

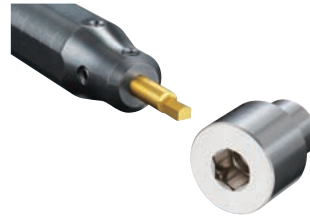
# SHAPER DUO



Hexalobular Socket



Hexagon Socket




Square Socket



- Now available for Hexalobular(6-lobe) Socket
- Perfect fit for back spindle of Swiss machine
- Achieves good corner edge sharpness


- Less tool pressure than Rotary-Broaching
- Easy to adjust for correct dimension
- Economical double-ended insert bar (Except for Hexalobular)

## Comparison Chart of Hexalobular Socket Machining

|  | Tool Pressure | Cycle Time | Tool Cost | High speed spindle | Program     |   |
|--|---------------|------------|-----------|--------------------|-------------|---|
| <b>Shaper Duo</b><br> | ◎             | ◎          | ◎         | Not necessary      | Simple      | <ul style="list-style-type: none"> <li>● No high speed spindle needed</li> <li>● A lot less cycle time</li> </ul> |
| End milling  | ○             | ×          | △         | Necessary          | Complicated | <ul style="list-style-type: none"> <li>● Need high speed spindle</li> <li>● Time consuming process</li> </ul>     |

- Small diameter endmill 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.

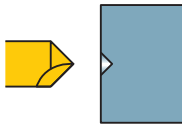
## Comparison Chart of HEX Socket Machining

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

- Rotary-broach is an efficient way for 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.

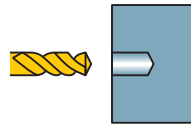
## Process Chart

### ① Center drilling



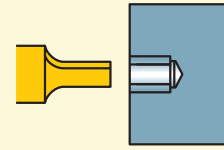
Make a center hole which is smaller than pilot hole drill.

### ② Drilling (Pilot hole)



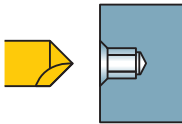
Select a drill with same or smaller (0~0.1mm) dia. as AF and machine a bit deeper because burrs may cause chipping on shaper insert

### ③ Shaper tool



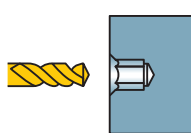
Machine socket rotating 60 degrees 6 times

### ④ Chamfering



Chamfer with the same pilot hole drill as ①

### ⑤ Deburring



Finish and deburr with the same drill as in process②  
☆Reduce cutting conditions due to heavy interruption

## SHAPER DUO Process Chart -Hexalobular-

| Socket Size | Tool         | Pilot bore Dia. (mm) | Starting "X" position (mm) | Number of passes        |                       |                        | Estimated cycle time *                          |                   |                 |
|-------------|--------------|----------------------|----------------------------|-------------------------|-----------------------|------------------------|---|-------------------|-----------------|
|             |              |                      |                            | Final "X" position (mm) | Roughing pass 0.025mm | Finishing pass 0.005mm | ISO10664 Stadard depth of Hexalobular hole (mm) | Whole process ①-⑤ | Process④ Shaper |
| T6          | SSP050N25T06 | 1.15                 | 1.14                       | 1.75                    | 13                    | 1                      | 1.82  | 51 sec            | 23.2 sec        |
| T7          | SSP050N31T07 | 1.38                 | 1.35                       | 2.06                    | 15                    | 1                      | 2.44  | 59 sec            | 28.2 sec        |
| T8          | SSP050N36T08 | 1.62                 | 1.59                       | 2.40                    | 17                    | 1                      | 3.05  | 67 sec            | 33.8 sec        |
| T10         | SSP050N41T10 | 1.92                 | 1.89                       | 2.80                    | 19                    | 1                      | 3.56  | 75 sec            | 39.5 sec        |
| T15         | SSP050N43T15 | 2.30                 | 2.29                       | 3.35                    | 22                    | 1                      | 3.81  | 84 sec            | 46.2 sec        |
| T20         | SSP050N46T20 | 2.71                 | 2.69                       | 3.95                    | 26                    | 1                      | 4.07  | 94 sec            | 55.4 sec        |
| T25         | SSP050N50T25 | 3.13                 | 3.09                       | 4.50                    | 29                    | 1                      | 4.45  | 105 sec           | 63.8 sec        |
| T27         | SSP050N55T27 | 3.52                 | 3.51                       | 5.07                    | 32                    | 1                      | 4.70  | 115 sec           | 71.8 sec        |
| T30         | SSP050N55T30 | 3.91                 | 3.89                       | 5.60                    | 35                    | 1                      | 4.95  | 125 sec           | 80.2 sec        |

\*Using Carbide drill

\*Shaper cutting conditions

Feed : 3000 mm/min

DOC : 0.025 mm (Roughing), 0.005 mm (Finishing)

## SHAPER DUO Process Chart -Hexagonal-

| HEX Standard | Tool          | Pilot bore Dia. (mm) | Starting "X" position (mm) | Number of passes        |                       |                        | Estimated cycle time *                   |                   |                 |
|--------------|---------------|----------------------|----------------------------|-------------------------|-----------------------|------------------------|--|-------------------|-----------------|
|              |               |                      |                            | Final "X" position (mm) | Roughing pass 0.025mm | Finishing pass 0.005mm | ISO 2936 standard depth of Hex hole (mm) | Whole process ①-⑤ | Process④ Shaper |
| HEX 1.5      | SSP020N1130H  | 1.5                  | 1.47                       | 1.73                    | 6                     | 1                      | 2  | 39 sec            | 14 sec          |
| HEX 2.0      | SSP020N1430H  | 2.0                  | 1.95                       | 2.31                    | 8                     | 1                      | 2.5                                      | 44 sec            | 16 sec          |
| HEX 2.5      | SSP030N1940H  | 2.5                  | 2.48                       | 2.89                    | 9                     | 1                      | 3  | 50 sec            | 20 sec          |
| HEX 3.0      | SSP030N1940H  | 3.0                  | 2.95                       | 3.46                    | 11                    | 1                      | 3.5                                      | 55 sec            | 23 sec          |
| HEX 4.0      | SSP040N2450H  | 4.0                  | 3.96                       | 4.62                    | 14                    | 1                      | 5  | 73 sec            | 33 sec          |
| HEX 5.0      | SSP050N3260H  | 5.0                  | 4.96                       | 5.77                    | 17                    | 1                      | 6  | 90 sec            | 46 sec          |
| HEX 6.0      | SSP060N42120H | 6.0                  | 5.97                       | 6.93                    | 20                    | 1                      | 8  | 117 sec           | 63 sec          |
| HEX 8.0      | SSP080N62160H | 8.0                  | 7.98                       | 9.24                    | 26                    | 1                      | 10                                       | 155 sec           | 92 sec          |

\*Pilot bore diameter is same or smaller(0-0.1mm) as AF.

\*Shaper cutting conditions

Feed : 3000 mm/min

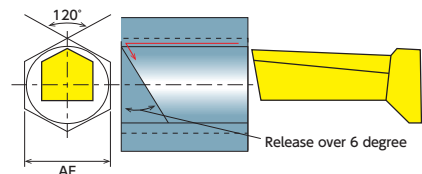
DOC : 0.025 mm (Roughing), 0.005 mm (Finishing)

## Recommended Cutting Conditions

Feed : 3000 mm/min

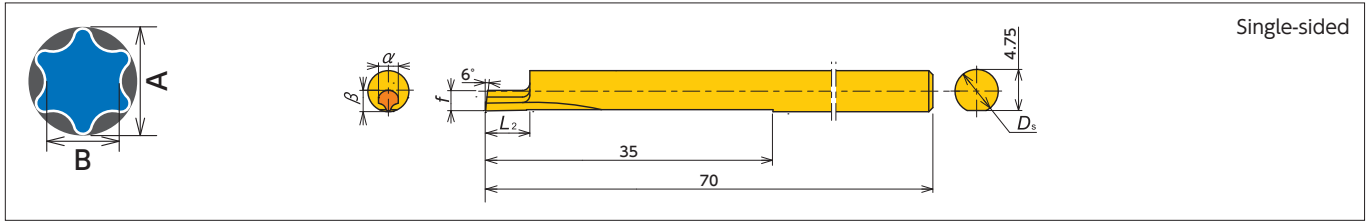
DOC : Roughing ... 0.025 mm + Finishing ... 0.005 mm

Program Example → J6 · J7



Sleeves → K8 · K9

## Insert Bar -Hexalobular-



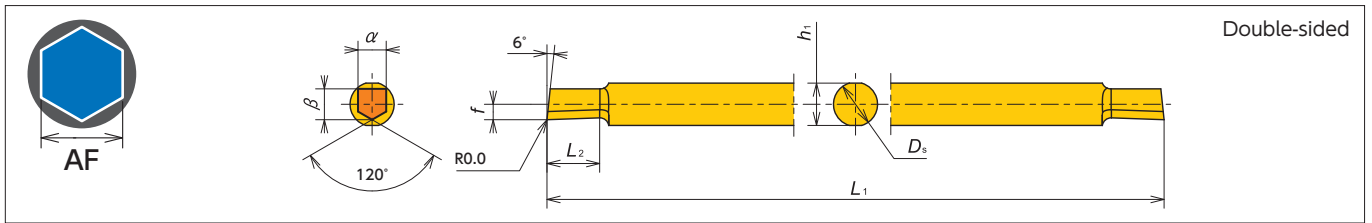
Single-sided

| Item Number  | Socket Size | Hexalobular Socket |           |           | $D_s$<br>(mm) | $L_2$<br>(mm) | $\alpha$<br>(mm) | $\beta$<br>(mm) | $f$<br>(mm) | Pilot Bore Dia<br>(mm) | Coated Carbide |
|--------------|-------------|--------------------|-----------|-----------|---------------|---------------|------------------|-----------------|-------------|------------------------|----------------|
|              |             | #                  | A<br>(mm) | B<br>(mm) |               |               |                  |                 |             |                        | TM4            |
| SSP050N25T06 | T6          | 6                  | 1.75      | 1.27      | $\phi 5$      | 2.5           | 1.08             | 1.09            | 2.4         | $\phi 1.15$            | ●              |
| SSP050N31T07 | T7          | -                  | -         | -         | $\phi 5$      | 3.1           | 1.27             | 1.29            | 2.4         | $\phi 1.38$            | ●              |
| SSP050N36T08 | T8          | 8                  | 2.4       | 1.75      | $\phi 5$      | 3.6           | 1.48             | 1.50            | 2.4         | $\phi 1.62$            | ●              |
| SSP050N41T10 | T10         | 10                 | 2.8       | 2.05      | $\phi 5$      | 4.1           | 1.67             | 1.70            | 2.4         | $\phi 1.92$            | ●              |
| SSP050N43T15 | T15         | 15                 | 3.35      | 2.4       | $\phi 5$      | 4.3           | 2.04             | 2.10            | 2.4         | $\phi 2.30$            | ●              |
| SSP050N46T20 | T20         | 20                 | 3.95      | 2.85      | $\phi 5$      | 4.6           | 2.41             | 2.50            | 2.4         | $\phi 2.71$            | ●              |
| SSP050N50T25 | T25         | 25                 | 4.5       | 3.25      | $\phi 5$      | 5.0           | 2.78             | 2.90            | 2.4         | $\phi 3.13$            | ●              |
| SSP050N55T27 | T27         | -                  | -         | -         | $\phi 5$      | 5.5           | 3.15             | 3.30            | 2.4         | $\phi 3.52$            | ●              |
| SSP050N55T30 | T30         | 30                 | 5.6       | 4.05      | $\phi 5$      | 5.5           | 3.52             | 3.70            | 2.4         | $\phi 3.91$            | ●              |

※Caution: Due to the tolerance, it might not fit into the holder which is made by other company.

Sleeves →K8 · K9

## Insert Bar -Hexagon-



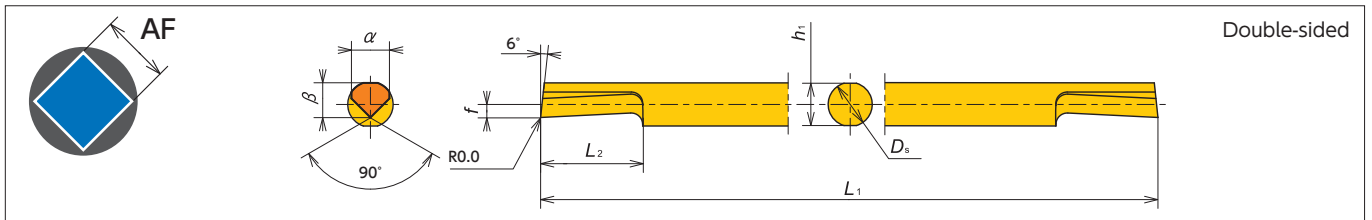
Double-sided

| Item Number   | Base AF<br>(mm) | HEX Standard size range<br>(mm) | AF range<br>(mm) | $D_s$<br>(mm) | $L_1$<br>(mm) | $L_2$<br>(mm) | $h_1$<br>(mm) | $\alpha$<br>(mm) | $\beta$<br>(mm) | $f$<br>(mm) | Coated Carbide |
|---------------|-----------------|---------------------------------|------------------|---------------|---------------|---------------|---------------|------------------|-----------------|-------------|----------------|
|               |                 |                                 |                  |               |               |               |               |                  |                 |             | TM4            |
| SSP020N1130H  | HEX 1.5         | HEX 1.5 - 2.0                   | 1.4 - 2.0        | $\phi 2$      | 50            | 3.0           | 1.8           | 1.1              | 0.8             | 0.40        | ●              |
| SSP020N1430H  | HEX 2.0         | HEX 2.0 - 2.5                   | 1.9 - 2.6        | $\phi 2$      | 50            | 3.0           | 1.8           | 1.4              | 1.1             | 0.55        | ●              |
| SSP030N1940H  | HEX 3.0         | HEX 2.5 - 3.5                   | 2.4 - 3.6        | $\phi 3$      | 50            | 4.0           | 2.8           | 1.9              | 1.6             | 0.8         | ●              |
| SSP040N2450H  | HEX 4.0         | HEX 3.5 - 4.5                   | 3.4 - 4.6        | $\phi 4$      | 60            | 5.0           | 3.8           | 2.4              | 2.6             | 1.3         | ●              |
| SSP050N3260H  | HEX 5.0         | HEX 4.5 - 6.0                   | 4.4 - 6.2        | $\phi 5$      | 70            | 6.0           | 4.8           | 3.2              | 3.4             | 1.70        | ●              |
| SSP060N42120H | HEX 6.0         | HEX 6.0 - 8.0                   | 5.9 - 8.2        | $\phi 6$      | 80            | 12.0          | 5.6           | 4.2              | 4.0             | 2.00        | ●              |
| SSP080N62160H | HEX 8.0         | HEX 8.0 - 12.0                  | 7.9 - 12.2       | $\phi 8$      | 80            | 16.0          | 7.6           | 6.2              | 4.7             | 2.35        | ●              |

※Caution: Due to the tolerance, it might not fit into the holder which is made by other company.

Sleeves →K8 · K9

## Insert Bar -Square-



Double-sided

| Item Number   | Base AF<br>(mm) | AF range<br>(mm) | $D_s$<br>(mm) | $L_1$<br>(mm) | $L_2$<br>(mm) | $h_1$<br>(mm) | $\alpha$<br>(mm) | $\beta$<br>(mm) | $f$<br>(mm) | Coated Carbide |
|---------------|-----------------|------------------|---------------|---------------|---------------|---------------|------------------|-----------------|-------------|----------------|
|               |                 |                  |               |               |               |               |                  |                 |             | TM4            |
| SSP020N1740S  | 2.0             | 1.9 - 2.3        | $\phi 2.0$    | 50            | 4.0           | 1.8           | 1.70             | 1.60            | 0.70        | ●              |
| SSP025N1940S  | 2.5             | 2.2 - 2.6        | $\phi 2.5$    | 50            | 4.0           | 2.3           | 1.95             | 1.80            | 0.65        | ●              |
| SSP030N2260S  | 3.0             | 2.5 - 3.0        | $\phi 3.0$    | 50            | 6.0           | 2.8           | 2.20             | 2.05            | 0.65        | ●              |
| SSP035N2760S  | 3.5             | 2.9 - 3.7        | $\phi 3.5$    | 60            | 6.0           | 3.3           | 2.70             | 2.25            | 0.60        | ●              |
| SSP040N3380S  | 4.0             | 3.6 - 4.6        | $\phi 4.0$    | 60            | 8.0           | 3.8           | 3.35             | 3.05            | 1.15        | ●              |
| SSP050N39100S | 5.0             | 4.5 - 5.4        | $\phi 5.0$    | 70            | 10.0          | 4.8           | 3.90             | 3.95            | 1.55        | ●              |
| SSP060N47120S | 6.0             | 5.3 - 6.6        | $\phi 6.0$    | 80            | 12.0          | 5.6           | 4.75             | 4.50            | 1.70        | ●              |
| SSP080N58160S | 8.0             | 6.5 - 8.1        | $\phi 8.0$    | 80            | 16.0          | 7.6           | 5.80             | 5.50            | 1.70        | ●              |

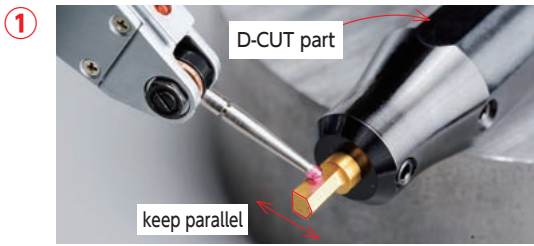
※Caution: Due to the tolerance, it might not fit into the holder which is made by other company.

Sleeves →K8 · K9

● : Stock

## SHAPER DUO Set-up Instructions - Hexagonal

### Outside machine

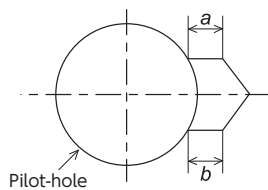
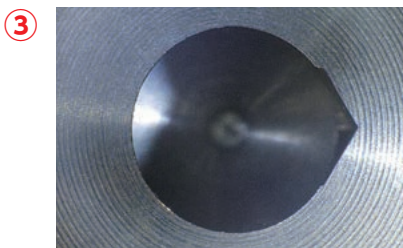


- Set the insert bar in the sleeve and check the parallelism of the flat portion of the sleeve and the insert bar.
- Minimize the overhang of the insert.

### Inside machine



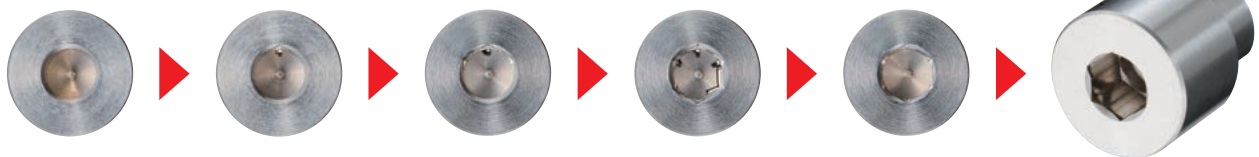
- Set the sleeve into the tool post and make sure the sleeve is set parallel.
- Minimize sleeve overhang.



- Increase the number of machining passes with smaller depth of cut if the insert chips with large depth of cut. (0.025mm×5pass is recommended)  
No chamfering process is required for measuring purpose.
- Measure the length of both [a] and [b] with comparator or magnifier.
- Adjust centerline height by rotating the sleeve until you get the same length for [a] and [b]. (The difference should be less than 0.02mm)  
\*If the straight is not seen with increased passes, please reset the insert and the sleeve.  
Please make sure both the insert and the sleeve are set up correctly.

### 4 Machine Hexagonal shape

- Run full HEX machining program.



### For Hexalobular machining Basically same as Hexagonal socket

