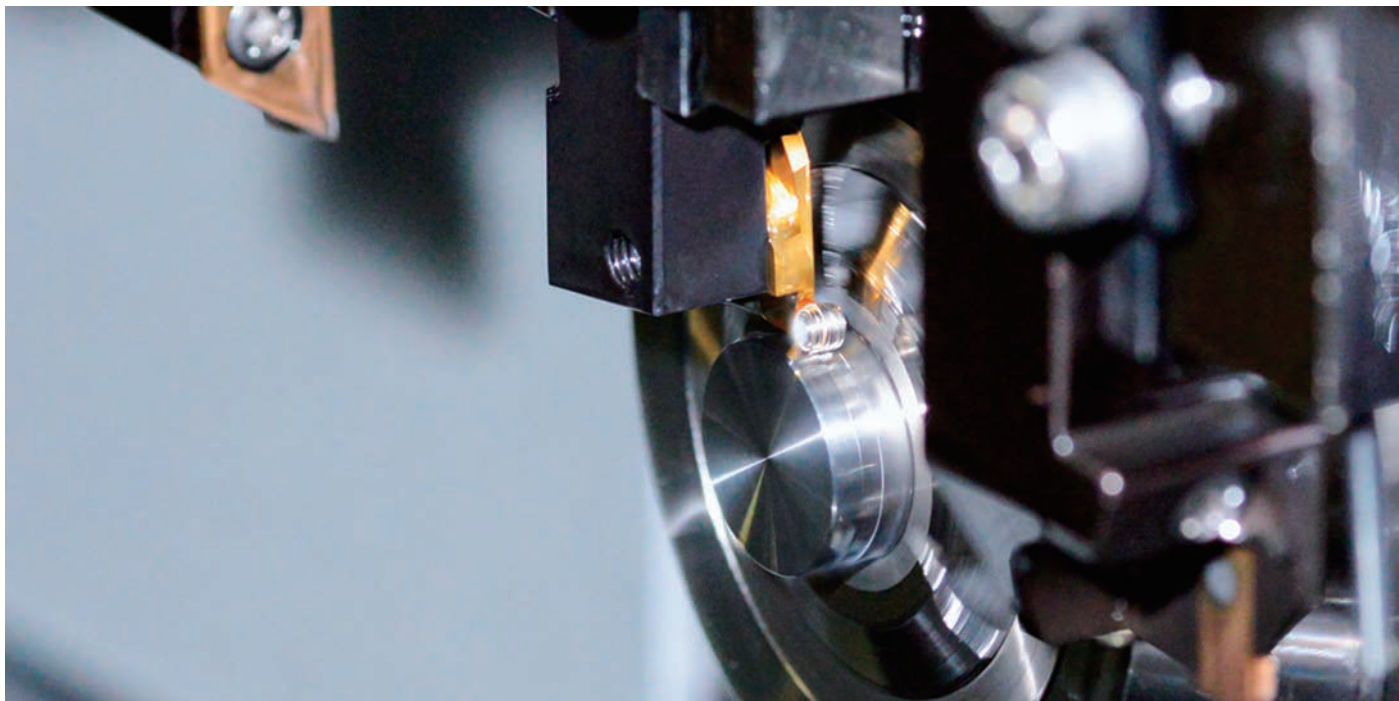
[Tools used] Holder : TBPR12 Insert : TM4 TBP72FR10M-BM

Case study

Conventional back- turning operation includes a roughing pass and a finishing pass.

The NTK-BM chipbreaker reduces the cycle time with one-pass machining, and its unique chipbreaker provides excellent chip control. Scratched and rough machined surfaces due to chips is eliminated and high quality machined surfaces obtained.

| | | | | |
|---------------|------------|--|-----------------------------|---|
| Work material | SUS430F | | TBP-BM | ① 1 pass machining * no extra operations required |
| Cutting speed | 50m/min | | | |
| Feed | 0.05mm/rev | | Competitor's product | ① Roughing - grooving operations ② Finishing - back turn operation |
| Depth of cut | 2.0mm | | | |
| Coolant | WET | | | |



For grooving | Swiss CNC lathes

GTMH-GX chipbreaker



Tightly curls the chip to prevent tangling

Dimple design on insert rake face ensures chip control when grooving and side turning

Performance

Groove widths from: 0.33mm - 3.0mm

Good surface finish in the groove and on the side face

Capable of up to 2.0mm DOC when side turning with larger width inserts



Chip control comparison (Grooving E-ring)

Solves problems of chips (rings) remaining at the bottom of grooves and wrapping around the workpieces

| | Feed (mm/rev) | | |
|---|---------------|------|------|
| | 0.01 | 0.03 | 0.05 |
| GX chipbreaker | | | |
| Conventional product (Ground chipbreaker) | | | |

[Cutting conditions] Material : SUS304 ($\phi 6 \Rightarrow \phi 3$) $V_c=80\text{m/min}$ $a_p=1.5\text{mm}$
Groove width : 0.75mm

Case study

The GX insert solved the issue of chips remaining in the groove which eliminated an inspection process.

| | | | |
|---------------|------------|--|---|
| Work material | SUS430 | | <p>DM4+GX chipbreaker 3500 pcs/corner</p> <hr/> <p>Competitor's ground chipbreaker (PVD-coated carbide) 2500 pcs /corner</p> |
| Cutting speed | 80m/min | | |
| Feed | 0.03mm/rev | | |
| Depth of cut | 1.0mm | | |
| Coolant | WET | | |



For OD , back turning, grooving, and multi-functional machining | For Swiss CNC lathes (gang type)

Y-axis holder series



Solves chip evacuation problems using gravity

Using the tool change control axis (Y-axis) of the gang tool post
Chips naturally fall to the bed of the machine

Performance

Eliminates the concern of chips tangling up
- chips automatically drop down away from part
Utilize coolant through y-axis holders and improve tool life and dimensional stability




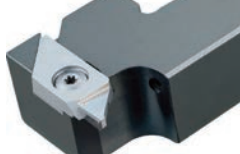
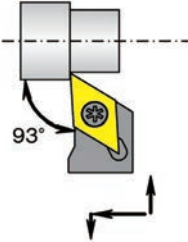
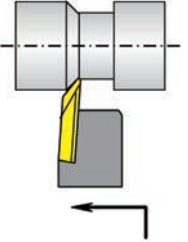
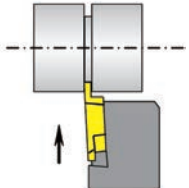
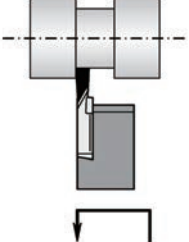


Application

Front turning / Back turning / For grooving
Pure Copper Processing / Machining Plastics

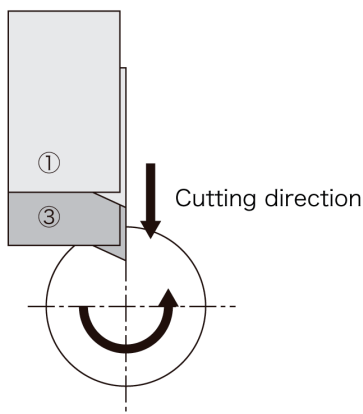


Line up

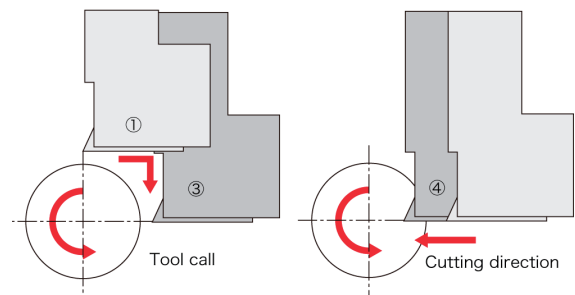
| Front turning | Back turning | Grooving / Back turning | Multi-function |
|---|---|--|---|
| Y-SDJC Y-SDJC-OH Y-SDJC-OH2 | Y-TBPR Y-TBPR-OH | Y-GTT Y-GTT-OH | Y-GTPA Y-GTPA-OH |
|  |  |  |  |
|  |  |  |  |

Tooling

Conventional toolholder



Machining with Y-axis holder



Programming guide

| | |
|--------------------|--------------------------------|
| ①T300 | ...Select tool |
| ②G0 Y11.0 Z0 T3 | ...Insert positioning |
| ③G1 X8.0 F0.08 | ...Cut to 8.0 mm |
| ⑤Z5.0 F0.05 | ... Cut up to 5.0 mm in length |
| ⑥X11.0 | |
| ⑦G0 X11.0 | |

In general front turning, a tool is selected and moved to readying position and then cutting is initiated.

The cut direction is the "**X-axis**"

Program sample

| | |
|----------------|--------------------------------|
| ①T300 | ...Select tool |
| ②G0 Y11.0 T3 | |
| ③X0 | ... Insert positioning |
| ④G1 Y8.0 F0.08 | ...Cut to 8.0 mm |
| ⑤Z5.0 F0.05 | ... Cut up to 5.0 mm in length |
| ⑥Y11.0 | |
| ⑦G0 X11.0 | |

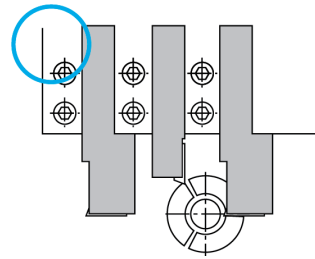
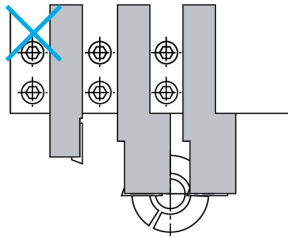
When using the Y-axis holder, the tool selection ①. Then, at position 3 the system starts the cutting operation.

The cut direction is the "**Y axis**"

Note: Need y-offset in the program for the holder shank size.

Y-axis holder positioning guidelines

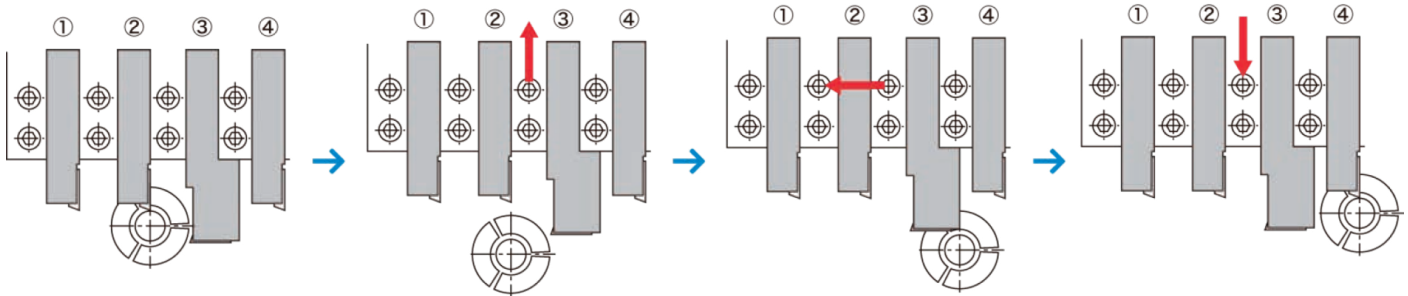
Use a maximum of 2 in vertical gang, and do not install side by side to prevent interference issues



The workpiece and Y-axis holder may interfere with each other

Typical positioning is sandwiching them in gang

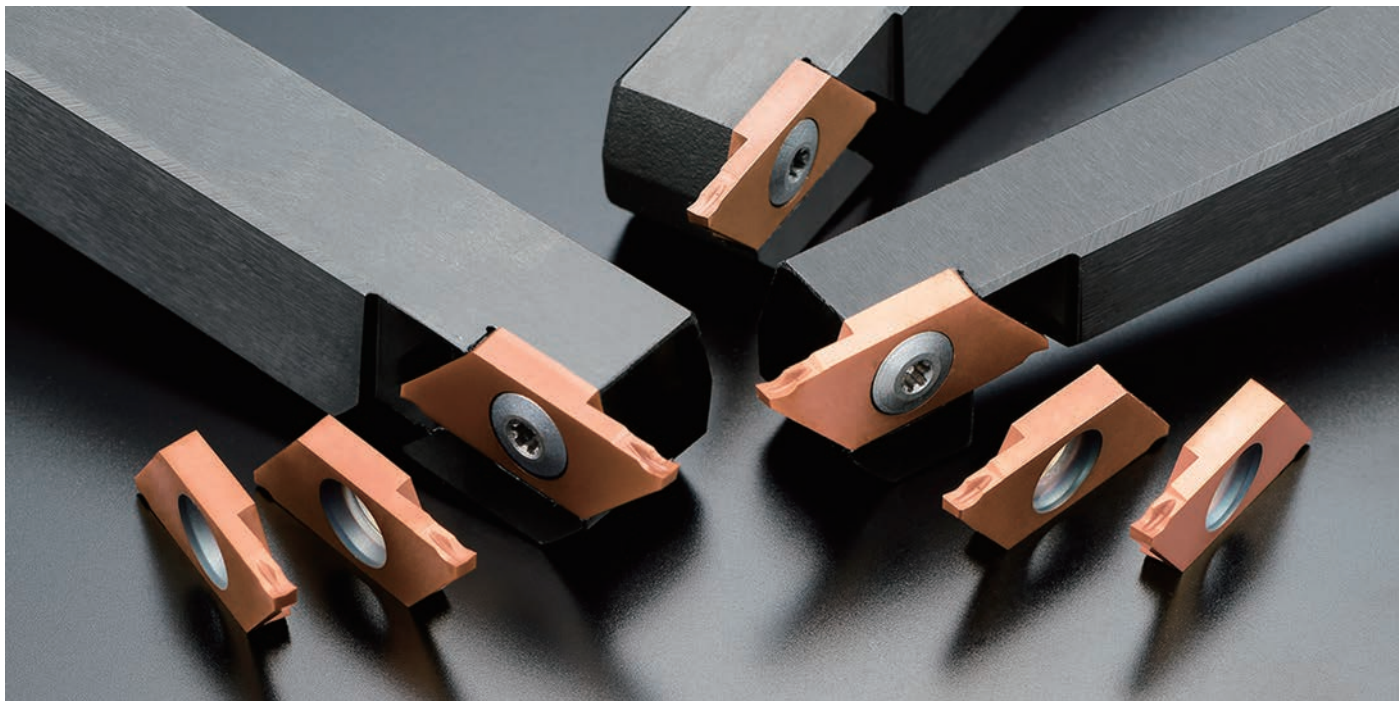
When moving from tool No. ② to ④, program retraction position based on the amount of y-axis holder overhang.



Workpiece diameters and Y-axis holder table

Example uses Y-GTTR grooving holder to show holder and workpiece diameters in machine area

| Overhang of the Y-axis holder | Figures | Item L | 20 | 22 | 25 |
|-------------------------------|---------|---|-------------------|-----------------|---------------------|
| 20 | | D1 (Machinable outer dia. for holder A) | Not limited | Not limited | Not limited |
| | | D2 (Machinable outer dia. for holder B) | 13 | 13 | 13 |
| | | D3 (Machinable outer dia. for holder C) | Not limited | Not limited | Not limited |
| 25 | | D1 (Machinable outer dia. for holder A) | 38 | 58 | Not limited |
| | | D2 (Machinable outer dia. for holder B) | 14.9 | 13.6 | 13 |
| | | D3 (Machinable outer dia. for holder C) | 38 | 58 | Not limited |
| 30 | | D1 (Machinable outer dia. for holder A) | 26.8 | 29 | 38.5 |
| | | D2 (Machinable outer dia. for holder B) | 20.6 | 17.9 | 14.9 |
| | | D3 (Machinable outer dia. for holder C) | 33 (26.8 for TBP) | 37 (29 for TBP) | 51.5 (38.5 for TBP) |



For cut-off with max. diameter up to $\phi 16$ | Swiss CNC lathes

CTP/CTPA-CX chipbreaker



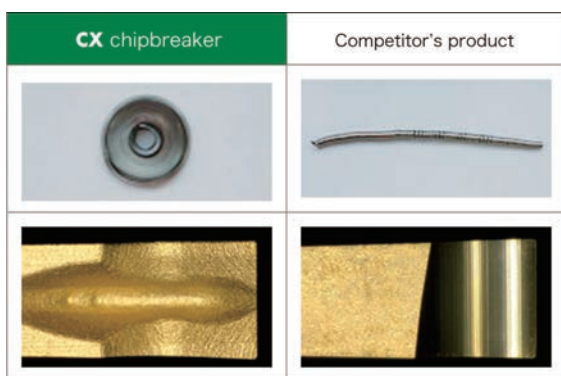
Prevents machine stoppage due to chip problems and achieves stable machining

CX molded chipbreaker curls and controls chips.

Prevents damage to machined surface by directing chips away from the part surface

Features

Uniquely developed CX breaker achieves outstanding chip control and evacuation.



Cutting performance

Chips are strongly folded from both ends of the breaker, preventing damage to the machined surface.

| Feed f (mm/rev) | CTP-CX chipbreaker | | Competitor's wiper insert | | Competitor's molded chipbreaker | |
|----------------------|-----------------------------------|----------------|---------------------------|----------------|--|----------------|
| | Chip | Surface finish | Chip | Surface finish | Chip | Surface finish |
| 0.02 | | | | | | |
| 0.05 | | | | | | |
| | Excellent machined surface finish | | Rough surface finish | | Vibration occurred due to rigidity issue | |

Case study

Competitor's insert edge chipped resulting in a rough machined surface.

The CX insert maintained a good cutting edge resulting in stable machining, smooth machined surface, and long tool life.

| | | | | |
|---------------|------------|--|--|---|
| Work material | SS400 | | <p>CX chipbreaker CTPA15FRN-CX</p> <p>5000 pcs/corner</p> | |
| Cutting speed | 80m/min | | | <p>Conventional ground chipbreaker</p> <p>2000 pcs/corner</p> |
| Feed | 0.04mm/rev | | | |
| Cut-off dia. | $\phi 9$ | | | |
| Coolant | WET | | | |



For front turning | Swiss CNC Lathes

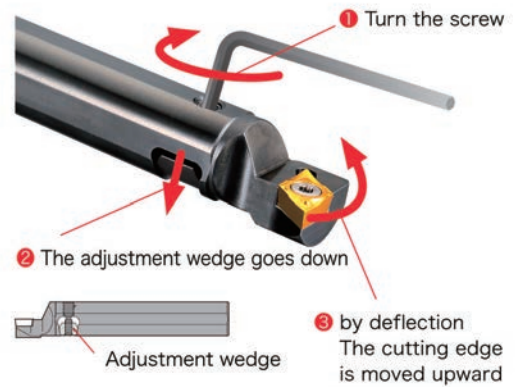
DS-ACH holder series



Wedge mechanism adjusts centerline height of the cutting edge by turning a set screw with a wrench
Eliminates time consuming cutting edge alignment process

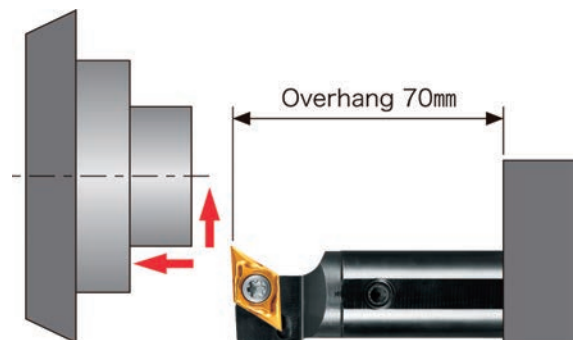
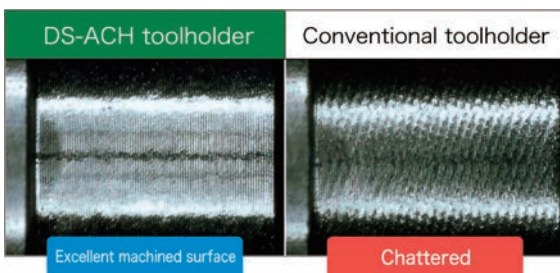
Feature 1.

Cutting edge height can be easily adjusted in the machine
Adjusted by turning the screw and deflecting the tip of the holder.



Feature 2.

Design optimizes vibration resistance



[Cutting conditions]

Material : SUS304

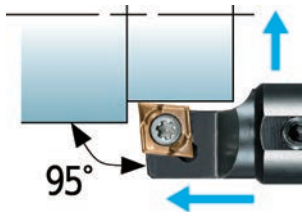
Holder : DS-SDUL19-11-ACH

Insert : TM4 DCGT11T302MCL

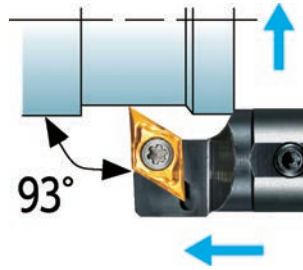
Cutting conditions : $V_c = 75 \text{ m/min}$, $f = 0.05 \text{ mm/rev}$, $a_p = 2.0 \text{ mm}$

Line up

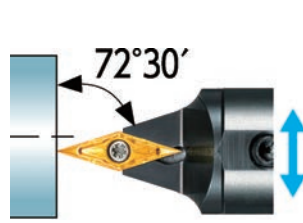
Front turning
DS-SCL-ACH



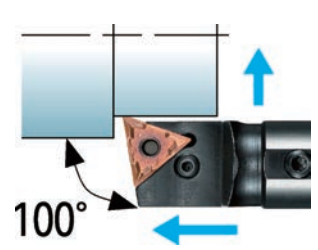
DS-SDU-ACH



DS-SVVP-ACH

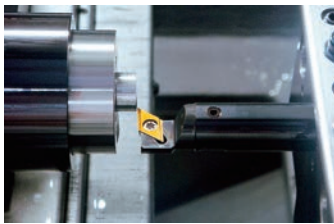


DS-PTX-ACH

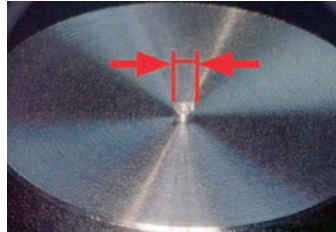


New and Unique
Swiss Tooling

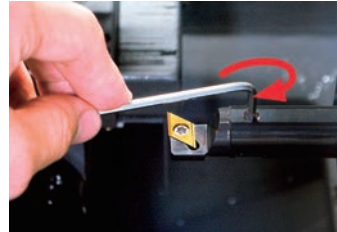
How to use: The insert moves in an upward direction only. (Loosen wedge screw before making any adjustments)



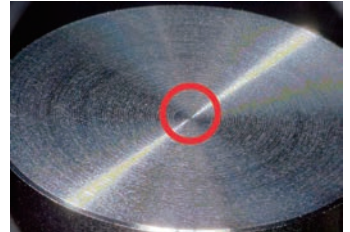
① Install the holder slightly below centerline. Then take a facing test cut. (be sure to loosen the wedge screw)



② Measure the diameter of the center boss



③ Raise the center height by one half of the diameter of the boss. Adjustment instruction sheet is supplied in the toolholder case.



④ Re-machine the end face.

Range of centerline adjustment: 0 - 0.3 mm

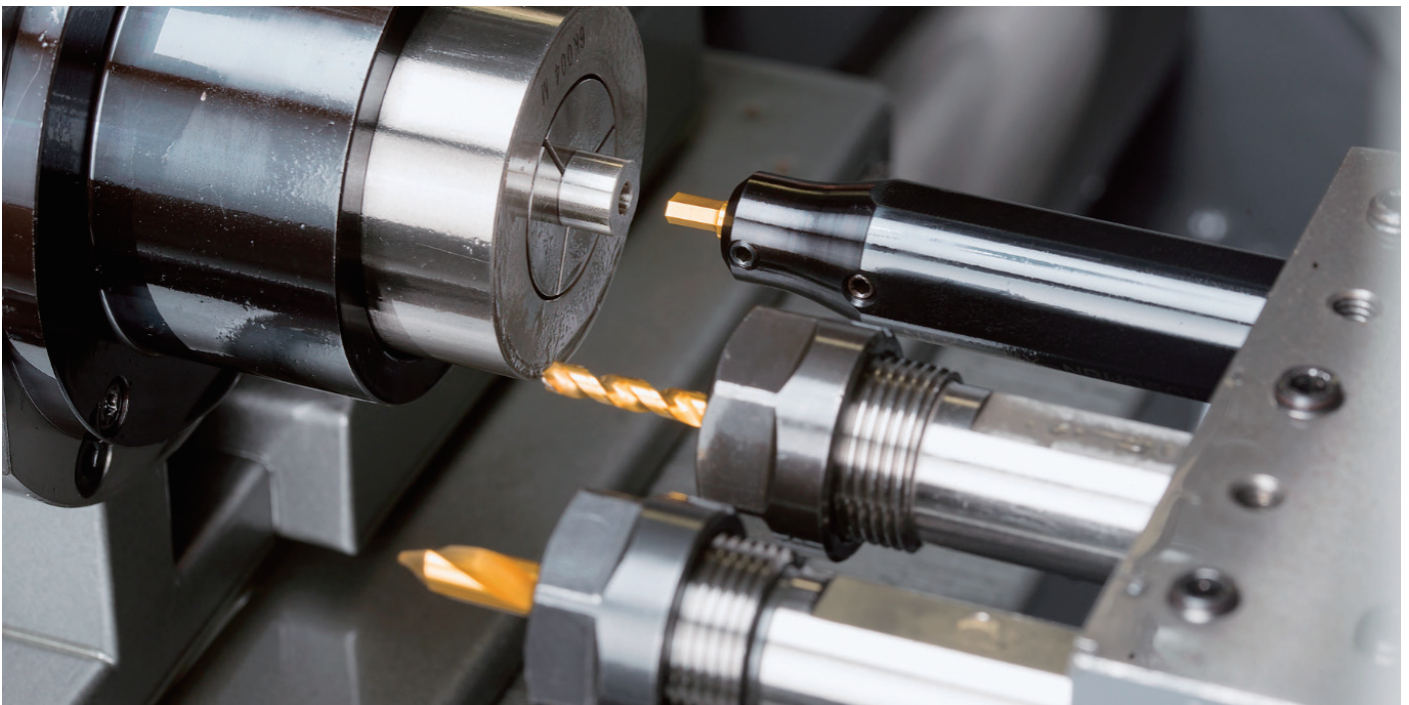
*Adjustment instructions are supplied in the tool case

Type A

| Angle of rotation | Approx. raise amt. (Diameter) |
|-------------------|-------------------------------|
| 180° | 0.05(0.10) mm |
| 360° | 0.10(0.20) mm |
| 540° | 0.15(0.30) mm |
| 720° | 0.20(0.40) mm |

Type B

| Angle of rotation | Approx. raise amt. (Diameter) |
|-------------------|-------------------------------|
| 180° | 0.05(0.10) mm |
| 360° | 0.10(0.20) mm |
| 540° | 0.20(0.40) mm |
| 720° | 0.30(0.60) mm |



For socket hole machining on CNC automatic lathes

SHAPER DUO



Hexagon, square and hexalobular socket machining can be achieved at a low cost and without any special equipment .

Wide range of socket styles and sizes can be machined by using the sub-spindle of automatic lathes.

Features ①

- Machine square, hexagon, and hexalobular socket holes
- Less tool pressure than Rotary-Broaching. Ideal for machining small diameter work pieces
- Wide range of socket dimensions can be machined with one size of SHAPER DUO
- Special workpieces and small quantity part runs can be machined with less tool costs



Features ②

Comparison Chart of Hexalobular Socket Machining

| | Tool Pressure | Cycle Time | Tool Cost | High speed spindle | Programming | |
|------------|---------------|------------|-----------|--------------------|-------------|---|
| Shaper Duo | ⊙ | ⊙ | ⊙ | Not necessary | Simple | <ul style="list-style-type: none"> • No high speed spindle needed • A lot less cycle time |
| End mill | ○ | × | △ | Necessary | Complicated | <ul style="list-style-type: none"> • Need high speed spindle • Time consuming process |

*Small diameter end mill driven by high-speed spindle is popular way to create Hexalobular(6-lobe) socket.

It has some flexibility but needs high speed spindle unit and it is a time consuming process.

*SHAPER DUO can make Hexalobular(6-lobe) socket faster and simpler.

Comparison Chart of HEX Socket Machining

| | Tool Pressure | Cycle Time | Flexibility | Tool Cost | |
|-------------|---------------|---|-------------|-----------|--|
| Shaper Duo | ⊙ | △ ※Can be off-set by over-wrapping operation | ○ | ⊙ | <ul style="list-style-type: none"> • Less tool pressure-especially on small diameter parts • One size can cover several socket sizes |
| Broach Tool | △ | ○ | × | △ | <ul style="list-style-type: none"> • Need to have tools for each socket size |

*Rotary-broaching is an efficient way to machine a Hexagon socket.

But tool pressure is high and often times it pushes part too hard.

*SHAPER DUO system enables less tool pressure and provides better tolerance with less cost.

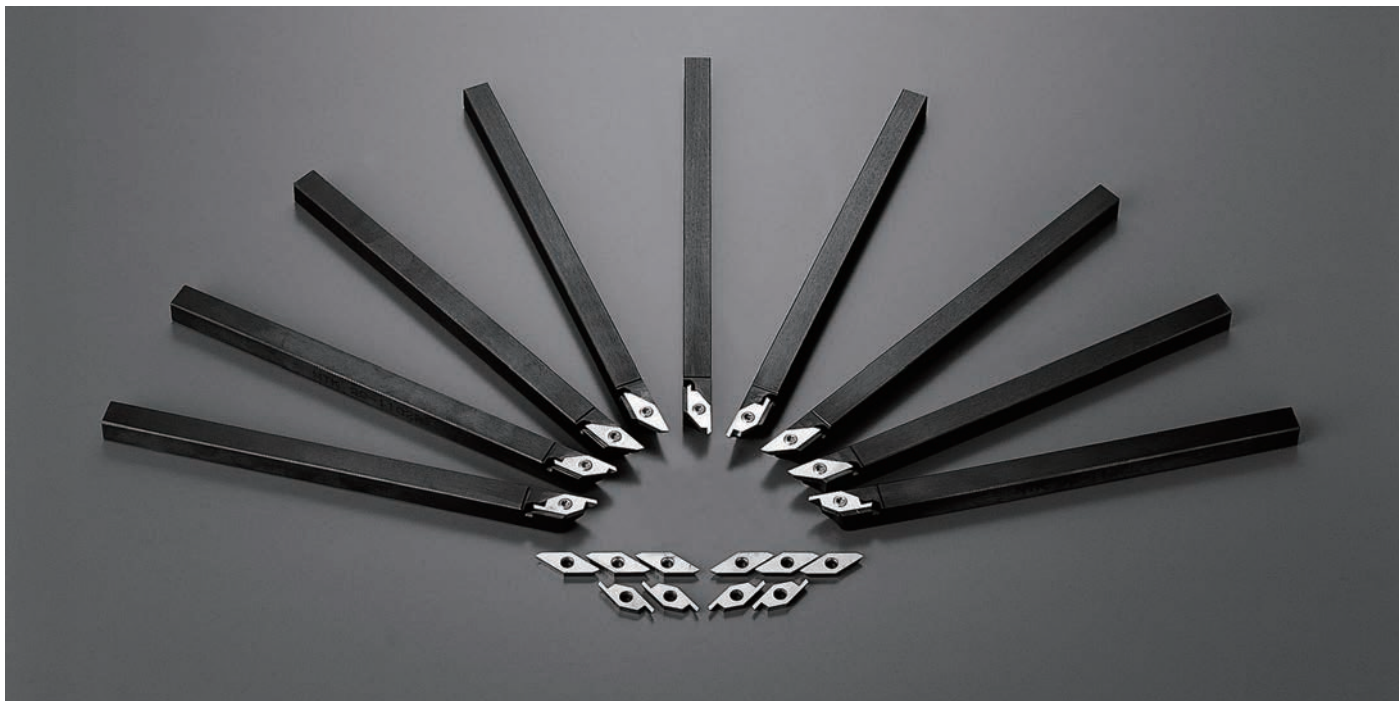
Example of machining Hexagon socket

SHAPER DUO has better tool life compared to the competitor which has an immediate worn and rounded cutting edge.

NTK's special grinding process and TM4 grade enable to:

- ① Keep good corner edge sharpness and long tool life ② Provide better tolerance and accuracy ③ Provide better surface quality

| | | | | |
|-------------------|-------------------|--|-------------------------|--------------------------|
| Work materials | SUS303 | | TM4 SSP030N1940H | 10,000 pcs/corner |
| Feed | 2,000 mm/min | | | |
| Depth of cut (ap) | Roughing 0.025mm | | Competitor's carbide | 300 pcs/corner |
| | Finishing 0.005mm | | | |
| Coolant | WET | | | |



Designed to machine extremely small diameter workpieces | Swiss CNC lathes & CAM style machines

CSV series



Designed for workpieces of $\phi 5$ diameter or less

A highly polished insert achieves high quality machined parts

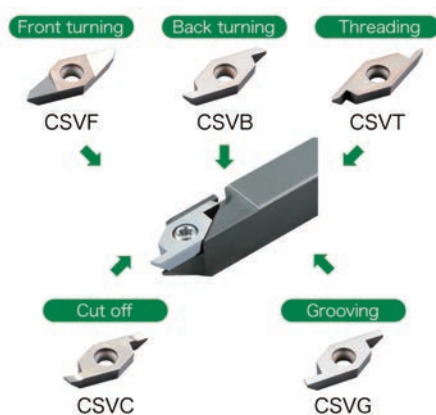
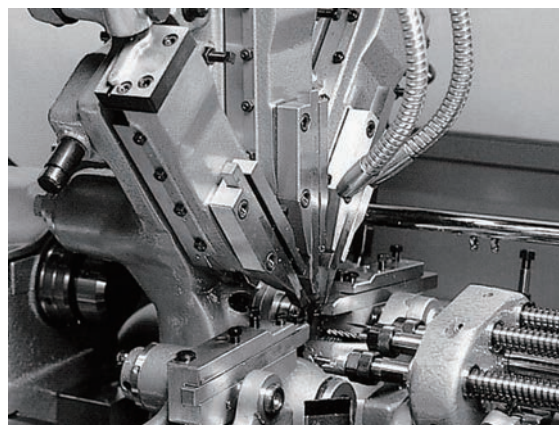
Reduction in cutting time compared to a standard carbide insert

All CSV inserts styles can be installed in same holder

Insert cutting edge is designed specifically for machining very small diameter parts

High precision achieved with the mirror finish polished insert

CSV holders are also available for cam-style cnc lathes



Case study Clock parts

The CSV insert achieves excellent part consistency and long tool life machining extremely small parts

| | | | | |
|---------------|-------------|--|------------|----------------------|
| Material | SK4 | | VM1 | 40,000 pieces |
| Cutting speed | 15m/min | | | Brazed Carbide Tool |
| Feed | 0.007mm/rev | | | |
| DOC | 0.03mm | | | |
| Coolant | WET | | | |



Cut-off operations for diameters up to $\phi 34$ | Swiss CNC Lathes

CUT DUO



Increased insert clamp rigidity to ensure stable machining

Molded chipbreaker and rigid holder system for stable performance

Coolant through holders available to further improve chip control

Cutting performance

Unique molded chipbreaker that tightly curls chips

Sharpness is improved by polishing the insert edge

Reduced tool pressure improves part surface finish

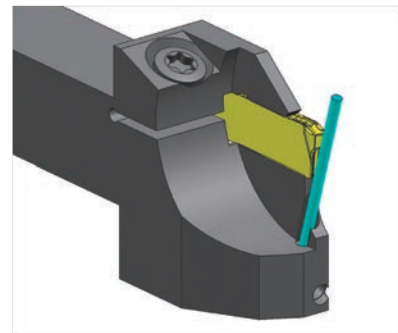
| Cutting performance | 0.05mm/rev | 0.08mm/rev | 0.12mm/rev |
|---------------------|------------|------------|------------|
| SCM435 | | | |
| SUS304 | | | |

[Chip comparison] $V_c=80\text{m/min}$

Coolant through series of holders (CTDP..OH/OH2)

Evacuates chips to eliminate chip tangling.

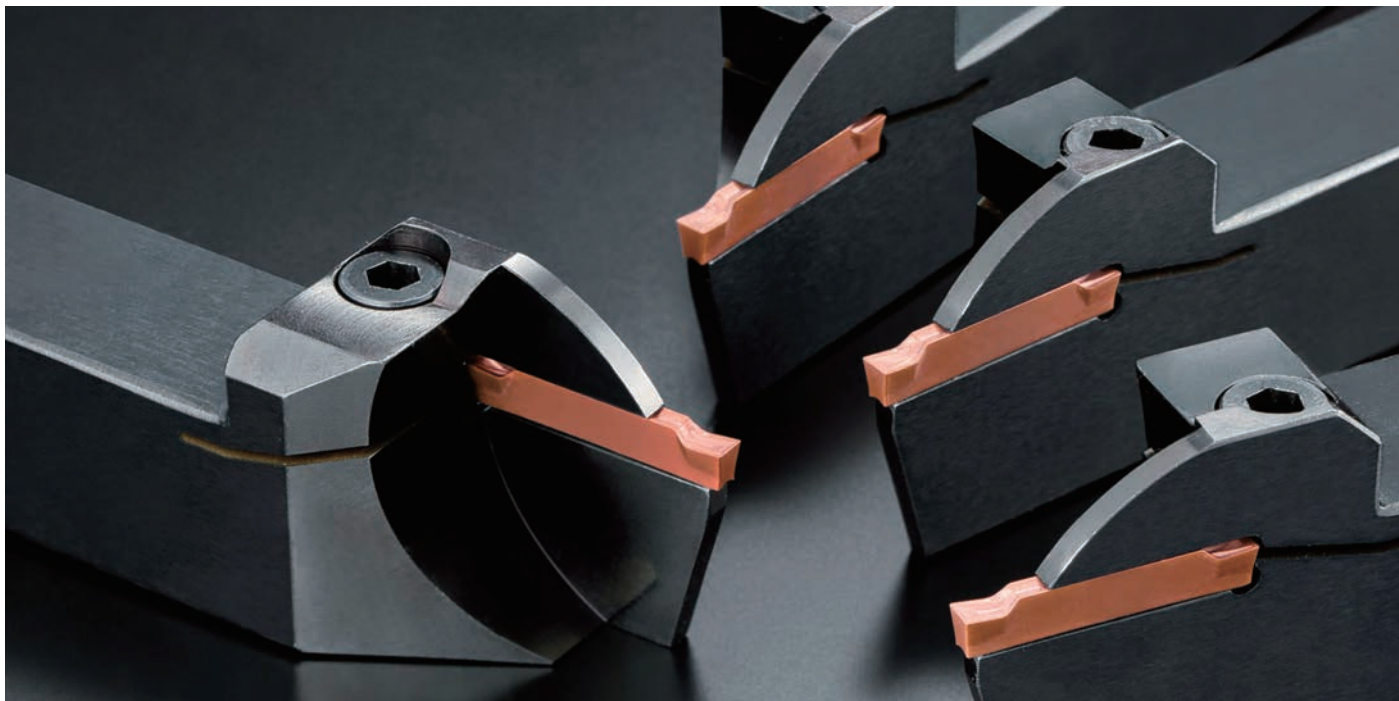
Coolant is directed at the cutting edge which greatly improves insert tool life.



Case study Shaft

Cut Duo achieved 2x the tool life and generated high quality surface finishes compared to the competitor's PVD coated insert

| | | | |
|---------------|------------|--|--|
| Material | SCM435 | | <p>QM3</p> <p>6,000 pcs / corner</p> <hr/> <p>Competitor's PVD coated carbide</p> <p>3,000 pcs / corner</p> |
| Cutting speed | 80m/min | | |
| Feed | 0.05 m/rev | | |
| DOC | - | | |
| Coolant | WET | | |



Cut-off operations for diameters up to $\phi 42$ | Swiss CNC lathe / Conventional CNC lathe

CUT DUO EXTRA



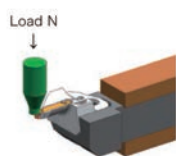
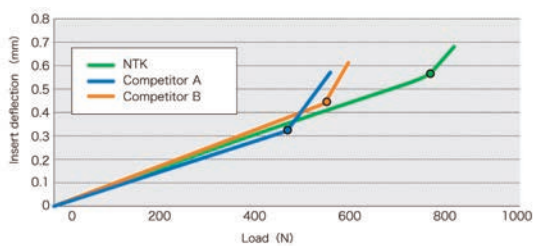
A highly rigid holder design combined with a molded insert chipbreaker ensures stability

Rigid system supports the process of large-diameter cut-off operations that are subject to high cutting loads
Chip control is achieved with the unique chipbreaker design

Tool rigidity comparison

Rigidity developed to accommodate high load cut-off applications to ensure reliability and productivity.

✳️The highest clamping strength of any holder currently on the market (according to our research)



Chip formation comparison

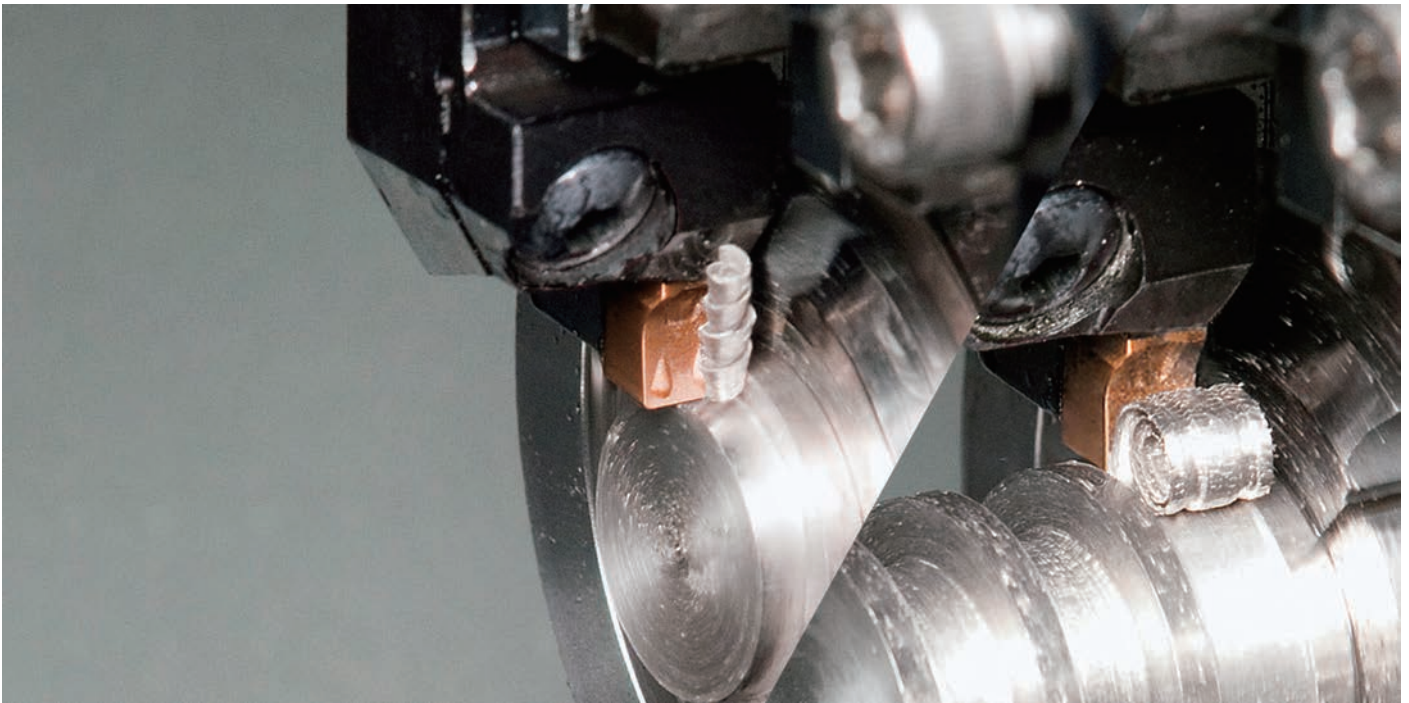
| Feed f_m (mm/rev) | CUT DUO EXTRA | | Competitor's rigid molded type chipbreaker | |
|---------------------|-----------------------------------|----------------|--|----------------|
| | Chips | Surface finish | Chips | Surface finish |
| 0.03 | | | | |
| 0.05 | | | | |
| 0.1 | | | | |
| | Excellent machined surface finish | | Rough surface finish occurs at low feed rate | |

Case study Coolant control parts

CUT DUO EXTRA with its 2 cutting edges significantly reduced cost compared to the competitor's 1 cutting edge insert.

Cut Max achieved excellent chip control and 2 times the tool life.

| | | | |
|---------------|---------------------|--|--|
| Material | S45C tempered steel | | |
| Cutting speed | 110m/min | | |
| Feed | 0.07mm/rev | | |
| DOC | - | | |
| Coolant | WET | | |



For grooving | Swiss CNC lathes / Conventional CNC lathes

SCRUM DUO



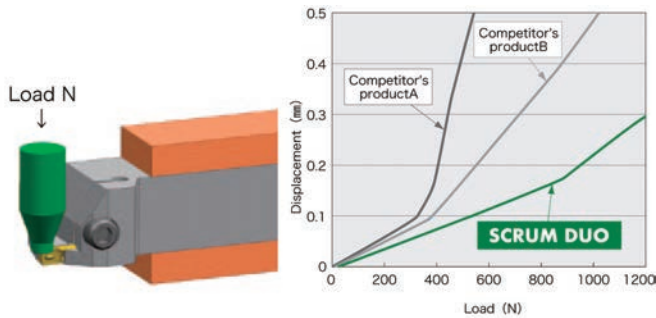
Exceptionally rigid design to ensure stable grooving

Prevents the insert from shifting during machining and achieves a good machined surface

Performance

- Applicable groove width: 3.0mm-6.0mm
- Highly rigid holder achieves a 3.5mm depth of cut during side turning operation

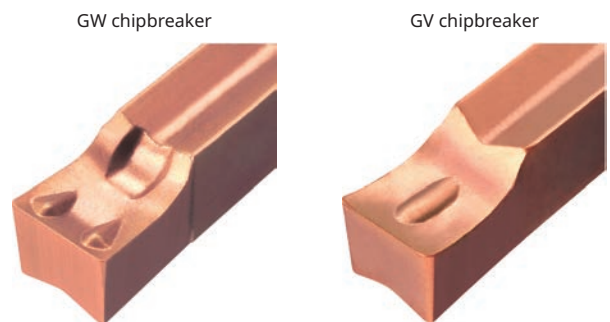
Tool pressure comparison when grooving



Two chipbreaker styles - select the best fit for your grooving application

GW chipbreaker: A versatile design with edge sharpness and chip control. Multi-functional for grooving and side turning.

GV chipbreaker: Features superior sharpness with high rake face. Ideal for applications requiring low tool pressure.



Grooving

| | New GW chipbreaker | Competitor's product |
|----------------|--------------------|----------------------|
| Chip | | |
| Surface finish | | |

Side turning

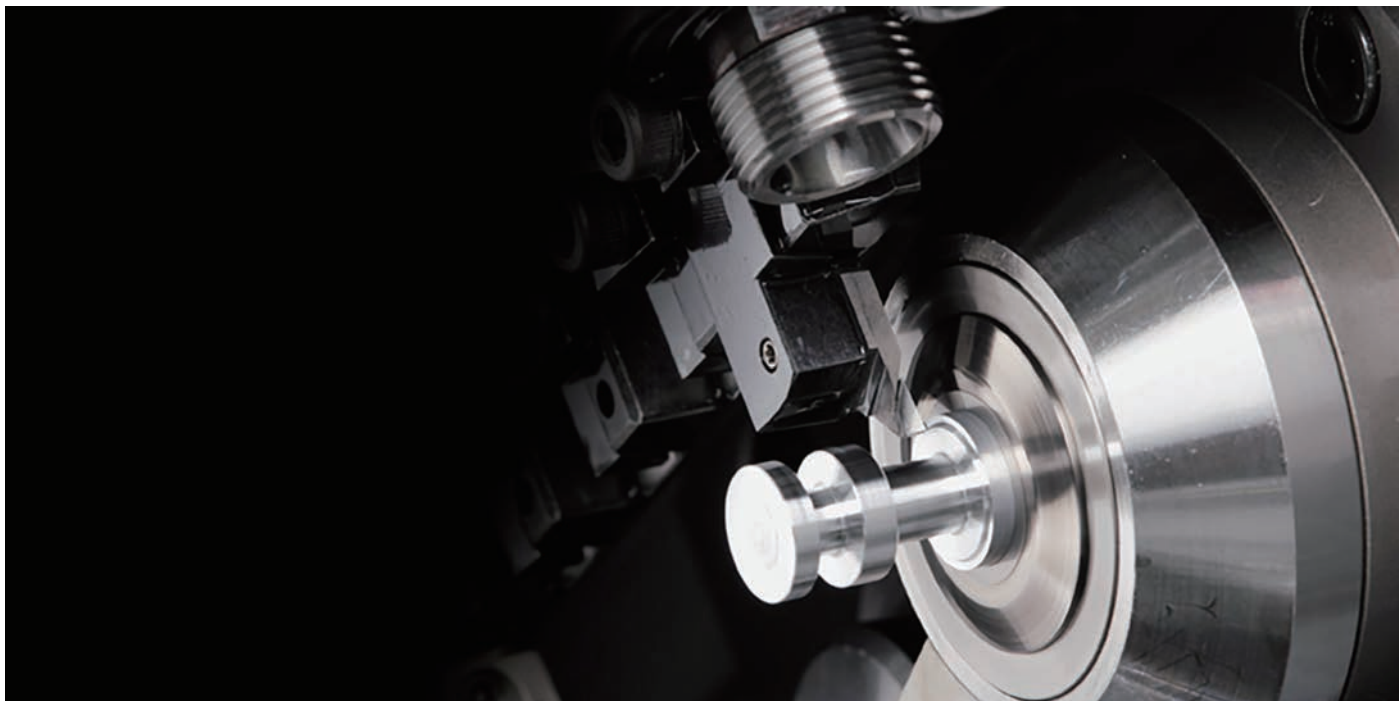
| | New GW chipbreaker | Competitor's product |
|----------------|--------------------|----------------------|
| Chip | | |
| Surface finish | | |

[Cutting conditions] SCM415 groove width: 5.0mm Vc=150m/min f=0.1mm/rev ap=7.0mm No step feed with coolant

[Tools] Insert: DM4 GWPG500N04F-GW Holder: GTWPR2525M-5F10

[Cutting conditions] Material: SCM415 Groove width: 5.0mm Vc=150m/min f=0.1mm/rev ap=1.0mm No step feed With coolant

[Tools] Insert: DM4 GWPG500N04F-GW Holder: GTWPR2525M-5F10



Multifunctioning tool for machining non-ferrous material | Swiss CNC Lathes

GTPA



High-precision and high efficiency machining

Grooving - side turning capability

Single pass machining to improve productivity

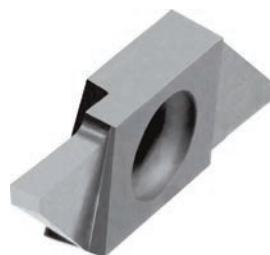
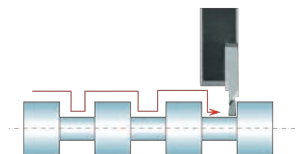
2 grades to choose from for machining needs

PD1 - PCD grade

Increased strength with fine grain polycrystalline diamond material
Adhesion resistance for non-ferrous materials
Prevents built-up edge for high precision and stable machining
Hard fine grain diamond to achieve high speed machining and long tool life

KM1 - carbide grade

Uncoated fine grain carbide grade designed for machining non-ferrous material
Up sharp edges and mirror finished inserts to achieve high-quality machined surfaces
Significantly lower insert cost compared to PCD inserts

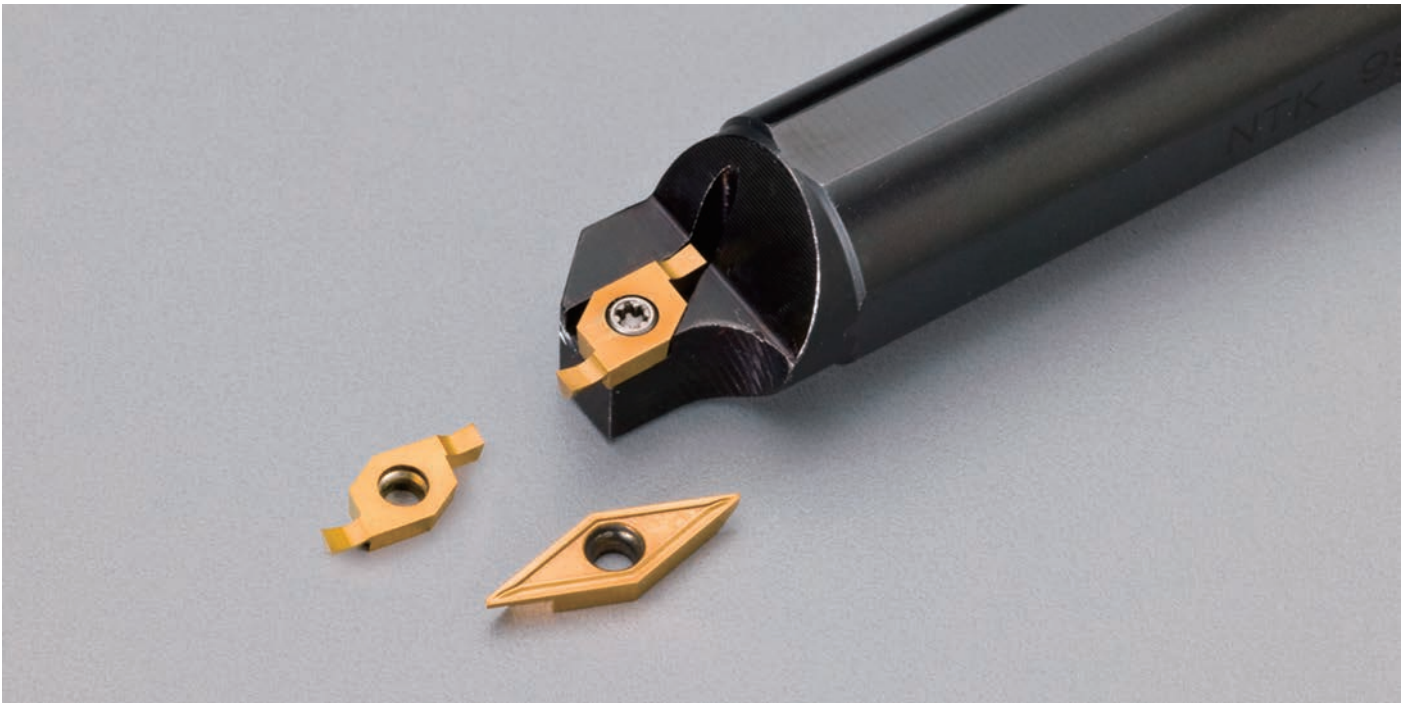


Case study Spool

Cut time shortened with one pass traversing.

PD1 insert generated super surface finish with efficiency. Tool life is extended with inserts adhesion resistance.

| | | | | |
|---------------|------------|--|------------|----------------------------------|
| Material | A6063 | | PD1 | 10,000 pcs |
| Cutting speed | 200m/min | | | Competitor's brazed Carbide Tool |
| Feed | 0.06mm/rev | | | |
| DOC | - | | | |
| Coolant | WET | | | |



Face Grooving | Swiss CNC Lathes

SATURN DUO

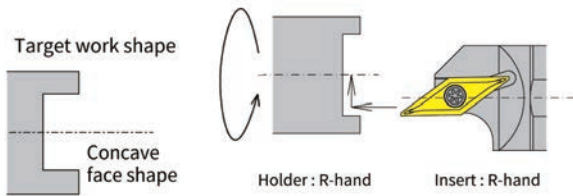
Single tool enables end face grooving and face machining

Reducing the number of tools and realizing process integration

FBV type for face machining

Minimum machining diameter $\phi 8.0$

Improves the efficiency of End face boring of up to 4mm depth

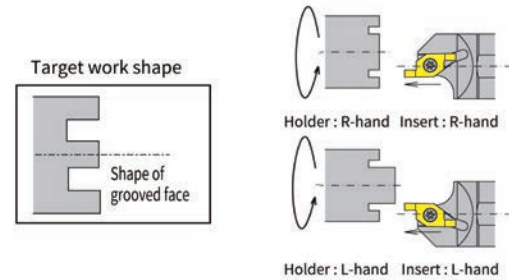


FGV type for face grooving

Minimum machining diameter $\phi 6.0$ and grooving width 1.0mm

High rigidity of inserts and holders enables machining in a wide range of cutting conditions

A lineup of left-handed tools is available for machining work with a boss feature



Case Study

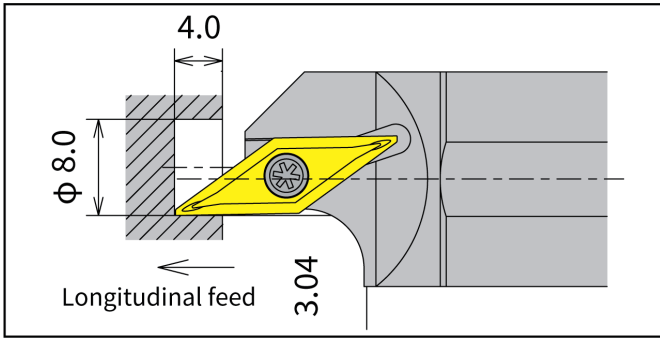
Previously, hand-polished high-speed tools were used, but by using SATURN DUO [FGV type], there was no variation in processing, and the life could be extended by about five times.

| | | | |
|---------------|------------|--|---|
| Material | SUS303 | | SATURN DUO 15,000 pcs/corner Hand-ground HSS tools 500~3,000 pcs/corner |
| Cutting speed | 27m/min | | |
| Feed | 0.02mm/rev | | |
| DOC | 0.5mm | | |
| Coolant | WET | | |

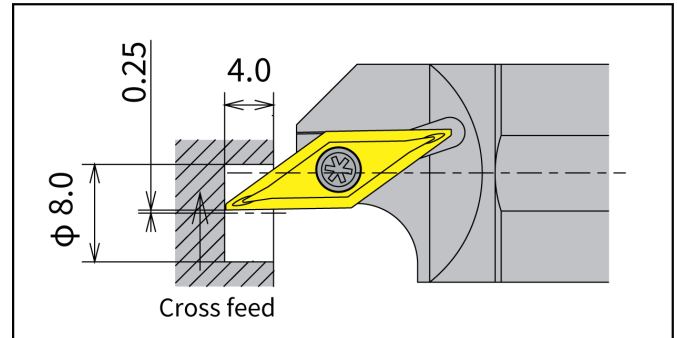
FBV type for face machining

Machining process

- For materials with good machinability, it is possible to machine up to 4mm deep at a low feed rate in a single pass for both longitudinal feed and cross feed.



Cutting in Z direction : Longitudinal feed



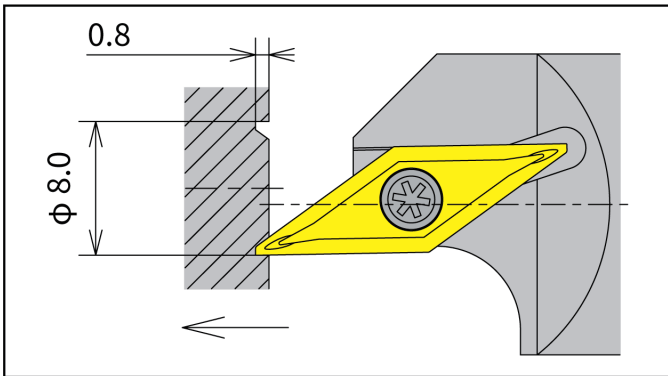
Cutting in X direction : Cross feed

Useful tips for machining

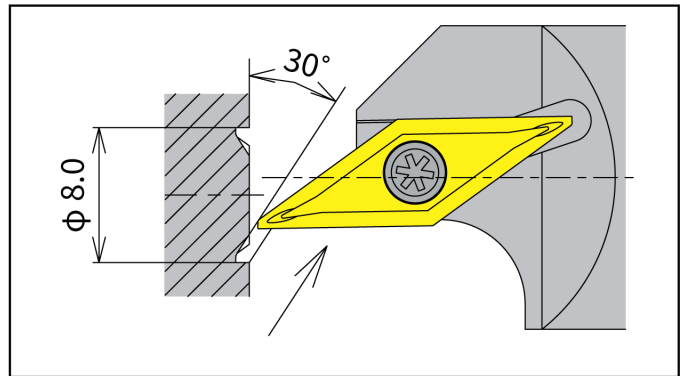
When burrs occur on ID surface, it is recommended to perform the cut in 2 passes, one for roughing and one for finishing as shown in the following procedure:

☆Example of 2-pass machining: Leave 0.2mm on roughing then run a finish cut

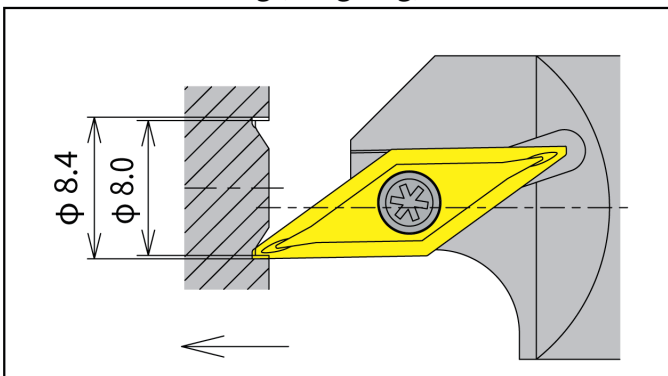
1 Longitudinal feed (roughing)



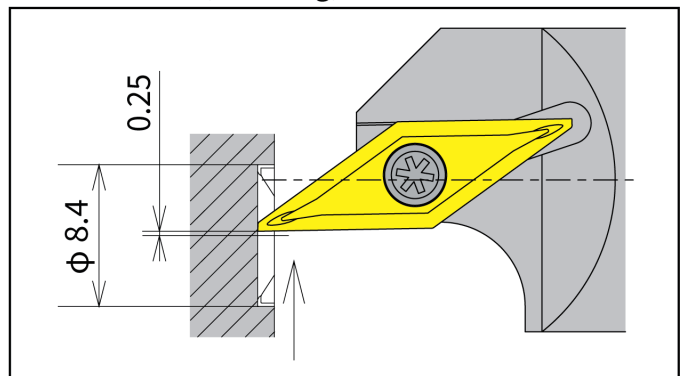
2 Longitudinal feed (finishing)



3 Slant machining (roughing)



4 Cross feed (finishing)



FGV type for face grooving

- Run multiple passes if turning wider grooves.
Make sure to groove from outer diameter to inner diameter to avoid any interference.
- If lines appear on the boss section, slow down feed rate when retracting the tool.
- If scratch appears at the end of the boss, slow down the feed rate.
- If groove surface looks torn, either slow down feed rate or increase speed.
- If groove bottom looks torn with a speed and feed condition, increase the speed.

☆Note

- Side turning cannot be performed with FGV style tooling.



Live tool station sleeve | Swiss CNC Lathes

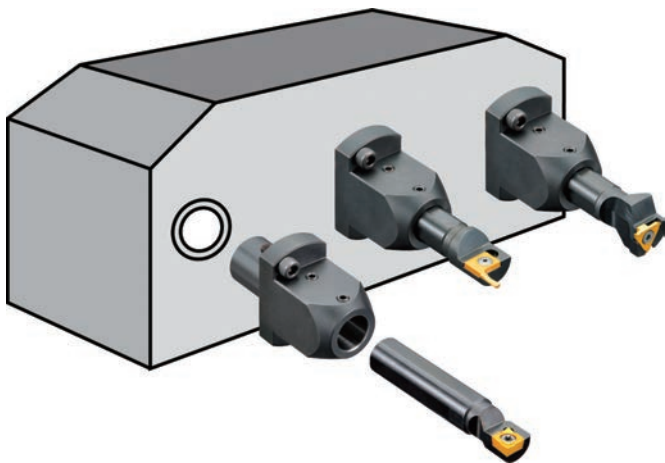
DS Sleeve

Prevents coolant and chips from damaging the rotating tool unit

I would like to use DS holder, but there is a gap in the mounting... this is the solution

Stop coolant and chips from damaging live tool stations

By using the DS Sleeve, you can use the DS Series holders without any worry about damaging live stations



Accepts DS Series holders to perform various back working

Front turning, Back turning, Grooving, Threading, and Small boring which fit into the machines vacant drill sleeves

DS Series toolholders can be used with both Swiss or non-Swiss type CNC lathes

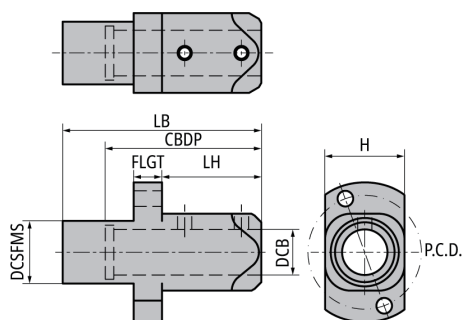


Compatible machine

Accepts DS Series holders to perform various back working
Designed exclusively for 22mm and 34mm round shank stations
Compatible with 16mm / 22mm round shank DS Series holders

For Back 4-spindle unit

SS-DSU-SK

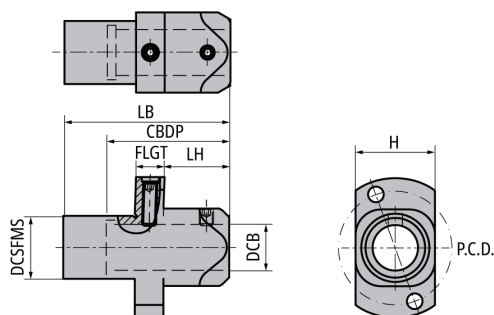


| EDP | Item Number | Stock | CBDP mm | DCB mm | DCSFMS mm | FLGT mm | H mm | LB mm | LH mm | P.C.D. mm | Comment |
|---------|-------------|-------|------------|-----------|--------------|------------|---------|----------|----------|--------------|---------------|
| 5788401 | SS-DSU-SK | ● | 55 | 16 | 22 | 10 | 28 | 70 | 35 | 40 | for DS holder |

Spare Parts

| Item Number | Screw (for Sleeve) | Screw (for Holder) | Wrench (for Sleeve) | Wrench (for Holder) |
|-------------|-----------------------|-----------------------|------------------------|------------------------|
| SS-DSU-SK | CS0520 | SS0506 | LW-4 | LW-2.5 |

SS-DSU-L23



| EDP | Item Number | Stock | CBDP mm | DCB mm | DCSFMS mm | FLGT mm | H mm | LB mm | LH mm | P.C.D. mm | Comment |
|---------|-------------|-------|------------|-----------|--------------|------------|---------|----------|----------|--------------|---------------|
| 5814512 | SS-DSU-L23 | ● | 43 | 16 | 22 | 10 | 28 | 58 | 23 | 40 | for DS holder |

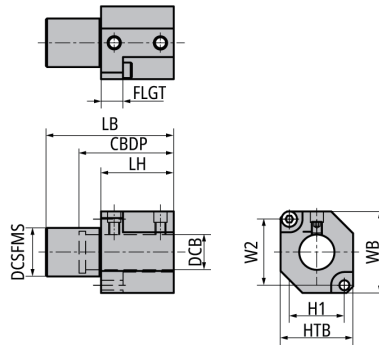
Spare Parts

| Item Number | Screw (for Sleeve) | Screw (for Holder) | Screw (for Holder) | Wrench (for Sleeve) | Wrench (for Holder) |
|-------------|-----------------------|-----------------------|-----------------------|------------------------|------------------------|
| SS-DSU-L23 | CS0520 | SS0506 | SS0515 | LW-4 | LW-2.5 |

For Back 8-spindle unit

SS-DSU-B8L23

New and Unique
Swiss Tooling

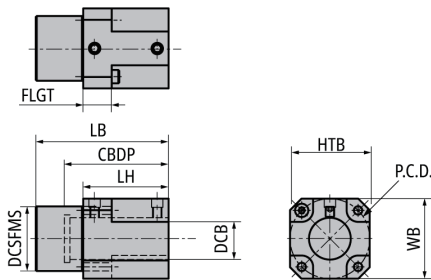


| EDP | Item Number | Stock | CBDP mm | DCB mm | DCSFMS mm | FLGT mm | H1 mm | HTB mm | LB mm | LH mm | WB mm | W2 mm | Comment |
|---------|--------------|-------|------------|-----------|--------------|------------|----------|-----------|----------|----------|----------|----------|---------------|
| 5892070 | SS-DSU-B8L23 | ● | 43 | 16 | 22 | 10 | 25 | 33 | 58 | 33 | 37 | 30 | for DS holder |

Spare Parts

| Item Number | Screw (for Sleeve) | Screw (for Holder) | Wrench (for Sleeve) | Wrench (for Holder) |
|--------------|-----------------------|-----------------------|------------------------|------------------------|
| SS-DSU-B8L23 | CS0420 | SS0506 | LW-3 | LW-2.5 |

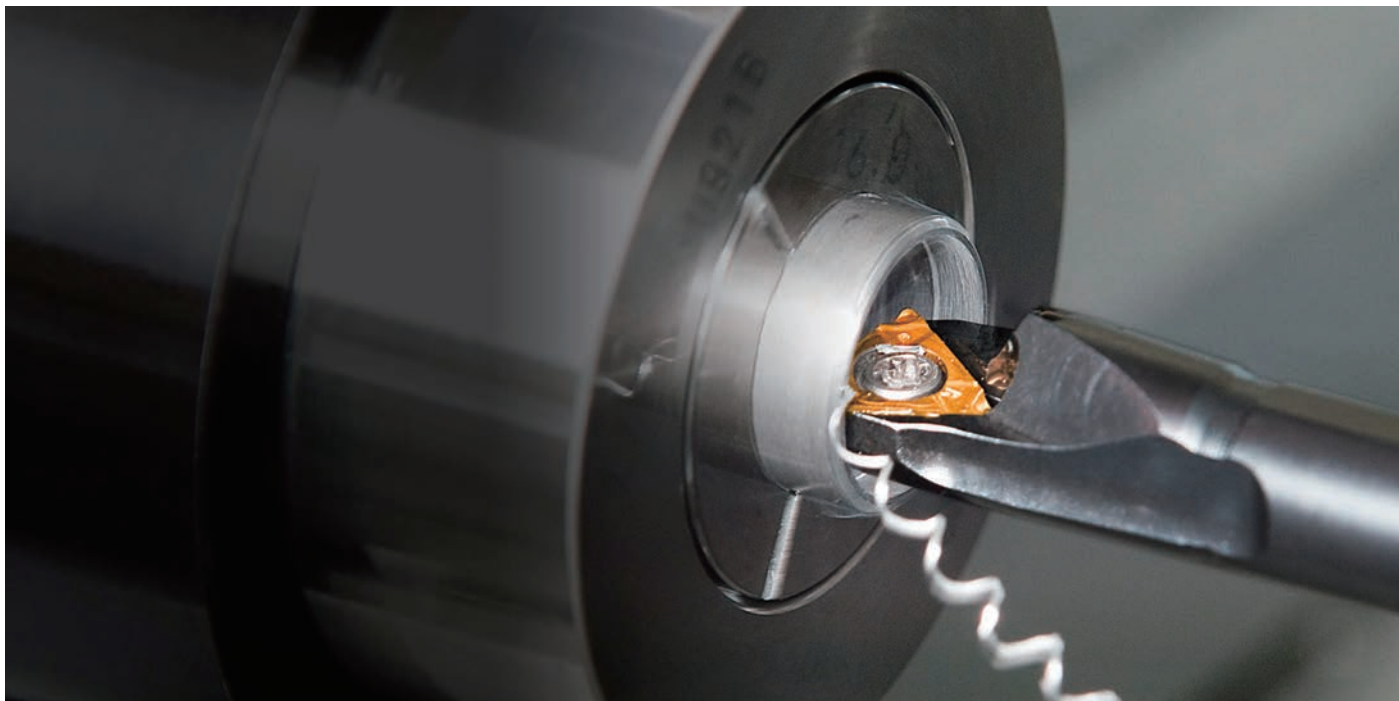
SS-DSU-B8D34



| EDP | Item Number | Stock | CBDP mm | DCB mm | DCSFMS mm | FLGT mm | HTB mm | LB mm | LH mm | WB mm | P.C.D. mm | Comment |
|---------|--------------|-------|------------|-----------|--------------|------------|-----------|----------|----------|----------|--------------|---------------|
| 5948252 | SS-DSU-B8D34 | ● | 55 | 22 | 34 | 15 | 42 | 70 | 45 | 42 | 42 | for DS holder |

Spare Parts

| Item Number | Screw (for Sleeve) | Screw (for Holder) | Wrench (for Sleeve) | Wrench (for Holder) |
|--------------|-----------------------|-----------------------|------------------------|------------------------|
| SS-DSU-B8D34 | CS0425 | SS0506 | LW-3 | LW-2.5 |



For ID boring operations | Swiss CNC Lathes

Mogul Bar

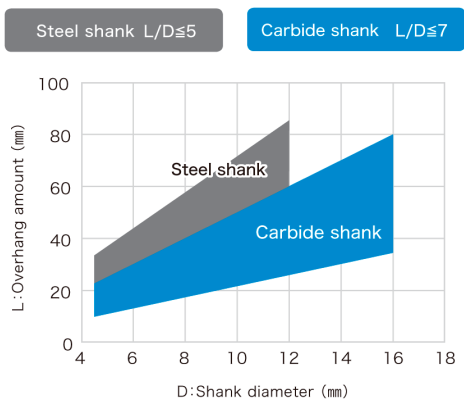


Highly rigid bars and inserts that direct chips away from the part

Unique boring bar design greatly improves rigidity combined with chipbreakers that control the direction of the chip evacuation during the boring operation

Features ①

Toolholder overhang



[Cutting conditions]

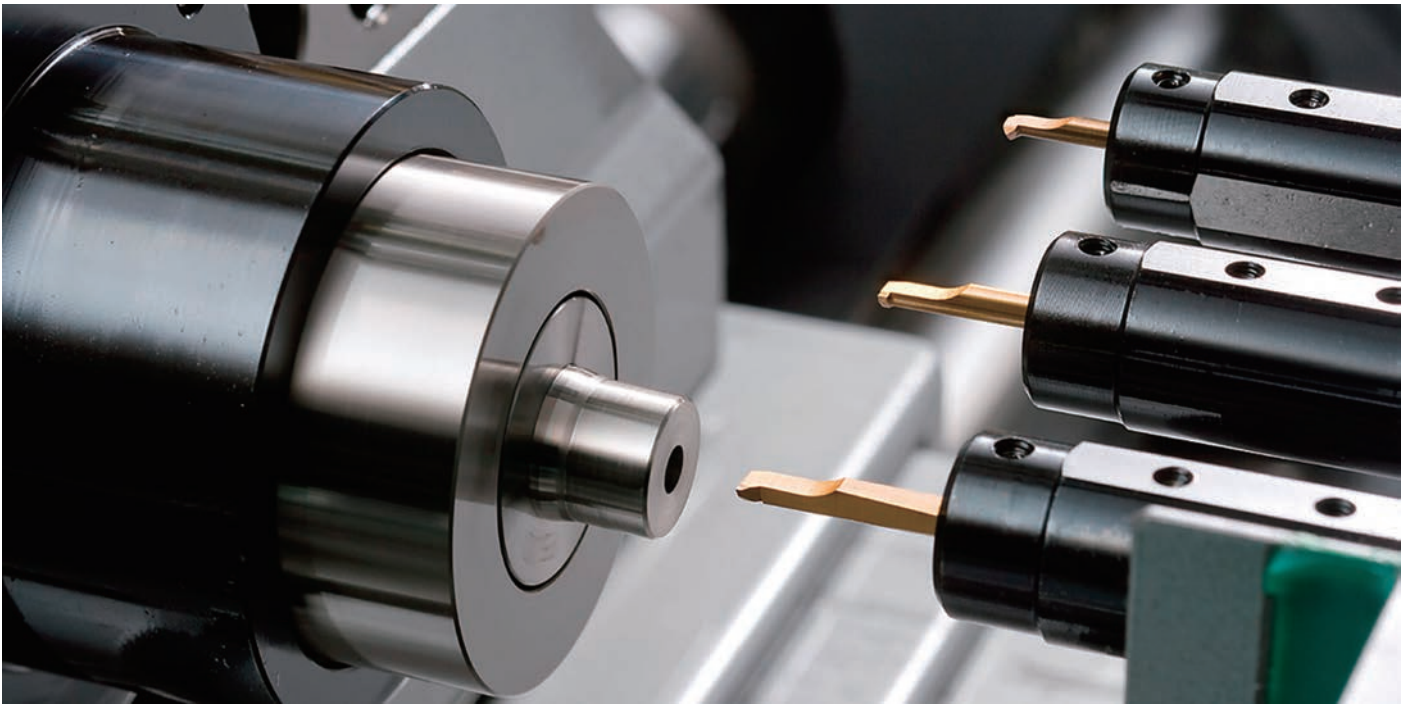
Material : Alloy steel, Stainless steel $V_c = 80\text{m/min}$ $f = 0.05\text{-}0.1\text{mm/rev}$ $a_p = 0.1\text{-}0.5\text{mm}$ WET

Case study Sleeve

The competitor's boring bar experienced a heavy amount of vibration due to extended overhang.

NTK's boring bar eliminated vibration issues and insert with F1 chipbreaker achieved 1.8 x more tool life.

| | | | | |
|---------------|------------|---|---|---------|
| Material | SUM43 | <p>Excellent rigidity & sharpness</p> | <p>Mogul bar +TM4 F1 chipbreaker</p> <p>900 pcs</p> | |
| Cutting speed | 75m/min | | | |
| Feed | 0.05mm/rev | | | |
| DOC | 0.1mm | | | |
| Coolant | WET | | | |
| | | | Conventional tool | 500 pcs |



For ID boring operations | Swiss CNC Lathes

STICK DUO

2-cornered solid bar type

Available from Min. bore diameter $\varnothing 2.2\text{mm}$

Three types of breakers are set according to the machining application.

S chipbreaker



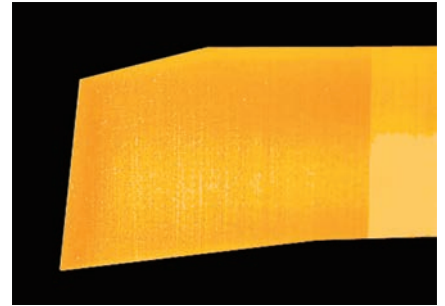
Sharp cutting edge
For Through hole

F chipbreaker





Evacuates chips BACKWARD
For Blind hole

H Flat type



Mirror finish edge
(Regrindable)

| For ID Grooving | For ID Face Grooving | For ID Back turning | For ID threading |
|---|---|--|---|
| Min. Bore Dia. $\varnothing 3.0$ - Blade width 0.5- 2.0mm | Min. Bore Dia. $\varnothing 6.0$ - Blade width 1.0 - 3.0mm | Min. Bore Dia. $\varnothing 3.0$ - | Min. Bore Dia. $\varnothing 2.5$ - Pitch 0.5 - 1.75mm |
|  |  |  |  |



For ID boring operations | Swiss CNC Lathes

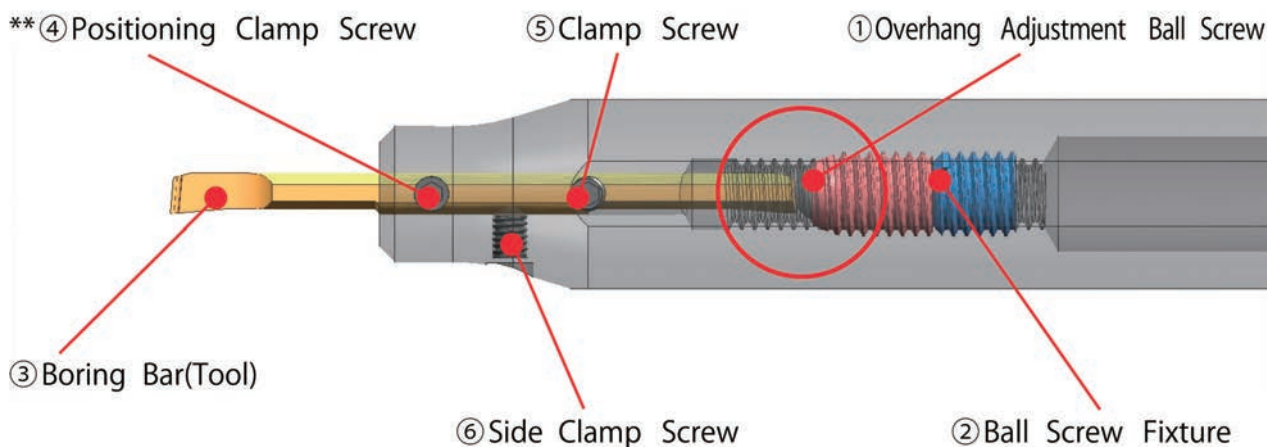
STICK DUO HYPER

Sleeves for ID Boring with Adjustable Overhang Mechanism

Adjustable overhang length

Offers high precision while maintaining compatibility with STICK DUO series

Can index boring bars like inserts



Features^①

High Precision Insert

| | Tool Length L_1 | Offset f | Centerline Y | Corner |
|--|-------------------|------------|----------------|--------|
| | ±0.1mm | ±0.025mm | ±0.1/0mm | 0.03mm |
| | ±0.02mm | ±0.015mm | 0.05/0mm | 0.05mm |

Features^②

- Min. Bore Dia. $\phi 2.2$ -
- Three types of breakers are set according to the machining application.

SHFS-H type



Mirror finish edge

SHFS-S type

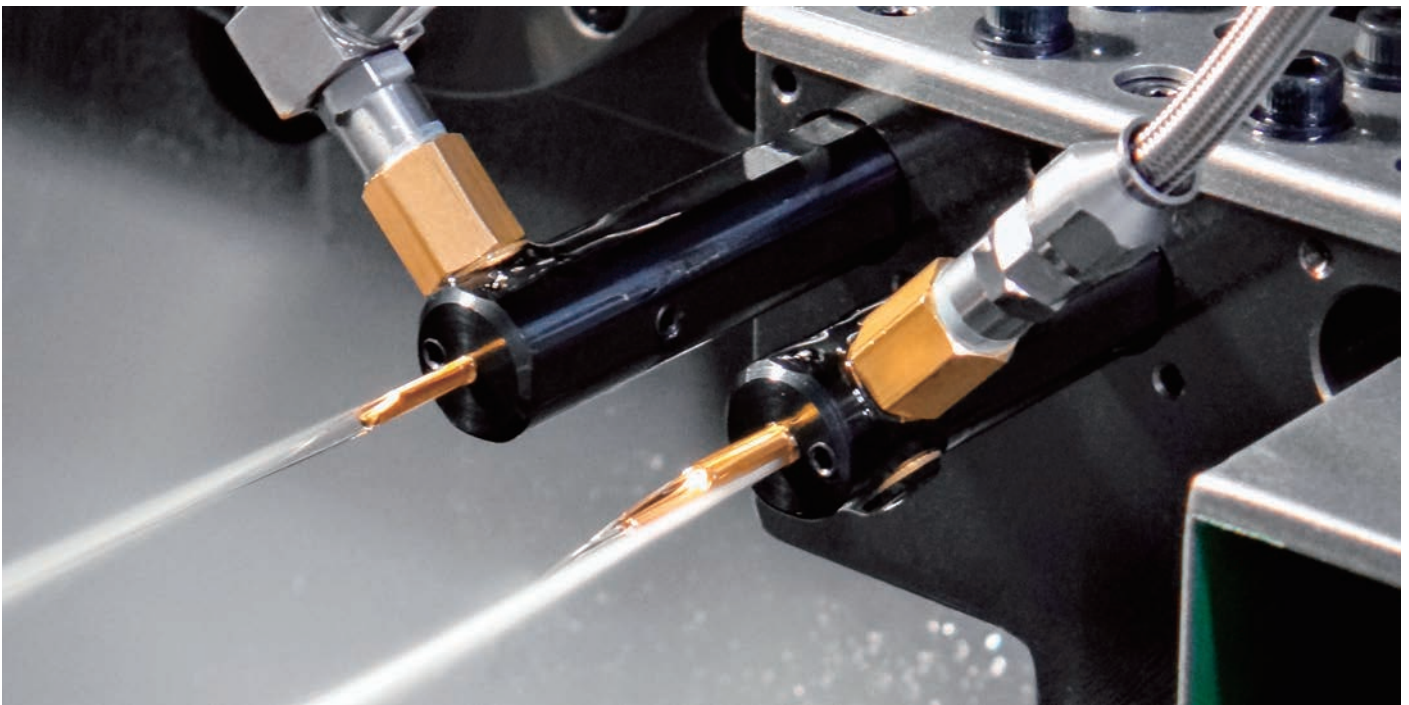


Sharp cutting edge

SHFB-F type



Evacuates chips BACKWARD



For ID boring operations | Swiss CNC Lathes

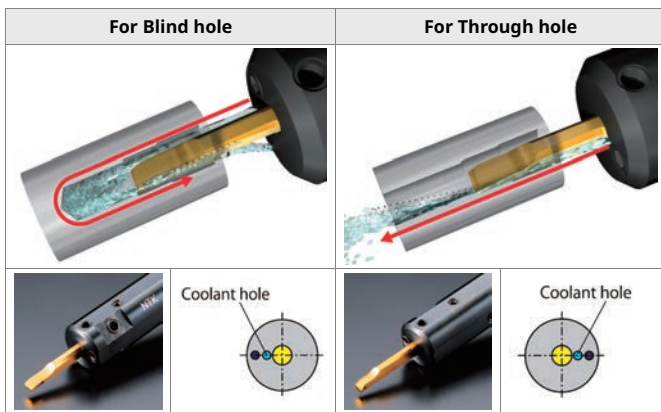
STICK DUO SPLASH

Coolant through sleeves for ID Boring with Adjustable Overhang Mechanism

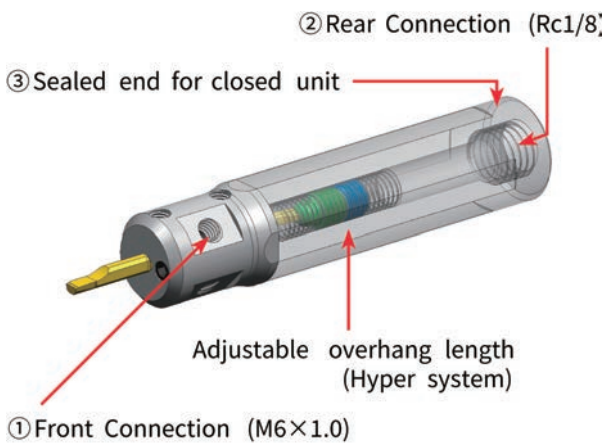
For high-precision machining, a combination of HYPER function and a coolant through holder offers high precision while maintaining compatibility with STICK DUO series

Choose from 2 coolant directions

Just rotated 180 degrees



3 coolant connection options



No chip problems

| STICK DUO SPLASH | External coolant |
|----------------------|------------------|
| | |
| | |
| No chips inside hole | Chips packed |

Coolant horse connection

