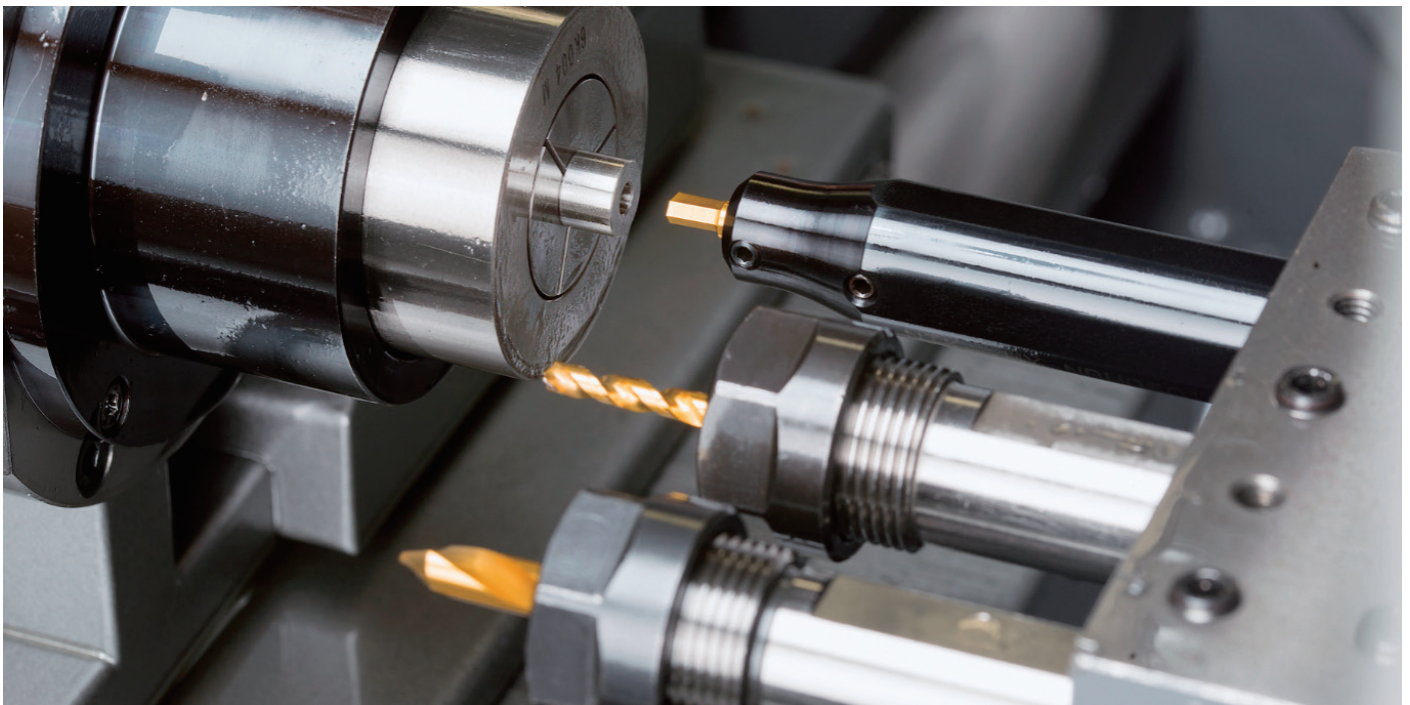




Shaper

SHAPER DUO	.....	W02
Insert bar	.....	W03
Sleeve	.....	W04
Machining Procedure	.....	W13
Set-up Instructions - Hexagonal	.....	W14
Machining Program Code Explanation	.....	W15
Troubleshooting	.....	W17



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:

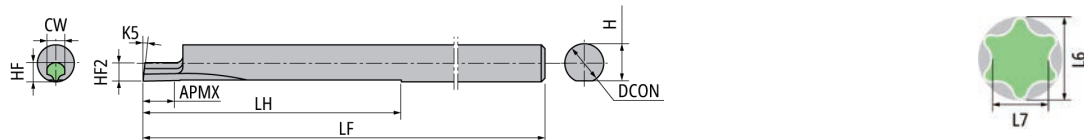
- ① Keep good corner edge sharpness and long tool life ② Provide better tolerance and accuracy ③ Provide better surface quality

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

Insert bar

Hexalobular socket (6-LOBE hole)

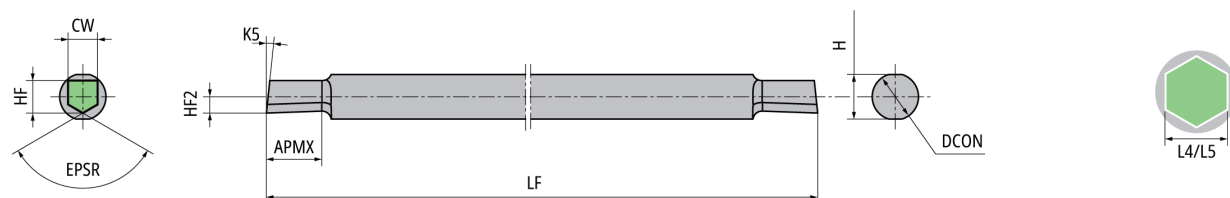
SSP-T



Item Number	Socket size	Socket number	L6 mm	L7 mm	Recommended Pilot bore Dia. mm	APMX mm	CW mm	DCON mm	H mm	HF mm	HF2 mm	K5 °	LF mm	LH mm	Carbide PVD coating TM4
SSP050N25T06	T6	6	1.75	1.27	1.15	2.5	1.2	5	4.75	1.09	2.4	6	70	35	●
SSP050N31T07	T7	-	-	-	1.38	3.1	1.4	5	4.75	1.29	2.4	6	70	35	●
SSP050N36T08	T8	8	2.4	1.75	1.62	3.6	1.6	5	4.75	1.5	2.4	6	70	35	●
SSP050N41T10	T10	10	2.8	2.05	1.92	4.1	1.8	5	4.75	1.7	2.4	6	70	35	●
SSP050N43T15	T15	15	3.35	2.4	2.3	4.3	2.2	5	4.75	2.1	2.4	6	70	35	●
SSP050N46T20	T20	20	3.95	2.85	2.71	4.6	2.6	5	4.75	2.5	2.4	6	70	35	●
SSP050N50T25	T25	25	4.5	3.25	3.13	5	3	5	4.75	2.9	2.4	6	70	35	●
SSP050N55T27	T27	-	-	-	3.52	5.5	3.4	5	4.75	3.3	2.4	6	70	35	●
SSP050N55T30	T30	30	5.6	4.05	3.91	5.5	3.8	5	4.75	3.7	2.4	6	70	35	●

Hexagon socket

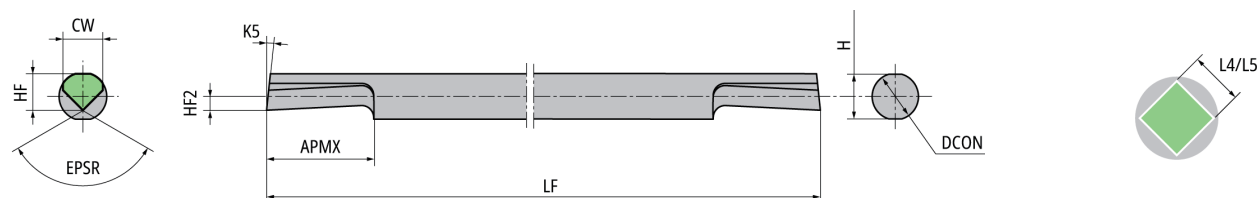
SSP-H



Item Number	Base AF L4 mm	AF range L5 mm	APMX mm	CW mm	DCON mm	EPSR °	H mm	HF mm	HF2 mm	K5 °	LF mm	Carbide PVD coating TM4
SSP020N06515H	1	1-1.1	1.5	0.65	2	120	1.8	0.7	0.35	15	50	●
SSP020N07018H	1.1	1.1-1.2	1.8	0.7	2	120	1.8	0.8	0.4	15	50	●
SSP020N07518H	1.2	1.2-1.3	1.8	0.75	2	120	1.8	0.9	0.45	15	50	●
SSP020N08020H	1.3	1.3-1.4	2	0.8	2	120	1.8	1	0.5	15	50	●
SSP020N1130H	1.5	1.4-1.9	3	1.1	2	120	1.8	0.9	0.45	6	50	●
SSP020N1430H	2	1.8-2.5	3	1.4	2	120	1.8	1.2	0.6	6	50	●
SSP030N1940H	3	2.3-3.5	4	1.9	3	120	2.8	1.5	0.75	6	50	●
SSP040N2450H	4	3.3-4.5	5	2.4	4	120	3.8	2.5	1.25	6	60	●
SSP050N3260H	5	4.3-6.1	6	3.2	5	120	4.8	3.3	1.65	6	70	●
SSP060N42120H	6	5.3-8.1	12	4.2	6	120	5.6	4	2	6	80	●
SSP080N62160H	8	7.3-12.1	16	6.2	8	120	7.6	4.9	2.45	6	80	●

Square Socket

SSP-S



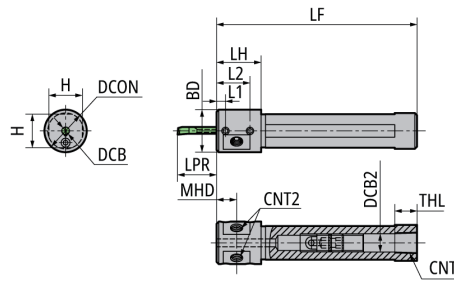
Item Number	Base AF L4 mm	AF range L5 mm	APMX mm	CW mm	DCON mm	EPSR °	H mm	HF mm	HF2 mm	K5 °	LF mm	Carbide PVD coating TM4
SSP020N1740S	2	2-2.3	4	1.7	2	90	1.8	1.6	0.7	6	50	●
SSP025N1940S	2.5	2.3-2.6	4	1.95	2.5	90	2.3	1.8	0.65	6	50	●
SSP030N2260S	3	2.6-3	6	2.2	3	90	2.8	2.05	0.65	6	50	●
SSP035N2760S	3.5	2.9-3.7	6	2.7	3.5	90	3.3	2.25	0.6	6	60	●
SSP040N3380S	4	3.7-4.5	8	3.35	4	90	3.8	3.05	1.15	6	60	●
SSP050N39100S	5	4.5-5.3	10	3.9	5	90	4.8	3.95	1.55	6	70	●
SSP060N47120S	6	5.3-6.5	12	4.75	8	90	5.6	4.5	1.7	6	80	●
SSP080N58160S	8	6.5-8	16	5.8	8	90	7.6	5.5	1.7	6	80	●

Shaper W

STICK DUO SPLASH

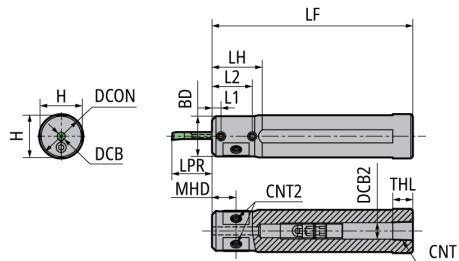
Sleeve for Shaper Duo series (Adjustable overhang / Internal coolant system)

HY-NBH-OH Shank diameter $\Phi 16$



EDP	Item Number	Stock	BD mm	CNT	CNT2	DCB mm	DCB2 mm	DCON mm	H mm	LF mm	LH mm	LPR mm	L1 mm	L2 mm	MHD mm	THL mm	Applicable insert bar
5893011	HY-NBH02016G-OH	●	19	Rc1/8	M6×P1.0	2	8.2	16	15	90	19	5-18	4	15	9.5	10	SBF../SHF.. SSP..
5893029	HY-NBH02516G-OH	●	19	Rc1/8	M6×P1.0	2.5	8.2	16	15	90	19	6.3-19.5	4	15	9.5	10	SBF../SHF.. SBT../SSP..
5893037	HY-NBH03016G-OH	●	19	Rc1/8	M6×P1.0	3	8.2	16	15	90	19	7.5-21	4	15	9.5	10	SBF../SHF../SBB.. SBG../SBT../SSP..
5893045	HY-NBH03516G-OH	●	19	Rc1/8	M6×P1.0	3.5	8.2	16	15	90	19	8.8-24.5	4	15	9.5	10	SBF../SHF.. SBT../SSP..
5893052	HY-NBH04016G-OH	●	19	Rc1/8	M6×P1.0	4	8.2	16	15	90	24	10-28	4	20	12	10	SBF../SHF../SBB.. SBG../SBT../SSP..
5893060	HY-NBH05016G-OH	●	19	Rc1/8	M6×P1.0	5	8.2	16	15	90	24	12.5-35	4	20	12	10	SBF../SHF.. SBG../SBT../SSP..

HY-NBH-OH Shank diameter $\Phi 19.05 - \Phi 25.4$

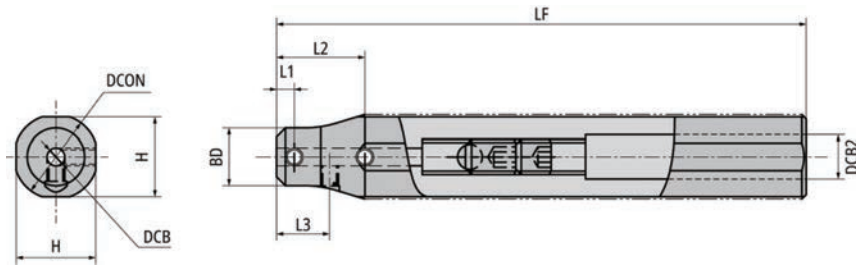


EDP	Item Number	Stock	BD mm	CNT	CNT2	DCB mm	DCB2 mm	DCON mm	H mm	LF mm	LH mm	LPR mm	L1 mm	L2 mm	MHD mm	THL mm	Applicable insert bar
5893078	HY-NBH02019J-OH	●	19.05	Rc1/8	M6×P1.0	2	8.2	19.05	18	110	-	5-18	4	15	9.5	10	SBF../SHF.. SSP..
5893086	HY-NBH02519J-OH	●	19.05	Rc1/8	M6×P1.0	2.5	8.2	19.05	18	110	-	6.3-19.5	4	15	9.5	10	SBF../SHF.. SBT../SSP..
5893094	HY-NBH03019J-OH	●	19.05	Rc1/8	M6×P1.0	3	8.2	19.05	18	110	-	7.5-21	4	15	9.5	10	SBF../SHF../SBB.. SBG../SBT../SSP..
5893102	HY-NBH03519J-OH	●	19.05	Rc1/8	M6×P1.0	3.5	8.2	19.05	18	110	-	8.8-24.5	4	15	9.5	10	SBF../SHF.. SBT../SSP..
5893136	HY-NBH04019J-OH	●	19.05	Rc1/8	M6×P1.0	4	8.2	19.05	18	110	-	10-28	4	20	12	10	SBF../SHF../SBB.. SBG../SBT../SSP..
5893144	HY-NBH05019J-OH	●	19.05	Rc1/8	M6×P1.0	5	8.2	19.05	18	110	-	12.5-35	4	20	12	10	SBF../SHF.. SBG../SBT../SSP..
5967922	HY-NBH06019J-OH	●	19.05	Rc1/8	M6×P1.0	6	8.2	19.05	18	110	-	15-42	4	20	12	10	SBF../SHF.. SBG../SFG../SBT../SSP..
5893151	HY-NBH02020J-OH	●	20	Rc1/8	M6×P1.0	2	8.2	20	19	110	-	5-18	4	15	9.5	10	SBF../SHF.. SSP..
5893169	HY-NBH02520J-OH	●	20	Rc1/8	M6×P1.0	2.5	8.2	20	19	110	-	6.3-19.5	4	15	9.5	10	SBF../SHF.. SBT../SSP..
5893177	HY-NBH03020J-OH	●	20	Rc1/8	M6×P1.0	3	8.2	20	19	110	-	7.5-21	4	15	9.5	10	SBF../SHF../SBB.. SBG../SBT../SSP..
5893185	HY-NBH03520J-OH	●	20	Rc1/8	M6×P1.0	3.5	8.2	20	19	110	-	8.8-24.5	4	15	9.5	10	SBF../SHF.. SBT../SSP..
5893193	HY-NBH04020J-OH	●	20	Rc1/8	M6×P1.0	4	8.2	20	19	110	-	10-28	4	20	12	10	SBF../SHF../SBB.. SBG../SBT../SSP..
5893201	HY-NBH05020J-OH	●	20	Rc1/8	M6×P1.0	5	8.2	20	19	110	-	12.5-35	4	20	12	10	SBF../SHF.. SBG../SBT../SSP..
5967930	HY-NBH06020J-OH	●	20	Rc1/8	M6×P1.0	6	8.2	20	19	110	-	15-42	4	20	12	10	SBF../SHF.. SBG../SFG../SBT../SSP..
5893219	HY-NBH02022X-OH	●	20	Rc1/8	M6×P1.0	2	8.2	22	21	120	25	5-18	4	15	9.5	10	SBF../SHF.. SSP..
5893227	HY-NBH02522X-OH	●	20	Rc1/8	M6×P1.0	2.5	8.2	22	21	120	25	6.3-19.5	4	15	9.5	10	SBF../SHF.. SBT../SSP..
5893235	HY-NBH03022X-OH	●	20	Rc1/8	M6×P1.0	3	8.2	22	21	120	25	7.5-21	4	15	9.5	10	SBF../SHF../SBB.. SBG../SBT../SSP..
5893243	HY-NBH03522X-OH	●	20	Rc1/8	M6×P1.0	3.5	8.2	22	21	120	25	8.8-24.5	4	15	9.5	10	SBF../SHF.. SBT../SSP..
5893250	HY-NBH04022X-OH	●	20	Rc1/8	M6×P1.0	4	8.2	22	21	120	25	10-28	4	20	12	10	SBF../SHF../SBB.. SBG../SBT../SSP..
5893268	HY-NBH05022X-OH	●	20	Rc1/8	M6×P1.0	5	8.2	22	21	120	25	12.5-35	4	20	12	10	SBF../SHF.. SBG../SBT../SSP..
5967948	HY-NBH06022X-OH	●	20	Rc1/8	M6×P1.0	6	8.2	22	21	120	25	15-42	4	20	12	10	SBF../SHF.. SBG../SFG../SBT../SSP..
5893276	HY-NBH02025.0K-OH	●	20	Rc1/8	M6×P1.0	2	8.2	25	24	125	25	5-18	4	15	9.5	10	SBF../SHF.. SSP..
5893284	HY-NBH02525.0K-OH	●	20	Rc1/8	M6×P1.0	2.5	8.2	25	24	125	25	6.3-19.5	4	15	9.5	10	SBF../SHF.. SBT../SSP..
5893292	HY-NBH03025.0K-OH	●	20	Rc1/8	M6×P1.0	3	8.2	25	24	125	25	7.5-21	4	15	9.5	10	SBF../SHF../SBB.. SBG../SBT../SSP..
5893300	HY-NBH03525.0K-OH	●	20	Rc1/8	M6×P1.0	3.5	8.2	25	24	125	25	8.8-24.5	4	15	9.5	10	SBF../SHF.. SBT../SSP..
5893318	HY-NBH04025.0K-OH	●	20	Rc1/8	M6×P1.0	4	8.2	25	24	125	25	10-28	4	20	12	10	SBF../SHF../SBB.. SBG../SBT../SSP..
5893326	HY-NBH05025.0K-OH	●	20	Rc1/8	M6×P1.0	5	8.2	25	24	125	25	12.5-35	4	20	12	10	SBF../SHF.. SBG../SBT../SSP..
5967955	HY-NBH06025.0K-OH	●	20	Rc1/8	M6×P1.0	6	8.2	25	24	125	25	15-42	4	20	12	10	SBF../SHF.. SBG../SFG../SBT../SSP..
5893334	HY-NBH02025.4K-OH	●	20	Rc1/8	M6×P1.0	2	8.2	25.4	24	125	25	5-18	4	15	9.5	10	SBF../SHF.. SSP..
5893367	HY-NBH02525.4K-OH	●	20	Rc1/8	M6×P1.0	2.5	8.2	25.4	24	125	25	6.3-19.5	4	15	9.5	10	SBF../SHF.. SBT../SSP..
5893375	HY-NBH03025.4K-OH	●	20	Rc1/8	M6×P1.0	3	8.2	25.4	24	125	25	7.5-21	4	15	9.5	10	SBF../SHF../SBB.. SBG../SBT../SSP..
5893383	HY-NBH03525.4K-OH	●	20	Rc1/8	M6×P1.0	3.5	8.2	25.4	24	125	25	8.8-24.5	4	15	9.5	10	SBF../SHF.. SBT../SSP..
5893391	HY-NBH04025.4K-OH	●	20	Rc1/8	M6×P1.0	4	8.2	25.4	24	125	25	10-28	4	20	12	10	SBF../SHF../SBB.. SBG../SBT../SSP..
5893409	HY-NBH05025.4K-OH	●	20	Rc1/8	M6×P1.0	5	8.2	25.4	24	125	25	12.5-35	4	20	12	10	SBF../SHF.. SBG../SBT../SSP..
5967963	HY-NBH06025.4K-OH	●	20	Rc1/8	M6×P1.0	6	8.2	25.4	24	125	25	15-42	4	20	12	10	SBF../SHF.. SBG../SFG../SBT../SSP..

STICK DUO HYPER

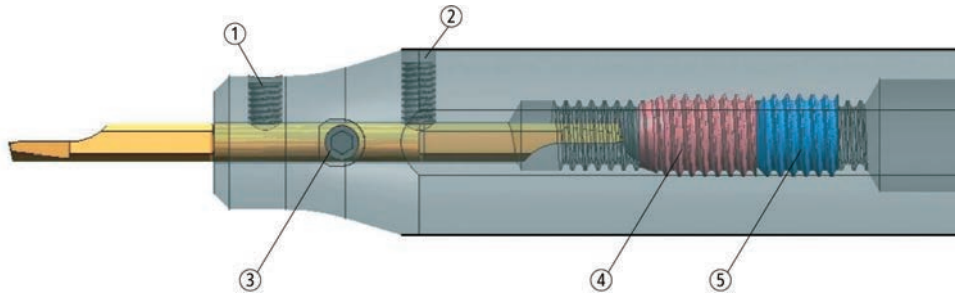
Sleeve for Shaper Duo series (Adjustable overhang)

HY-NBH



EDP	Item Number	Stock	BD mm	DCB mm	DCB2 mm	DCON mm	H mm	LF mm	L1 mm	L2 mm	L3 mm	Applicable insert bar
5709894	HY-NBH02016H	●	11	2	10	16	15	100	4	15	9.5	SBF./SHF., SSP.
5709902	HY-NBH02516H	●	11.5	2.5	10	16	15	100	4	15	9.5	SBF./SHF., SBT./SSP.
5709910	HY-NBH03016H	●	12	3	10	16	15	100	4	15	9.5	SBF./SHF./SBB., SBG./SBT./SSP.
5709936	HY-NBH03516H	●	12.5	3.5	10	16	15	100	4	20	12	SBF./SHF., SBT./SSP.
5709944	HY-NBH04016H	●	13	4	10	16	15	100	4	20	12	SBF./SHF./SBB., SBG./SBT./SSP.
5709951	HY-NBH05016H	●	14	5	10	16	15	100	4	20	12	SBF./SHF., SBG./SBT./SSP.
5709969	HY-NBH02019K	●	11	2	10	19.05	18	125	4	15	9.5	SBF./SHF., SSP.
5709977	HY-NBH02519K	●	11.5	2.5	10	19.05	18	125	4	15	9.5	SBF./SHF., SBT./SSP.
5709985	HY-NBH03019K	●	12	3	10	19.05	18	125	4	15	9.5	SBF./SHF./SBB., SBG./SBT./SSP.
5709993	HY-NBH03519K	●	12.5	3.5	10	19.05	18	125	4	20	12	SBF./SHF., SBT./SSP.
5710009	HY-NBH04019K	●	13	4	10	19.05	18	125	4	20	12	SBF./SHF./SBB., SBG./SBT./SSP.
5710017	HY-NBH05019K	●	14	5	10	19.05	18	125	4	20	12	SBF./SHF., SBG./SBT./SSP.
5712708	HY-NBH02020K	●	11	2	10	20	19	125	4	15	9.5	SBF./SHF., SSP.
5712716	HY-NBH02520K	●	11.5	2.5	10	20	19	125	4	15	9.5	SBF./SHF., SBT./SSP.
5712724	HY-NBH03020K	●	12	3	10	20	19	125	4	15	9.5	SBF./SHF./SBB., SBG./SBT./SSP.
5712740	HY-NBH03520K	●	12.5	3.5	10	20	19	125	4	20	12	SBF./SHF., SBT./SSP.
5712757	HY-NBH04020K	●	13	4	10	20	19	125	4	20	12	SBF./SHF./SBB., SBG./SBT./SSP.
5712765	HY-NBH05020K	●	14	5	10	20	19	125	4	20	12	SBF./SHF., SBG./SBT./SSP.
5712773	HY-NBH02022K	●	11	2	10	22	21	125	4	15	9.5	SBF./SHF., SSP.
5712799	HY-NBH02522K	●	11.5	2.5	10	22	21	125	4	15	9.5	SBF./SHF., SBT./SSP.
5712831	HY-NBH03022K	●	12	3	10	22	21	125	4	15	9.5	SBF./SHF./SBB., SBG./SBT./SSP.
5712856	HY-NBH03522K	●	12.5	3.5	10	22	21	125	4	20	12	SBF./SHF., SBT./SSP.
5712872	HY-NBH04022K	●	13	4	10	22	21	125	4	20	12	SBF./SHF./SBB., SBG./SBT./SSP.
5712914	HY-NBH05022K	●	14	5	10	22	21	125	4	20	12	SBF./SHF., SBG./SBT./SSP.
5712732	HY-NBH02025K-MET	●	11	2	10	25	24	125	4	15	9.5	SBF./SHF., SSP.
5712823	HY-NBH02525K-MET	●	11.5	2.5	10	25	24	125	4	15	9.5	SBF./SHF., SBT./SSP.
5712849	HY-NBH03025K-MET	●	12	3	10	25	24	125	4	15	9.5	SBF./SHF./SBB., SBG./SBT./SSP.
5712864	HY-NBH03525K-MET	●	12.5	3.5	10	25	24	125	4	20	12	SBF./SHF., SBT./SSP.
5712898	HY-NBH04025K-MET	●	13	4	10	25	24	125	4	20	12	SBF./SHF./SBB., SBG./SBT./SSP.
5712922	HY-NBH05025K-MET	●	14	5	10	25	24	125	4	20	12	SBF./SHF., SBG./SBT./SSP.
5713003	HY-NBH02025K	●	11	2	10	25.4	24	125	4	15	9.5	SBF./SHF., SSP.
5713029	HY-NBH02525K	●	11.5	2.5	10	25.4	24	125	4	15	9.5	SBF./SHF., SBT./SSP.
5713045	HY-NBH03025K	●	12	3	10	25.4	24	125	4	15	9.5	SBF./SHF./SBB., SBG./SBT./SSP.
5713060	HY-NBH03525K	●	12.5	3.5	10	25.4	24	125	4	20	12	SBF./SHF., SBT./SSP.
5713086	HY-NBH04025K	●	13	4	10	25.4	24	125	4	20	12	SBF./SHF./SBB., SBG./SBT./SSP.
5713102	HY-NBH05025K	●	14	5	10	25.4	24	125	4	20	12	SBF./SHF., SBG./SBT./SSP.

Parts

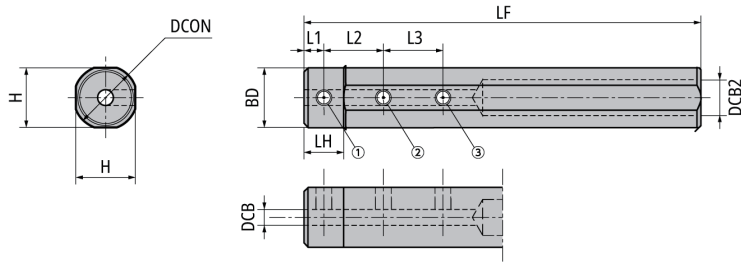


Item Number	Clamp Screw			Overhang Adjustment		Wrench	
	①	②	③	④	⑤	for①②③	for④⑤
HY-NBH02016H	SS04045FS	SS0406F	SS0404F	SS0812R	SS0808F	LW-2	LW-4*104
HY-NBH02516H	SS04045FS	SS0406F	SS0404F	SS0812R	SS0808F	LW-2	LW-4*104
HY-NBH03016H	SS04045FS	SS0406F	SS0404F	SS0812R	SS0808F	LW-2	LW-4*104
HY-NBH03516H	SS04045FS	SS0404F	SS0404F	SS0812R	SS0808F	LW-2	LW-4*104
HY-NBH04016H	SS04045FS	SS0404F	SS0404F	SS0812R	SS0808F	LW-2	LW-4*104
HY-NBH05016H	SS04045FS	SS0404F	SS0404F	SS0812R	SS0808F	LW-2	LW-4*104
HY-NBH02019K	SS04045FS	SS0406F	SS0404F	SS0812R	SS0808F	LW-2	LW-4*104
HY-NBH02519K	SS04045FS	SS0406F	SS0404F	SS0812R	SS0808F	LW-2	LW-4*104
HY-NBH03019K	SS04045FS	SS0406F	SS0404F	SS0812R	SS0808F	LW-2	LW-4*104
HY-NBH03519K	SS04045FS	SS0406F	SS0404F	SS0812R	SS0808F	LW-2	LW-4*104
HY-NBH04019K	SS04045FS	SS0406F	SS0404F	SS0812R	SS0808F	LW-2	LW-4*104
HY-NBH05019K	SS04045FS	SS0406F	SS0404F	SS0812R	SS0808F	LW-2	LW-4*104
HY-NBH02020K	SS04045FS	SS0406F	SS0404F	SS0812R	SS0808F	LW-2	LW-4*104
HY-NBH02520K	SS04045FS	SS0406F	SS0404F	SS0812R	SS0808F	LW-2	LW-4*104
HY-NBH03020K	SS04045FS	SS0406F	SS0404F	SS0812R	SS0808F	LW-2	LW-4*104
HY-NBH03520K	SS04045FS	SS0406F	SS0404F	SS0812R	SS0808F	LW-2	LW-4*104
HY-NBH04020K	SS04045FS	SS0406F	SS0404F	SS0812R	SS0808F	LW-2	LW-4*104
HY-NBH05020K	SS04045FS	SS0406F	SS0404F	SS0812R	SS0808F	LW-2	LW-4*104
HY-NBH02022K	SS04045FS	SS0406F	SS0404F	SS0812R	SS0808F	LW-2	LW-4*104
HY-NBH02522K	SS04045FS	SS0406F	SS0404F	SS0812R	SS0808F	LW-2	LW-4*104
HY-NBH03022K	SS04045FS	SS0406F	SS0404F	SS0812R	SS0808F	LW-2	LW-4*104
HY-NBH03522K	SS04045FS	SS0406F	SS0404F	SS0812R	SS0808F	LW-2	LW-4*104
HY-NBH04022K	SS04045FS	SS0406F	SS0404F	SS0812R	SS0808F	LW-2	LW-4*104
HY-NBH05022K	SS04045FS	SS0406F	SS0404F	SS0812R	SS0808F	LW-2	LW-4*104
HY-NBH02025K-MET	SS04045FS	SS0406F	SS0404F	SS0812R	SS0808F	LW-2	LW-4*104
HY-NBH02525K-MET	SS04045FS	SS0406F	SS0404F	SS0812R	SS0808F	LW-2	LW-4*104
HY-NBH03025K-MET	SS04045FS	SS0406F	SS0404F	SS0812R	SS0808F	LW-2	LW-4*104
HY-NBH03525K-MET	SS04045FS	SS0406F	SS0404F	SS0812R	SS0808F	LW-2	LW-4*104
HY-NBH04025K-MET	SS04045FS	SS0406F	SS0404F	SS0812R	SS0808F	LW-2	LW-4*104
HY-NBH05025K-MET	SS04045FS	SS0406F	SS0404F	SS0812R	SS0808F	LW-2	LW-4*104
HY-NBH02025K	SS04045FS	SS0406F	SS0404F	SS0812R	SS0808F	LW-2	LW-4*104
HY-NBH02525K	SS04045FS	SS0406F	SS0404F	SS0812R	SS0808F	LW-2	LW-4*104
HY-NBH03025K	SS04045FS	SS0406F	SS0404F	SS0812R	SS0808F	LW-2	LW-4*104
HY-NBH03525K	SS04045FS	SS0406F	SS0404F	SS0812R	SS0808F	LW-2	LW-4*104
HY-NBH04025K	SS04045FS	SS0406F	SS0404F	SS0812R	SS0808F	LW-2	LW-4*104
HY-NBH05025K	SS04045FS	SS0406F	SS0404F	SS0812R	SS0808F	LW-2	LW-4*104

STICK DUO

Sleeve for Shaper Duo series

■ NBH Shank diameter $\Phi 15.875 - \Phi 19.05$



EDP	Item Number	Stock	BD mm	DCB mm	DCB2 mm	DCON mm	H mm	LF mm	LH mm	L1 mm	L2 mm	L3 mm	Applicable insert bar
5631403	NBH02015H	●	15	2	9	15.875	15	100	10	5	10	-	SBF./SHF.. SSP..
5702915	NBH02515H	●	15	2.5	9	15.875	15	100	10	5	10	-	SBF./SHF.. SBT../SSP..
5631411	NBH03015H	●	15	3	9	15.875	15	100	10	5	10	10	SBF./SHF./SBB.. SBG../SBT../SSP..
5586110	NBH03515H	●	15	3.5	9	15.875	15	100	10	5	10	10	SBF./SHF.. SBT../SSP..
5586128	NBH04015H	●	15	4	9	15.875	15	100	10	5	15	15	SBF./SHF./SBB.. SBG../SBT../SSP..
5585997	NBH04515H	●	15	4.5	9	15.875	15	100	10	5	15	15	-
5585989	NBH05015H	●	15	5	9	15.875	15	100	10	5	15	15	SBF./SHF.. SBG../SBT../SSP..
5585971	NBH06015H	●	15	6	9	15.875	15	100	10	5	20	20	SBF./SHF.. SBG../SFG../SBT../SSP..
5585963	NBH08015H	●	15	8	9	15.875	15	100	10	5	20	20	SBF./SHF.. SBG../SFG../SSP..
5631429	NBH02016H	●	15	2	9	16	15	100	10	5	10	-	SBF./SHF.. SSP..
5702899	NBH02516H	●	15	2.5	9	16	15	100	10	5	10	-	SBF./SHF.. SBT../SSP..
5631437	NBH03016H	●	15	3	9	16	15	100	10	5	10	10	SBF./SHF./SBB.. SBG../SBT../SSP..
5586102	NBH03516H	●	15	3.5	9	16	15	100	10	5	10	10	SBF./SHF.. SBT../SSP..
5586094	NBH04016H	●	15	4	9	16	15	100	10	5	15	15	SBF./SHF./SBB.. SBG../SBT../SSP..
5586086	NBH04516H	●	15	4.5	9	16	15	100	10	5	15	15	-
5586078	NBH05016H	●	15	5	9	16	15	100	10	5	15	15	SBF./SHF.. SBG../SBT../SSP..
5586060	NBH06016H	●	15	6	9	16	15	100	10	5	20	20	SBF./SHF.. SBG../SFG../SBT../SSP..
5774195	NBH07016H	●	15	7	9	16	15	100	10	5	20	20	SBF./SHF.. -
5586052	NBH08016H	●	15	8	9	16	15	100	10	5	20	20	SBF./SHF.. SBG../SFG../SSP..
5631445	NBH02019K	●	18	2	11	19.05	18	125	10	5	10	-	SBF./SHF.. SSP..
5702907	NBH02519K	●	18	2.5	11	19.05	18	125	10	5	10	-	SBF./SHF.. SBT../SSP..
5631452	NBH03019K	●	18	3	11	19.05	18	125	10	5	10	10	SBF./SHF./SBB.. SBG../SBT../SSP..
5586045	NBH03519K	●	18	3.5	11	19.05	18	125	10	5	10	10	SBF./SHF.. SBT../SSP..
5586037	NBH04019K	●	18	4	11	19.05	18	125	10	5	15	15	SBF./SHF./SBB.. SBG../SBT../SSP..
5586029	NBH04519K	●	18	4.5	11	19.05	18	125	10	5	15	15	-
5586011	NBH05019K	●	18	5	11	19.05	18	125	10	5	15	15	SBF./SHF.. SBG../SBT../SSP..
5586003	NBH06019K	●	18	6	11	19.05	18	125	10	5	20	20	SBF./SHF.. SBG../SFG../SBT../SSP..
5774203	NBH07019K	●	18	7	11	19.05	18	125	10	5	20	20	SBF./SHF.. -
5586227	NBH08019K	●	18	8	11	19.05	18	125	10	5	20	20	SBF./SHF.. SBG../SFG../SSP..
5586219	NBH10019K	●	18	10	11	19.05	18	125	10	5	20	20	-

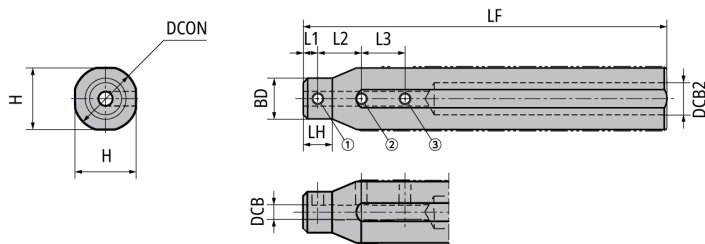
Parts

Item Number	Clamp Screw			Wrench for①②③
	①	②	③	
NBH02015H	SS0406F	SS0406F	-	LW-2
NBH02515H	SS0406F	SS0406F	-	LW-2
NBH03015H	SS0404F	SS0404F	SS0404F	LW-2
NBH03515H	SS0404F	SS0404F	SS0404F	LW-2
NBH04015H	SS0404F	SS0404F	SS0404F	LW-2
NBH04515H	SS0404F	SS0404F	SS0404F	LW-2
NBH05015H	SS0404F	SS0404F	SS0404F	LW-2
NBH06015H	SS0404F	SS0404F	SS0404F	LW-2
NBH08015H	SS0403F	SS0403F	SS0403F	LW-2
NBH02016H	SS0406F	SS0406F	-	LW-2
NBH02516H	SS0406F	SS0406F	-	LW-2
NBH03016H	SS0404F	SS0404F	SS0404F	LW-2
NBH03516H	SS0404F	SS0404F	SS0404F	LW-2
NBH04016H	SS0404F	SS0404F	SS0404F	LW-2
NBH04516H	SS0404F	SS0404F	SS0404F	LW-2
NBH05016H	SS0404F	SS0404F	SS0404F	LW-2
NBH06016H	SS0404F	SS0404F	SS0404F	LW-2
NBH07016H	SS0403F	SS0404F	SS0404F	LW-2
NBH08016H	SS0403F	SS0403F	SS0403F	LW-2
NBH02019K	SS0408F	SS0408F	-	LW-2
NBH02519K	SS0408F	SS0408F	-	LW-2
NBH03019K	SS0406F	SS0406F	SS0406F	LW-2
NBH03519K	SS0406F	SS0406F	SS0406F	LW-2
NBH04019K	SS0406F	SS0406F	SS0406F	LW-2
NBH04519K	SS0406F	SS0406F	SS0406F	LW-2
NBH05019K	SS0406F	SS0406F	SS0406F	LW-2
NBH06019K	SS0406F	SS0406F	SS0406F	LW-2
NBH07019K	SS0404F	SS0404F	SS0404F	LW-2
NBH08019K	SS0404F	SS0404F	SS0404F	LW-2
NBH10019K	SS0403F	SS0404F	SS0404F	LW-2

STICK DUO

Sleeve for Shaper Duo series

■ NBH Shank diameter $\Phi 20 - \Phi 32$



EDP	Item Number	Stock	BD mm	DCB mm	DCB2 mm	DCON mm	H mm	LF mm	LH mm	L1 mm	L2 mm	L3 mm	Applicable insert bar
5631460	NBH02020K	●	11	2	11	20	19	125	10	5	10	-	SBF./SHF.. SSP.
5702881	NBH02520K	●	11	2.5	11	20	19	125	10	5	10	-	SBF./SHF.. SBT./SSP..
5631478	NBH03020K	●	12	3	11	20	19	125	10	5	10	10	SBF./SHF./SBB.. SBG./SBT./SSP..
5586201	NBH03520K	●	12	3.5	11	20	19	125	10	5	10	10	SBF./SHF.. SBT./SSP..
5586185	NBH04020K	●	13	4	11	20	19	125	10	5	15	15	SBF./SHF./SBB.. SBG./SBT./SSP..
5586177	NBH04520K	●	13	4.5	11	20	19	125	10	5	15	15	-
5586169	NBH05020K	●	14	5	11	20	19	125	10	5	15	15	SBF./SHF.. SBG./SBT./SSP..
5586151	NBH06020K	●	15	6	11	20	19	125	10	5	20	20	SBF./SHF.. SBG./SFG./SBT./SSP..
5774211	NBH07020K	●	16	7	11	20	19	125	10	5	20	20	SBF./SHF.. -
5586144	NBH08020K	●	17	8	11	20	19	125	10	5	20	20	SBF./SHF.. SBG./SFG./SSP..
5586136	NBH10020K	●	19	10	11	20	19	125	10	5	20	20	-
5914742	NBH12020K	●	19	12	14	20	19	125	10	5	25	25	-
5631486	NBH02022K	●	11	2	11	22	21	125	10	5	10	-	SBF./SHF.. SSP.
5702873	NBH02522K	●	11	2.5	11	22	21	125	10	5	10	-	SBF./SHF.. SBT./SSP..
5631494	NBH03022K	●	12	3	11	22	21	125	10	5	10	10	SBF./SHF./SBB.. SBG./SBT./SSP..
5586326	NBH03522K	●	12	3.5	11	22	21	125	10	5	10	10	SBF./SHF.. SBT./SSP..
5586318	NBH04022K	●	13	4	11	22	21	125	10	5	15	15	SBF./SHF./SBB.. SBG./SBT./SSP..
5586300	NBH04522K	●	13	4.5	11	22	21	125	10	5	15	15	-
5586292	NBH05022K	●	14	5	11	22	21	125	10	5	15	15	SBF./SHF.. SBG./SBT./SSP..
5586284	NBH06022K	●	15	6	11	22	21	125	10	5	20	20	SBF./SHF.. SBG./SFG./SBT./SSP..
5774229	NBH07022K	●	16	7	11	22	21	125	10	5	20	20	SBF./SHF.. -
5586276	NBH08022K	●	17	8	11	22	21	125	10	5	20	20	SBF./SHF.. SBG./SFG./SSP..
5586268	NBH10022K	●	19	10	11	22	21	125	10	5	20	20	-
5631502	NBH12022K	●	21	12	14	22	21	125	10	5	25	25	-
5631510	NBH02023K	●	11	2	11	23	21	125	10	5	10	-	SBF./SHF.. SSP.
5702857	NBH02523K	●	11	2.5	11	23	21	125	10	5	10	-	SBF./SHF.. SBT./SSP..
5631528	NBH03023K	●	12	3	11	23	21	125	10	5	10	10	SBF./SHF./SBB.. SBG./SBT./SSP..
5586250	NBH03523K	●	12	3.5	11	23	21	125	10	5	10	10	SBF./SHF.. SBT./SSP..
5651336	NBH04023K	●	13	4	11	23	21	125	10	5	15	15	SBF./SHF./SBB.. SBG./SBT./SSP..
5586243	NBH04523K	●	13	4.5	11	23	21	125	10	5	15	15	-
5631536	NBH05023K	●	14	5	11	23	21	125	10	5	15	15	SBF./SHF.. SBG./SBT./SSP..
5631544	NBH06023K	●	15	6	11	23	21	125	10	5	20	20	SBF./SHF.. SBG./SFG./SBT./SSP..
5631551	NBH08023K	●	17	8	11	23	21	125	10	5	20	20	SBF./SHF.. SBG./SFG./SSP..
5631569	NBH10023K	●	19	10	11	23	21	125	10	5	20	20	-
5631577	NBH12023K	●	21	12	14	23	21	125	10	5	25	25	-
5631585	NBH02025K-MET	●	11	2	11	25	24	125	10	5	10	-	SBF./SHF.. SSP.
5704283	NBH02525K-MET	●	11	2.5	11	25	24	125	10	5	10	-	SBF./SHF.. SBT./SSP..
5631593	NBH03025K-MET	●	12	3	11	25	24	125	10	5	10	10	SBF./SHF./SBB.. SBG./SBT./SSP..
5631601	NBH03525K-MET	●	12	3.5	11	25	24	125	10	5	10	10	SBF./SHF.. SBT./SSP..
5651328	NBH04025K-MET	●	13	4	11	25	24	125	10	5	15	15	SBF./SHF./SBB.. SBG./SBT./SSP..
5631619	NBH04525K-MET	●	13	4.5	11	25	24	125	10	5	15	15	-
5631627	NBH05025K-MET	●	14	5	11	25	24	125	10	5	15	15	SBF./SHF.. SBG./SBT./SSP..
5631635	NBH06025K-MET	●	15	6	11	25	24	125	10	5	20	20	SBF./SHF.. SBG./SFG./SBT./SSP..
5774252	NBH07025K-MET	●	16	7	11	25	24	125	10	5	20	20	SBF./SHF.. -
5631643	NBH08025K-MET	●	17	8	11	25	24	125	10	5	20	20	SBF./SHF.. SBG./SFG./SSP..
5631650	NBH10025K-MET	●	19	10	11	25	24	125	10	5	20	20	-
5631668	NBH12025K-MET	●	21	12	14	25	24	125	10	5	25	25	-
5631676	NBH02025K	●	11	2	11	25.4	24	125	10	5	10	-	SBF./SHF.. SSP.
5702865	NBH02525K	●	11	2.5	11	25.4	24	125	10	5	10	-	SBF./SHF.. SBT./SSP..
5631684	NBH03025K	●	12	3	11	25.4	24	125	10	5	10	10	SBF./SHF./SBB.. SBG./SBT./SSP..
5586235	NBH03525K	●	12	3.5	11	25.4	24	125	10	5	10	10	SBF./SHF.. SBT./SSP..
5586383	NBH04025K	●	13	4	11	25.4	24	125	10	5	15	15	SBF./SHF./SBB.. SBG./SBT./SSP..
5586375	NBH04525K	●	13	4.5	11	25.4	24	125	10	5	15	15	-
5586367	NBH05025K	●	14	5	11	25.4	24	125	10	5	15	15	SBF./SHF.. SBG./SBT./SSP..
5586359	NBH06025K	●	15	6	11	25.4	24	125	10	5	20	20	SBF./SHF.. SBG./SFG./SBT./SSP..
5774260	NBH07025K	●	16	7	11	25.4	24	125	10	5	20	20	SBF./SHF.. -
5586342	NBH08025K	●	17	8	11	25.4	24	125	10	5	20	20	SBF./SHF.. SBG./SFG./SSP..
5586334	NBH10025K	●	19	10	11	25.4	24	125	10	5	20	20	-

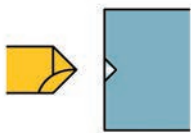
EDP	Item Number	Stock	BD mm	DCB mm	DCB2 mm	DCON mm	H mm	LF mm	LH mm	L1 mm	L2 mm	L3 mm	Applicable insert bar	
5631692	NBH12025K	●	21	12	14	25.4	24	125	10	5	25	25	-	-
5939475	NBH04532K	●	13	4.5	11	32	30	125	10	5	15	15	-	-
5939483	NBH05032K	●	14	5	11	32	30	125	10	5	15	15	SBF../SHF..	SBG../SBT../SSP..
5939491	NBH06032K	●	15	6	11	32	30	125	10	5	20	20	SBF../SHF..	SBG../SFG../SBT../SSP..
5939509	NBH07032K	●	16	7	11	32	30	125	10	5	20	20	SBF../SHF..	-
5939525	NBH08032K	●	17	8	11	32	30	125	10	5	20	20	SBF../SHF..	SBG../SFG../SSP..
5939533	NBH10032K	●	19	10	11	32	30	125	10	5	20	20	-	-
5939467	NBH12032K	●	21	12	14	32	30	125	10	5	25	25	-	-
5939459	NBH14032K	●	23	14	16	32	30	125	10	5	25	25	-	-
5939442	NBH16032K	●	25	16	18	32	30	125	10	5	25	25	-	-

Parts

Item Number	Clamp Screw			Wrench for①②③
	①	②	③	
NBH02020K	SS0404F	SS0404F	-	LW-2
NBH02520K	SS0404F	SS0404F	-	LW-2
NBH03020K	SS0404F	SS0404F	SS0406F	LW-2
NBH03520K	SS0404F	SS0404F	SS0406F	LW-2
NBH04020K	SS0404F	SS0406F	SS0406F	LW-2
NBH04520K	SS0404F	SS0406F	SS0406F	LW-2
NBH05020K	SS0404F	SS0406F	SS0406F	LW-2
NBH06020K	SS0404F	SS0406F	SS0406F	LW-2
NBH07020K	SS0404F	SS0406F	SS0406F	LW-2
NBH08020K	SS0404F	SS0404F	SS0404F	LW-2
NBH10020K	SS0404F	SS0404F	SS0404F	LW-2
NBH12020K	SS0403F	SS0403F	SS0403F	LW-2
NBH02022K	SS0404F	SS0406F	-	LW-2
NBH02522K	SS0404F	SS0406F	-	LW-2
NBH03022K	SS0404F	SS0406F	SS0408F	LW-2
NBH03522K	SS0404F	SS0406F	SS0406F	LW-2
NBH04022K	SS0404F	SS0406F	SS0406F	LW-2
NBH04522K	SS0404F	SS0406F	SS0406F	LW-2
NBH05022K	SS0404F	SS0406F	SS0406F	LW-2
NBH06022K	SS0404F	SS0406F	SS0406F	LW-2
NBH07022K	SS0404F	SS0406F	SS0406F	LW-2
NBH08022K	SS0404F	SS0406F	SS0406F	LW-2
NBH10022K	SS0404F	SS0404F	SS0404F	LW-2
NBH12022K	SS0404F	SS0404F	SS0404F	LW-2
NBH02023K	SS0404F	SS0406F	-	LW-2
NBH02523K	SS0404F	SS0406F	-	LW-2
NBH03023K	SS0404F	SS0406F	SS0408F	LW-2
NBH03523K	SS0404F	SS0406F	SS0406F	LW-2
NBH04023K	SS0404F	SS0406F	SS0406F	LW-2
NBH04523K	SS0404F	SS0406F	SS0406F	LW-2
NBH05023K	SS0404F	SS0406F	SS0406F	LW-2
NBH06023K	SS0404F	SS0406F	SS0406F	LW-2
NBH08023K	SS0404F	SS0406F	SS0406F	LW-2
NBH10023K	SS0404F	SS0404F	SS0404F	LW-2
NBH12023K	SS0404F	SS0404F	SS0404F	LW-2
NBH02025K-MET	SS0404F	SS0406F	-	LW-2
NBH02525K-MET	SS0404F	SS0406F	-	LW-2
NBH03025K-MET	SS0404F	SS0406F	SS0408F	LW-2
NBH03525K-MET	SS0404F	SS0406F	SS0408F	LW-2
NBH04025K-MET	SS0404F	SS0408F	SS0408F	LW-2
NBH04525K-MET	SS0404F	SS0408F	SS0408F	LW-2
NBH05025K-MET	SS0404F	SS0408F	SS0408F	LW-2
NBH06025K-MET	SS0404F	SS0408F	SS0408F	LW-2
NBH07025K-MET	SS0404F	SS0408F	SS0408F	LW-2
NBH08025K-MET	SS0404F	SS0406F	SS0406F	LW-2
NBH10025K-MET	SS0404F	SS0406F	SS0406F	LW-2
NBH12025K-MET	SS0404F	SS0404F	SS0404F	LW-2
NBH02025K	SS0404F	SS0406F	-	LW-2
NBH02525K	SS0404F	SS0406F	-	LW-2
NBH03025K	SS0404F	SS0406F	SS0408F	LW-2
NBH03525K	SS0404F	SS0406F	SS0408F	LW-2
NBH04025K	SS0404F	SS0408F	SS0408F	LW-2
NBH04525K	SS0404F	SS0408F	SS0408F	LW-2
NBH05025K	SS0404F	SS0408F	SS0408F	LW-2
NBH06025K	SS0404F	SS0408F	SS0408F	LW-2
NBH07025K	SS0404F	SS0408F	SS0408F	LW-2
NBH08025K	SS0404F	SS0406F	SS0406F	LW-2
NBH10025K	SS0404F	SS0406F	SS0406F	LW-2
NBH12025K	SS0404F	SS0404F	SS0404F	LW-2
NBH04532K	SS0404F	SS0408F	SS0408F	LW-2
NBH05032K	SS0404F	SS0408F	SS0408F	LW-2
NBH06032K	SS0404F	SS0408F	SS0408F	LW-2
NBH07032K	SS0404F	SS0408F	SS0408F	LW-2
NBH08032K	SS0404F	SS0408F	SS0408F	LW-2
NBH10032K	SS0404F	SS0408F	SS0408F	LW-2
NBH12032K	SS0404F	SS0406F	SS0406F	LW-2
NBH14032K	SS0504	SS0506	SS0506	LW-2
NBH16032K	SS0504	SS0506	SS0506	LW-2

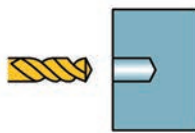
Machining Procedure

① Center drilling



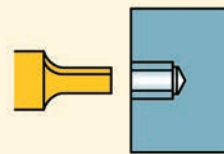
Make a center hole which is smaller than pilot hole drill.

② Drilling (Pilot hole)



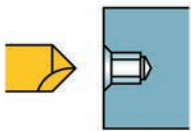
Select a drill with same or smaller (0~0.1mm) dia. as AF and machine a bit deeper because burrs may cause chipping on shaper insert

③ Shaper tool



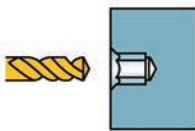
Machine socket rotating 60 degrees 6 times

④ Chamfering



Chamfer with the same pilot hole drill as ①

⑤ Deburring



Finish and deburr with the same drill as in process ②
☆Reduce cutting conditions due to heavy interruption

SHAPER DUO Process Chart -Hexalobular-

Socket Size	Tool	Pilot bore Dia. (mm)	Starting" X" position (mm)	Final" X" position (mm)	Number of passes		Estimated cycle time*		
					Roughing pass 0.025mm	Finishing pass 0.005mm	ISO10664 Standard depth of Hexalobular hole (mm)	Whole process ①-⑤	Shaper process ③
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	2.3	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	SSP0550N55T27	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 drills *Shaper cutting conditions Feed: 3000mm/min Depth of cut : Roughing 0.025mm / Finishing 0.005mm

SHAPER DUO Process Chart -Hexagonal-

HEX Standard	Tool	Pilot bore Dia. (mm)	Starting" X" position (mm)	Final" X" position (mm)	Number of passes		Estimated cycle time*		
					Roughing pass 0.025mm	Finishing pass 0.005mm	ISO 2936 standard depth of Hex hole (mm)	Whole process ①-⑤	Shaper process ③
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

*Using carbide drills *Shaper cutting conditions Feed: 3000mm/min Depth of cut : Roughing 0.025mm / Finishing 0.005mm

Recommended cutting conditions

Feed : F1000 - F4000 mm/min Depth of Cut : Roughing 0.025mm / Finishing 0.005mm

Precautions when replacing the insert bar

The tool nose position dimensions (HF2) vary. Check the dimensions of the cutting tool after changing tools or indexing insert bar.

Shaper W

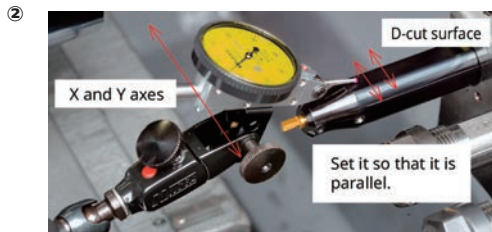
SHAPER DUO Set-up Instructions -Hexagonal

Outside machine

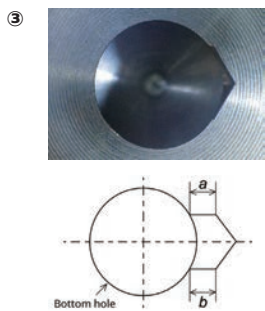


- Set the insert bar in the sleeve and check the parallelism of the flat portion of the sleeve and the insert bar.
- Minimize the overhang of the insert.

Inside machine



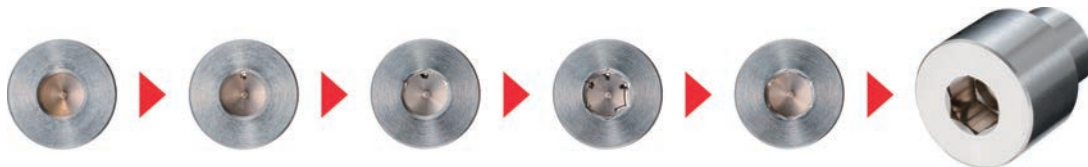
- Set the sleeve into the tool post and make sure the sleeve is set parallel.
- Minimize sleeve overhang.



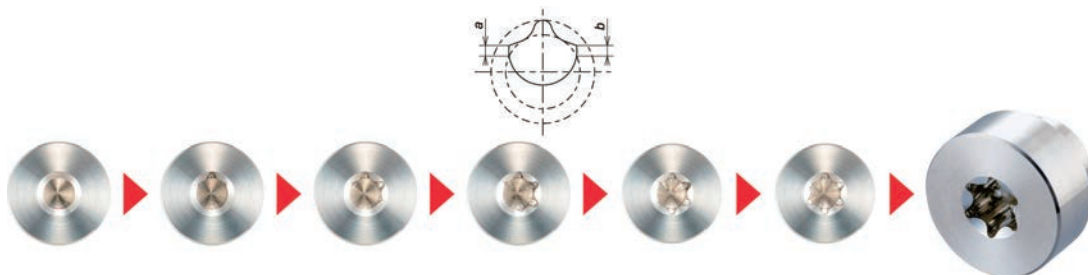
- Increase the number of machining passes with smaller depth of cut if the insert chips with large depth of cut. (0.025mm×5pass is recommended)
No chamfering process is required for measuring purpose.
- Measure the length of both [a] and [b] with comparator or magnifier.
- Adjust centerline height by 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, you need to reset the insert and the sleeve.Please make sure both the insert and the sleeve are set up correctly.

Machine Hexagonal shape

*Run full HEX machining program.

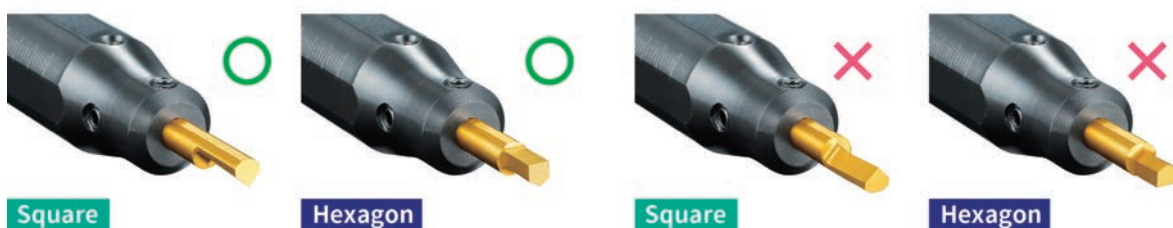


Machining hexalobular shape is basically the same as hexagon socket



Important Note for Insert Set-up

When using the STICK DUO HYPER series, it is important that the insert is installed and oriented so the bar flat is lined up with the clamp screws. If installed in the wrong position, insert edge chipping may occur due to interference with the positioning and clamping screws. See diagram below.



Machining Program Code Explanation

Important: The programming codes and values will depend on the machine brands. For details, please contact the machine manufacturer.

Example machining piece : Hexagon socket dimensions

: AF 3.0mm, Diagonal 3.46mm, Socket depth 3.5mm, Pilot drill diameter ϕ 3.0mm

DOC : Roughing 0.025mm / Finishing 0.005mm

Insert bar : TM4 SSP030N1940H

Programming tips

- Make a program considering final "X" position.

#1 Final "X" position : 3.46mm (AF)

#2 Finishing position of roughing : $3.46 - 0.01$ (Finishing) = 3.45mm

#3 Calculate total DOC for roughing : $3.45 - 3.0$ (Pilot hole) = 0.45mm

#4 Determine number of cuts : $0.45 \div 0.05$ (DOC for Dia.) = 9.0 + 2 (round down to whole number and add "2" for program adjustment)
→ Roughing sequence runs **11 times**

#5 Set starting point : $3.45 - (0.05 \times (11 - 1)) = 2.95$ mm : must subtract by "1" for program adjustment

```

Main program

☆:Rear spindle rotation stop
☆:Back spindle indexing 0° .....①
T0000(Shaper)
G50 U-1.5 .....②
G0 X2.95 Z-2.0 T00 .....③
☆:Sub-program call (0000①) Repeat 11 times .....④
☆:Sub-program call (0002②) .....⑤

☆Back spindle indexing 60° .....①
G0 X2.95 Z-2.0
☆:Sub-program call (0000①) Repeat 11 times .....④
☆:Sub-program call (0002②) .....⑤

☆:Back spindle indexing 120° .....①
G0 X2.95 Z-2.0
☆:Sub-program call (0000①) Repeat 11 times .....④
☆:Sub-program call (0002②) .....⑤

☆:Back spindle indexing 180° .....①
G0 X2.95 Z-2.0
☆:Sub-program call (0000①) Repeat 11 times .....④
☆:Sub-program call (0002②) .....⑤

☆:Back spindle indexing 240° .....①
G0 X2.95 Z-2.0
☆:Sub-program call (0000①) Repeat 11 times .....④
☆:Sub-program call (0002②) .....⑤

☆:Back spindle indexing 300° .....①
G0 X2.95 Z-2.0
☆:Sub-program call (0000①) Repeat 11 times .....④
☆:Sub-program call (0002②) .....⑤

☆:Spindle indexing release
G0 Z-2.0
G50 U-1.5
G0 U0 W0 T0
M1
    
```

☆:Enter the program corresponding to your machine.

- ①= Index the sub-spindle 6 times in 60 degree increments.
- ②= Specify the coordinate system shift command (in X axis direction) for the tool. [2 x HF2 ; where HF2 is tool dimension located in the catalog].
* A positive direction shift is recommended for easier programming.
- ③= Execute the positioning of the tool.
 - X position should be smaller than pilot drill diameter.
 - Z position should be offset 2.0 mm from material to achieve program feed rate.

```

Sub-program ①

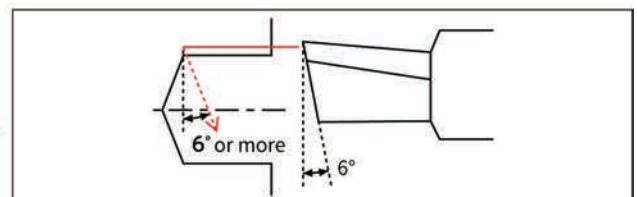
N0000① (Roughing)
G4 U0.02 .....⑥
G98 G1 Z3.5 F3000 .....⑦
G4 U0.02
U-0.2 W-0.018 .....⑧
G4 U0.02
G0 Z-2.0
G4 U0.02
U0.25 .....⑨
M99
    
```

```

Sub-program ②

N0000② (Finishing)
G98 G1 X3.46 Z-2.0 F1000
G4 U0.02
Z3.5 F3000
G4 U0.02
U-0.2 W-0.018
G4 U0.02
G0 Z-2.0
M99
    
```

- ④=Go to the Sub-Program #1.
 - Sequence runs 11 times. First cutting point X2.95 and final cutting point X3.45, with 0.05 DOC (for diameter) each time.
- ⑤=Go to the Sub-Program #2, for finishing sequence.
 - Finishing operation with 0.005mm DOC (X 3.46) is recommended for better surface finish.
- ⑥=Specify dwell time. This allows the program and machine to stay synchronized.
- ⑦=Cut into part 3.5mm. F3000 is recommended feed to be used for most materials; including Titanium Alloy and Stainless Steel.
- ⑧=This code backs off the tool with an angle greater than K5 degrees (10 degrees used in example). See page 3.



- ⑨=Return to the X position + 0.05mm (the DOC for diameter).

Shaper W

Hexagon Socket Programming Code Examples from Machine Builders in Metric

Important: The programming codes and values will depend on the machine brands. For details, please contact to the machine manufactures.

Example machining piece : Hexagon socket dimensions

: AF 3.0mm, Diagonal 3.46mm, Socket depth 3.5mm, Pilot drill diameter ϕ 3.0mm

DOC : Roughing 0.025mm / Finishing 0.005mm

Insert bar : TM4 SSP030N1940H

■ CITIZEN

```

Main program

M25
M78 S0 .....①
T○○○○(Shaper)
G50 U-1.5 .....②
G0 X2.95 Z-2.0 T○○ .....③
M98 P2100 L11 .....④
M98 P2200 .....⑤

M78 S60 .....①
G0 X2.95 Z-2.0
M98 P2100 L11
M98 P2200
} 《A》

Repeat 《A》 at S120, S180, S240, S300
with indexing at 60° increments

M20
G0 Z-2.0
G50 U-1.5
G0 U0 W0 T0
M1
    
```

■ STAR

```

Main program

M25
T○○○○ (Shaper)
G50 U-1.5 .....②
M8
G0 X2.95 Z-2.0 C0 T○○ .....①③
M98 P2100 L11 .....④
M98 P2200 .....⑤

G0 C60.0 .....①
G0 X2.95 Z-2.0
M98 P2100 L11
M98 P2200
} 《A》

Repeat 《A》 at S120, S180, S240, S300
with indexing at 60° increments

G0 Z-2.0
G50 U-1.5
G0 T0
G28 W0
M1
    
```

■ TSUGAMI

```

Main program

M105
M150
G28 H0 .....①
M182
T○○○○ (Shaper)
G50 U-1.5 .....②
G0 X2.95 Z2.0 T○○ .....③
M98 P2100 L11 .....④
M98 P2200 .....⑤
M183

G0 C60 .....①
M182
G0 X2.95 Z2.0
M98 P2100 L11
M98 P2200
M183
} 《A》

Repeat 《A》 at S120, S180, S240, S300
with indexing at 60° increments

M151
G0 Z2.0
G50 U-1.5
G0 U0 W0 T0
M1
    
```

```

Sub-program①

N2100 (Roughing)
G4 U0.02 .....⑥
G98 G1 Z3.5 F3000 .....⑦
G4 U0.02
U-0.2 W-0.018 .....⑧
G4 U0.02
G0 Z-2.0
G4 U0.02
U0.25 .....⑨
M99
    
```

```

Sub-program①

O2100 (Roughing)
G4 U0.02 .....⑥
G98 G1 Z3.5 F3000 .....⑦
G4 U0.02
U-0.2 W-0.018 .....⑧
G4 U0.02
G0 Z-2.0
G4 U0.02
U0.25 .....⑨
M99
    
```

```

Sub-program①

O2100 (Roughing)
G4 U0.02 .....⑥
G98 G1 Z-3.5 F3000 .....⑦
G4 U0.02
U-0.2 W0.018 .....⑧
G4 U0.02
G0 Z2.0
G4 U0.02
U0.25 .....⑨
M99
    
```

```

Sub-program②

N2200 (Finishing)
G98 G1 X3.46 Z-2.0 F1000
G4 U0.02
Z3.5 F3000
G4 U0.02
U-0.2 W-0.018
G4 U0.02
G0 Z-2.0
M99
    
```

```

Sub-program②

O2200 (Finishing)
G98 G1 X3.46 Z-2.0 F1000
G4 U0.02
Z3.5 F3000
G4 U0.02
U-0.2 W-0.018
G4 U0.02
G0 Z-2.0
M99
    
```

```

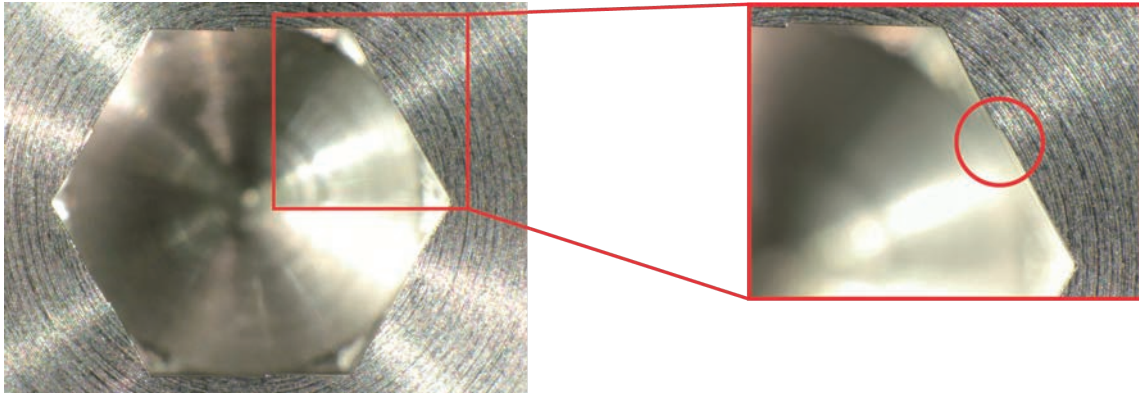
Sub-program②

O2200 (Finishing)
G98 G1 X3.46 Z2.0 F1000
G4 U0.02
Z-3.5 F3000
G4 U0.02
U-0.2 W0.018
G4 U0.02
G0 Z2.0
M99
    
```

W Shaper

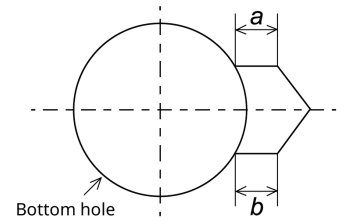
Troubleshooting

Problem: Step on sides

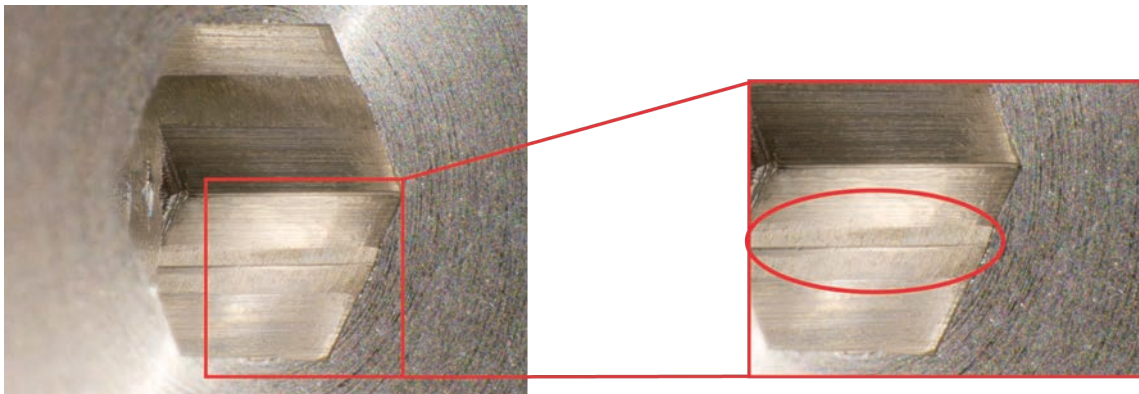


Cause: Incorrect tool set-up (Center-line shift)

Solution: Machine one angle and make sure both [a] and [b] lengths are identical, rotating the sleeve if necessary



Problem: Wall dented



Cause: Pilot hole remaining

Solution: Need pilot hole tool's offset

Problem: Wall tapered

Solution:

- Smaller depth of cut
- Less tool overhang

Problem: Chuck is slipping / Insert chipped

Solution:

- Run at 3000 mm/min feed rate
- Smaller depth of cut

-
- 3000 mm/min feed rate can cover most materials including Titanium alloy and Stainless steel.
 - Too slow or too fast of a feed rate may cause excessive tool pressure for the workpiece and tool.