

**MUGEN COATING PREMIUM Plus**  
**4-Flute Long Neck Corner Radius End Mill**  
with short shank for Hardened Steel and High accuracy cutting

**MHRSH430RSF** **Size Expansion**

Total 205 sizes



Lineup extended from  $\phi$  0.1 to  $\phi$  6,  
 combining specialized tool design and high accuracy corner R  
 enhance finishing performance on hardened steels

MUGEN COATING PREMIUM Plus

4-Flute Long Neck Corner Radius End Mill

with short shank for Hardened Steel and High accuracy cutting

**MHRSH430RSF**

Lineup Expansion



$\phi$  0.1  $\times$  R0.01  $\sim$   $\phi$  6  $\times$  R1

Total 205 sizes



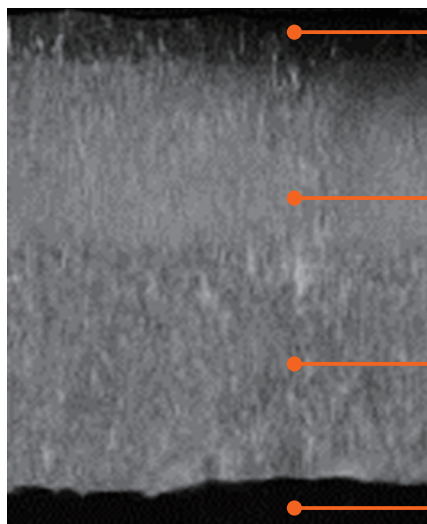
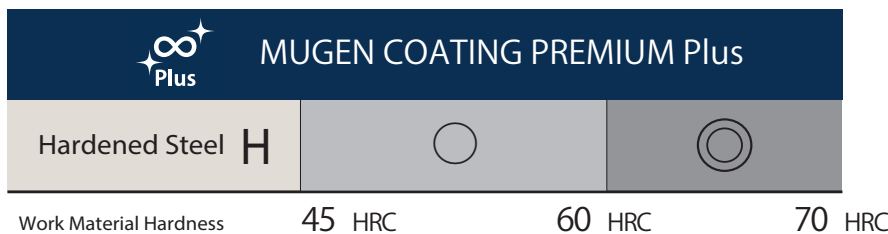
## Features

Feature  
1

Long tool life

MUGEN COATING PREMIUM Plus

High oxidation resistance and abrasion resistance is suitable for machining above 60HRC  
 Demonstrates same performance with MUGEN COATING PREMIUM even on machining  
 45 ~ 60HRC



- Oxidation resistant layer  
 Prevents oxidation due to heat generated during cutting
- Hard coating layer  
 Tool wear can be reduced when machining on high hardened steel
- High adhesion coating layer  
 Structure that is difficult to crack and propagate when impact forced
- Super Micro Grain Carbide

Feature 2

Excellent accuracy and surface roughness

High accuracy corner R and wiper

Corner radius end mill to pursue accuracy and surface roughness



End tooth profile no center tooth  
 $\phi 0.1 \times R0.01 \sim \phi 2 \times R0.5$



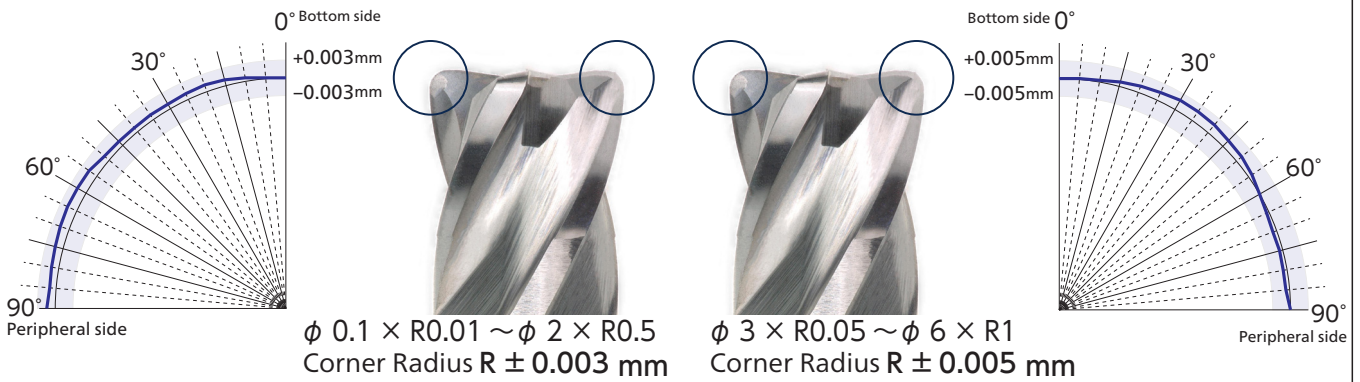
End tooth profile with center tooth  
 $\phi 3 \times R0.05 \sim \phi 6 \times R1$

High accuracy corner R

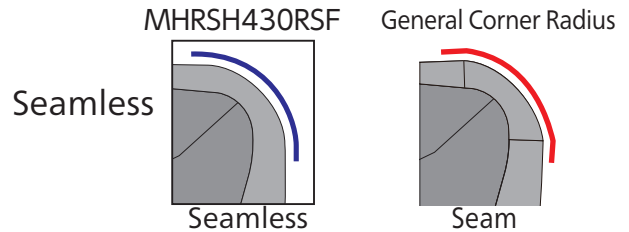


Wiper Strong back taper

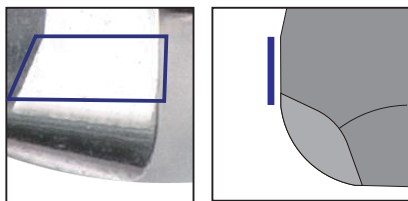
Enhances surface roughness and accuracy on side machining  
High accuracy corner R and Seamless



Corner R and peripheral cutting edge are seamlessly connected, and the smooth cutting edge improves the surface roughness on side machining



Improves surface roughness on bottom by wiper  
( $D \geq \phi 0.4$ )



By adopting wiper at the end tooth, improves the surface roughness on bottom surface machining

Surface roughness comparison after bottom surface finishing

Work material HAP40 (64HRC)	MHRSH430RSF	Conventional	Other tool brand A	Other tool brand B
Tool size $\phi 2 \times R0.2 \times 6$				
Magnification rate $\times 400$	Ra 0.010 $\mu\text{m}$	Ra 0.028 $\mu\text{m}$	Ra 0.029 $\mu\text{m}$	Ra 0.026 $\mu\text{m}$

Lineup extended from  $\phi 0.1$  to  $\phi 6$ ,  
 combining specialized tool design and high accuracy corner R  
 enhance finishing performance on hardened steels

Feature 3 Improved cutting accuracy Optimal overhung length by high accuracy short shank

Realized high rigidity and high precision machining

**MHRSH430RSF**

High precision short shank  
 High rigidity with shrink fit chuck

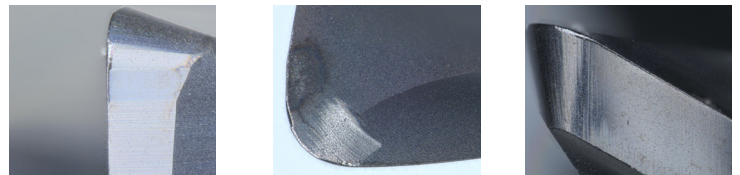
**Conventional**

Shank tolerance with wide range  
 long overhung caused lower tool rigidity

Surface roughness and wear after 60 mins machining

Tool MHRSH430RSF  $\phi 2 \times R0.2 \times 6$   
 Work material HAP40 (64HRC)  
 Spindle speed 12,000 min<sup>-1</sup>  
 Feed 1,000 mm/min  
 Depth of cut  $a_p 0.02 \times a_e 0.05$  mm

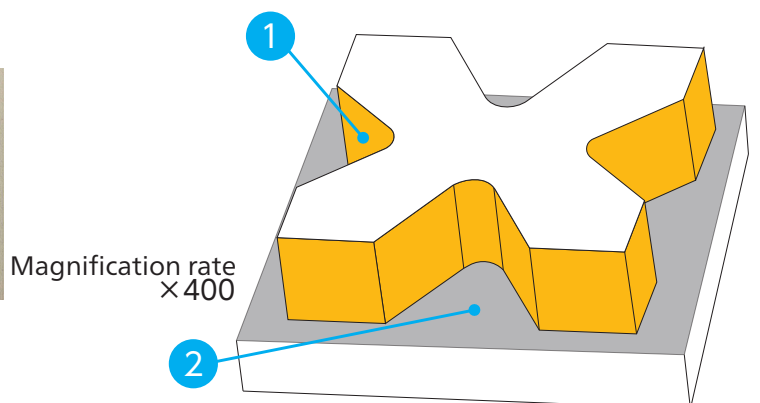
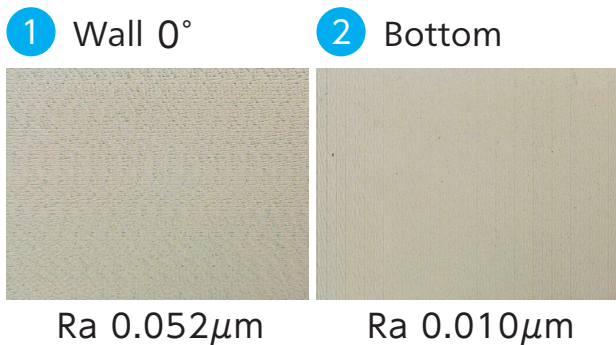
Tool wear



End tooth  
 Flank wear width  
 0.023mm

Corner R  
 R retreat amount  
 0.003mm

Surface roughness







Leads to various tool information



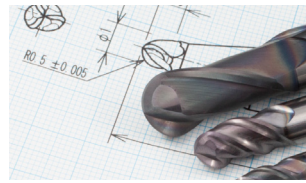
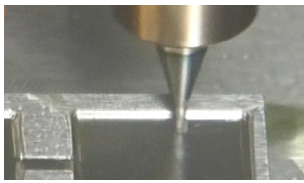
From 2D barcode on back of product case



MUGEN COATING PREMIUM Plus  
4-Flute Long Neck Corner Radius End Mill  
with short shank for Hardened Steel and High accuracy cutting

**MHRSH430RSF**  
Example for MHRSH430RSF

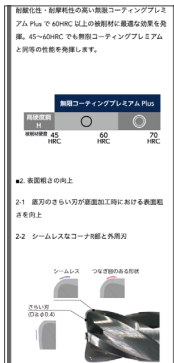
You can check disclosure information



Features

Size and Milling conditions

Video etc



Others



- Contact us by phone
- LinkedIn
- Twitter
- Facebook

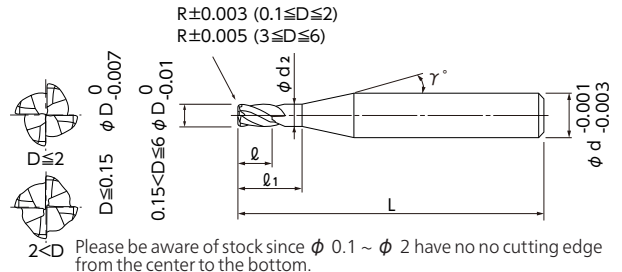
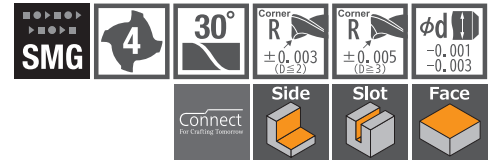
We will expand NS Tool Connect web service widely for future products

## MUGEN COATING PREMIUM Plus

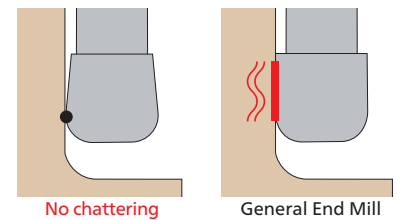
4-Flute Long Neck Corner Radius End Mill with short shank for Hardened Steel and High accuracy cutting

Total 205 sizes

Lineup extended up to  $\phi 6$ , combining specialized tool design and high accuracy corner R enhance finishing performance on hardened steels

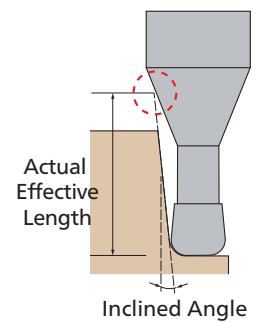


- MUGEN COATING PREMIUM Plus for hardened steels with strong back taper reduce chattering to realize long tool life and excellent finishing surface.
- 4-flute end mill for high efficiency machining.
- 4-Flute end mill has 205 sizes in total that lineup from the smallest diameter  $\phi 0.1$  to  $\phi 6$ .



### Work Material

Hardened Steel H	
45~60HRC	60~70HRC
○	◎



Unit [Size : mm]

Code No.	Dia. (D)	Corner Radius (R)	Under Neck Length ( $l_1$ )	Length of Cut ( $l$ )	Neck Dia. (d2)	Neck Taper Angle ( $\gamma$ )	Shank Dia. (d)	Overall Length (L)	Actual effective length depending on inclined angle of workpiece				
									30°	1°	1°30'	2°	3°
08-00239-01002	0.1	R0.01	0.2	0.08	0.085	15°	4	35	0.23	0.24	0.25	0.26	0.28
08-00239-01003			0.3	0.08	0.085	15°	4	35	0.33	0.35	0.36	0.37	0.4
08-00239-01503	0.15	R0.01	0.3	0.12	0.135	15°	4	35	0.33	0.35	0.36	0.37	0.4
08-00239-01505			0.5	0.12	0.135	15°	4	35	0.54	0.56	0.58	0.6	0.65
08-00239-01523		R0.02	0.3	0.12	0.135	15°	4	35	0.33	0.34	0.36	0.37	0.4
08-00239-01525			0.5	0.12	0.135	15°	4	35	0.54	0.56	0.58	0.6	0.65
08-00239-02203	0.2	R0.02	0.3	0.15	0.18	15°	4	35	0.34	0.35	0.37	0.38	0.41
08-00239-02205			0.5	0.15	0.18	15°	4	35	0.55	0.57	0.59	0.61	0.66
08-00239-02207			0.75	0.15	0.18	15°	4	35	0.81	0.84	0.87	0.9	0.97
08-00239-02210			1	0.15	0.18	15°	4	35	1.07	1.1	1.14	1.18	1.28
08-00239-02403		R0.05	0.3	0.15	0.18	15°	4	35	0.34	0.35	0.36	0.38	0.4
08-00239-02405			0.5	0.15	0.18	15°	4	35	0.55	0.57	0.59	0.61	0.65
08-00239-02407			0.75	0.15	0.18	15°	4	35	0.81	0.83	0.86	0.89	0.96
08-00239-02410			1	0.15	0.18	15°	4	35	1.07	1.1	1.14	1.18	1.27
08-00239-03205	0.3	R0.02	0.5	0.25	0.28	15°	4	35	0.55	0.57	0.59	0.61	0.66
08-00239-03207			0.75	0.25	0.28	15°	4	35	0.81	0.84	0.87	0.9	0.97
08-00239-03210			1	0.25	0.28	15°	4	35	1.07	1.1	1.14	1.18	1.28
08-00239-03215			1.5	0.25	0.28	15°	4	35	1.58	1.64	1.7	1.76	1.9
08-00239-03405		R0.05	0.5	0.25	0.28	15°	4	35	0.55	0.57	0.59	0.61	0.65
08-00239-03407			0.75	0.25	0.28	15°	4	35	0.81	0.83	0.86	0.89	0.96
08-00239-03410			1	0.25	0.28	15°	4	35	1.07	1.1	1.14	1.18	1.27
08-00239-03415			1.5	0.25	0.28	15°	4	35	1.58	1.64	1.69	1.76	1.89

### How to Order

When you order, indicate MHRSH430RSF (D)×(R)×( $l_1$ ). ※( $\gamma$ ) is reference value.

Unit [Size : mm]

Code No.	Dia. (D)	Corner Radius (R)	Under Neck Length ( $\ell_1$ )	Length of Cut ( $\ell$ )	Neck Dia. (d2)	Neck Taper Angle ( $\gamma$ )	Shank Dia. (d)	Overall Length (L)	Actual effective length depending on inclined angle of workpiece					
									30°	1°	1°30'	2°	3°	
08-00239-04205	0.4	R0.02	0.5	0.3	0.37	15°	4	35	0.57	0.59	0.61	0.63	0.68	
08-00239-04210			1	0.3	0.37	15°	4	35	1.09	1.12	1.16	1.21	1.3	
08-00239-04215			1.5	0.3	0.37	15°	4	35	1.6	1.66	1.72	1.78	1.92	
08-00239-04220			2	0.3	0.37	15°	4	35	2.12	2.19	2.27	2.36	2.55	
08-00239-04405		R0.05	0.5	0.3	0.37	15°	4	35	0.57	0.59	0.61	0.63	0.67	
08-00239-04410			1	0.3	0.37	15°	4	35	1.08	1.12	1.16	1.2	1.3	
08-00239-04415			1.5	0.3	0.37	15°	4	35	1.6	1.66	1.71	1.78	1.92	
08-00239-04420			2	0.3	0.37	15°	4	35	2.12	2.19	2.27	2.35	2.54	
08-00239-05210	0.5	R0.02	1	0.4	0.46	15°	4	35	1.11	1.14	1.18	1.23	1.33	
08-00239-05215			1.5	0.4	0.46	15°	4	35	1.62	1.68	1.74	1.8	1.95	
08-00239-05220			2	0.4	0.46	15°	4	35	2.14	2.21	2.29	2.38	2.57	
08-00239-05225			2.5	0.4	0.46	15°	4	35	2.66	2.75	2.85	2.95	3.19	
08-00239-05410		R0.05	1	0.4	0.46	15°	4	35	1.1	1.14	1.18	1.22	1.32	
08-00239-05415			1.5	0.4	0.46	15°	4	35	1.62	1.68	1.73	1.8	1.94	
08-00239-05420			2	0.4	0.46	15°	4	35	2.14	2.21	2.29	2.37	2.56	
08-00239-05425			2.5	0.4	0.46	15°	4	35	2.65	2.75	2.84	2.95	3.18	
08-00239-05510		R0.1	1	0.4	0.46	15°	4	35	1.1	1.14	1.18	1.22	1.31	
08-00239-05515			1.5	0.4	0.46	15°	4	35	1.62	1.67	1.73	1.79	1.93	
08-00239-05520			2	0.4	0.46	15°	4	35	2.14	2.21	2.28	2.37	2.55	
08-00239-05525			2.5	0.4	0.46	15°	4	35	2.65	2.74	2.84	2.94	3.17	
08-00239-06210	0.6	R0.02	1	0.5	0.56	15°	4	35	1.11	1.14	1.18	1.23	1.33	
08-00239-06220			2	0.5	0.56	15°	4	35	2.14	2.21	2.29	2.38	2.57	
08-00239-06230			3	0.5	0.56	15°	4	35	3.17	3.28	3.4	3.53	3.81	
08-00239-06410		R0.05	1	0.5	0.56	15°	4	35	1.1	1.14	1.18	1.22	1.32	
08-00239-06420			2	0.5	0.56	15°	4	35	2.14	2.21	2.29	2.37	2.56	
08-00239-06430			3	0.5	0.56	15°	4	35	3.17	3.28	3.4	3.52	3.81	
08-00239-06510		R0.1	1	0.5	0.56	15°	4	35	1.1	1.14	1.18	1.22	1.31	
08-00239-06520			2	0.5	0.56	15°	4	35	2.14	2.21	2.28	2.37	2.55	
08-00239-06530			3	0.5	0.56	15°	4	35	3.17	3.28	3.39	3.52	3.79	
08-00239-08202		0.8	R0.02	2	0.65	0.76	15°	4	35	2.14	2.21	2.29	2.38	2.57
08-00239-08203				3	0.65	0.76	15°	4	35	3.17	3.28	3.4	3.53	3.81
08-00239-08204				4	0.65	0.76	15°	4	35	4.21	4.35	4.51	4.68	5.06
08-00239-08402	R0.05		2	0.65	0.76	15°	4	35	2.14	2.21	2.29	2.37	2.56	
08-00239-08403			3	0.65	0.76	15°	4	35	3.17	3.28	3.4	3.52	3.81	
08-00239-08404			4	0.65	0.76	15°	4	35	4.21	4.35	4.51	4.67	5.05	
08-00239-08502	R0.1		2	0.65	0.76	15°	4	35	2.14	2.21	2.28	2.37	2.55	
08-00239-08503			3	0.65	0.76	15°	4	35	3.17	3.28	3.39	3.52	3.79	
08-00239-08504			4	0.65	0.76	15°	4	35	4.2	4.35	4.5	4.67	5.04	
08-00239-08602	R0.2		2	0.65	0.76	15°	4	35	2.13	2.2	2.27	2.35	2.53	
08-00239-08603			3	0.65	0.76	15°	4	35	3.17	3.27	3.38	3.5	3.77	
08-00239-08604			4	0.65	0.76	15°	4	35	4.2	4.34	4.49	4.65	5.01	
08-00239-10202	1		R0.02	2	0.8	0.95	15°	4	35	2.16	2.23	2.31	2.4	2.59
08-00239-10203				3	0.8	0.95	15°	4	35	3.19	3.3	3.42	3.55	3.84
08-00239-10204				4	0.8	0.95	15°	4	35	4.23	4.37	4.53	4.7	5.08
08-00239-10205				5	0.8	0.95	15°	4	40	5.26	5.44	5.64	5.85	6.32
08-00239-10402			R0.05	2	0.8	0.95	15°	4	35	2.16	2.23	2.31	2.39	2.59
08-00239-10403				3	0.8	0.95	15°	4	35	3.19	3.3	3.42	3.54	3.83
08-00239-10404		4		0.8	0.95	15°	4	35	4.22	4.37	4.53	4.69	5.07	
08-00239-10405		5		0.8	0.95	15°	4	40	5.26	5.44	5.63	5.84	6.31	
08-00239-10502		R0.1	2	0.8	0.95	15°	4	35	2.16	2.23	2.3	2.39	2.57	
08-00239-10503			3	0.8	0.95	15°	4	35	3.19	3.3	3.41	3.54	3.82	
08-00239-10504			4	0.8	0.95	15°	4	35	4.22	4.37	4.52	4.69	5.06	
08-00239-10505			5	0.8	0.95	15°	4	40	5.26	5.44	5.63	5.84	6.3	
08-00239-10602		R0.2	2	0.8	0.95	15°	4	35	2.15	2.22	2.29	2.37	2.55	
08-00239-10603			3	0.8	0.95	15°	4	35	3.19	3.29	3.4	3.52	3.79	
08-00239-10604			4	0.8	0.95	15°	4	35	4.22	4.36	4.51	4.67	5.04	
08-00239-10605			5	0.8	0.95	15°	4	40	5.25	5.43	5.62	5.82	6.28	

## MUGEN COATING PREMIUM Plus

4-Flute Long Neck Corner Radius End Mill with short shank for Hardened Steel and High accuracy cutting

Unit [Size : mm]

Code No.	Dia. (D)	Corner Radius (R)	Under Neck Length (ℓ1)	Length of Cut (ℓ)	Neck Dia. (d2)	Neck Taper Angle (γ)	Shank Dia. (d)	Overall Length (L)	Actual effective length depending on inclined angle of workpiece				
									30°	1°	1°30′	2°	3°
08-00239-10702	1	R0.3	2	0.8	0.95	15°	4	35	2.15	2.21	2.28	2.36	2.53
08-00239-10703			3	0.8	0.95	15°	4	35	3.18	3.28	3.39	3.51	3.77
08-00239-10704			4	0.8	0.95	15°	4	35	4.22	4.35	4.5	4.66	5.01
08-00239-10705			5	0.8	0.95	15°	4	40	5.25	5.42	5.61	5.81	6.26
08-00239-15203	1.5	R0.02	3	1.2	1.43	15°	4	35	3.23	3.34	3.46	3.59	3.88
08-00239-15204			4	1.2	1.43	15°	4	35	4.26	4.41	4.57	4.74	5.13
08-00239-15206			6	1.2	1.43	15°	4	40	6.33	6.55	6.79	7.04	7.61
08-00239-15208			8	1.2	1.43	15°	4	40	8.4	8.69	9	9.34	10.1
08-00239-15403		R0.05	3	1.2	1.43	15°	4	35	3.23	3.34	3.46	3.59	3.87
08-00239-15404			4	1.2	1.43	15°	4	35	4.26	4.41	4.57	4.74	5.12
08-00239-15406			6	1.2	1.43	15°	4	40	6.33	6.55	6.78	7.04	7.6
08-00239-15408			8	1.2	1.43	15°	4	40	8.4	8.69	9	9.34	10.09
08-00239-15503	R0.1	3	1.2	1.43	15°	4	35	3.23	3.34	3.45	3.58	3.86	
08-00239-15504		4	1.2	1.43	15°	4	35	4.26	4.41	4.56	4.73	5.11	
08-00239-15506		6	1.2	1.43	15°	4	40	6.33	6.55	6.78	7.03	7.59	
08-00239-15508		8	1.2	1.43	15°	4	40	8.4	8.69	9	9.33	10.08	
08-00239-15603		R0.2	3	1.2	1.43	15°	4	35	3.22	3.33	3.44	3.57	3.84
08-00239-15604			4	1.2	1.43	15°	4	35	4.26	4.4	4.55	4.72	5.08
08-00239-15606			6	1.2	1.43	15°	4	40	6.33	6.54	6.77	7.01	7.57
08-00239-15608			8	1.2	1.43	15°	4	40	8.39	8.68	8.98	9.31	10.06
08-00239-15703	R0.3	3	1.2	1.43	15°	4	35	3.22	3.32	3.43	3.55	3.82	
08-00239-15704		4	1.2	1.43	15°	4	35	4.25	4.39	4.54	4.7	5.06	
08-00239-15706		6	1.2	1.43	15°	4	40	6.32	6.53	6.76	7	7.55	
08-00239-15708		8	1.2	1.43	15°	4	40	8.39	8.67	8.97	9.3	10.03	
08-00239-15803	R0.5	3	1.2	1.43	15°	4	35	3.21	3.31	3.41	3.52	3.77	
08-00239-15804		4	1.2	1.43	15°	4	35	4.25	4.38	4.52	4.67	5.01	
08-00239-15806		6	1.2	1.43	15°	4	40	6.32	6.52	6.74	6.97	7.5	
08-00239-15808		8	1.2	1.43	15°	4	40	8.38	8.66	8.95	9.27	9.98	
08-00239-20204	2	R0.02	4	1.6	1.91	15°	4	35	4.3	4.45	4.61	4.78	5.17
08-00239-20206			6	1.6	1.91	15°	4	35	6.37	6.59	6.83	7.08	7.66
08-00239-20208			8	1.6	1.91	15°	4	40	8.44	8.73	9.05	9.38	10.14
08-00239-20210			10	1.6	1.91	15°	4	40	10.5	10.87	11.26	11.68	12.63
08-00239-20404		R0.05	4	1.6	1.91	15°	4	35	4.3	4.45	4.61	4.78	5.16
08-00239-20406			6	1.6	1.91	15°	4	35	6.37	6.59	6.83	7.08	7.65
08-00239-20408			8	1.6	1.91	15°	4	40	8.44	8.73	9.04	9.38	10.14
08-00239-20410			10	1.6	1.91	15°	4	40	10.5	10.87	11.26	11.68	12.62
08-00239-20504		R0.1	4	1.6	1.91	15°	4	35	4.3	4.45	4.6	4.77	5.15
08-00239-20506			6	1.6	1.91	15°	4	35	6.37	6.59	6.82	7.07	7.64
08-00239-20508			8	1.6	1.91	15°	4	40	8.43	8.73	9.04	9.37	10.13
08-00239-20510			10	1.6	1.91	15°	4	40	10.5	10.86	11.25	11.67	12.61
08-00239-20604		R0.2	4	1.6	1.91	15°	4	35	4.3	4.44	4.59	4.76	5.13
08-00239-20606			6	1.6	1.91	15°	4	35	6.36	6.58	6.81	7.06	7.62
08-00239-20608			8	1.6	1.91	15°	4	40	8.43	8.72	9.03	9.36	10.1
08-00239-20610			10	1.6	1.91	15°	4	40	10.5	10.86	11.24	11.66	12.59
08-00239-20704		R0.3	4	1.6	1.91	15°	4	35	4.29	4.43	4.58	4.74	5.11
08-00239-20706			6	1.6	1.91	15°	4	35	6.36	6.57	6.8	7.04	7.59
08-00239-20708			8	1.6	1.91	15°	4	40	8.43	8.71	9.02	9.34	10.08
08-00239-20710			10	1.6	1.91	15°	4	40	10.5	10.85	11.23	11.64	12.56
08-00239-20804		R0.5	4	1.6	1.91	15°	4	35	4.29	4.42	4.56	4.71	5.06
08-00239-20806			6	1.6	1.91	15°	4	35	6.35	6.56	6.78	7.01	7.54
08-00239-20808			8	1.6	1.91	15°	4	40	8.42	8.7	8.99	9.31	10.03
08-00239-20810			10	1.6	1.91	15°	4	40	10.49	10.84	11.21	11.61	12.52

### How to Order

When you order, indicate MHRSH430RSF (D)×(R)×(ℓ1). ※(γ) is reference value.



Unit [Size : mm]

Code No.	Dia. (D)	Corner Radius (R)	Under Neck Length (ℓ1)	Length of Cut (ℓ)	Neck Dia. (d2)	Neck Taper Angle (γ)	Shank Dia. (d)	Overall Length (L)	Actual effective length depending on inclined angle of workpiece					
									30°	1°	1°30'	2°	3°	
◆ 08-00239-30404	3	R0.05	4	2.5	2.85	15°	6	45	4.42	4.57	4.73	4.91	5.30	
◆ 08-00239-30406			6	2.5	2.85	15°	6	45	6.48	6.71	6.95	7.21	7.79	
◆ 08-00239-30408			8	2.5	2.85	15°	6	45	8.55	8.85	9.17	9.51	10.28	
◆ 08-00239-30410			10	2.5	2.85	15°	6	50	10.62	10.99	11.38	11.81	12.76	
◆ 08-00239-30412			12	2.5	2.85	15°	6	50	12.69	13.13	13.60	14.11	15.25	
◆ 08-00239-30415			15	2.5	2.85	15°	6	55	15.79	16.34	16.92	17.56	18.98	
◆ 08-00239-30504		R0.1	4	2.5	2.85	15°	6	45	4.42	4.57	4.73	4.90	5.29	
◆ 08-00239-30506			6	2.5	2.85	15°	6	45	6.48	6.71	6.94	7.20	7.78	
◆ 08-00239-30508			8	2.5	2.85	15°	6	45	8.55	8.84	9.16	9.50	10.26	
◆ 08-00239-30510			10	2.5	2.85	15°	6	50	10.62	10.98	11.38	11.80	12.75	
◆ 08-00239-30512			12	2.5	2.85	15°	6	50	12.68	13.12	13.59	14.10	15.24	
◆ 08-00239-30515			15	2.5	2.85	15°	6	55	15.79	16.33	16.92	17.55	18.97	
◆ 08-00239-30604		R0.2	4	2.5	2.85	15°	6	45	4.41	4.56	4.72	4.89	5.27	
◆ 08-00239-30606			6	2.5	2.85	15°	6	45	6.48	6.70	6.93	7.19	7.75	
◆ 08-00239-30608			8	2.5	2.85	15°	6	45	8.55	8.84	9.15	9.49	10.24	
◆ 08-00239-30610			10	2.5	2.85	15°	6	50	10.61	10.98	11.37	11.79	12.73	
◆ 08-00239-30612			12	2.5	2.85	15°	6	50	12.68	13.12	13.58	14.09	15.21	
◆ 08-00239-30615			15	2.5	2.85	15°	6	55	15.78	16.33	16.91	17.54	18.94	
◆ 08-00239-30704		R0.3	4	2.5	2.85	15°	6	45	4.41	4.55	4.71	4.87	5.24	
◆ 08-00239-30706			6	2.5	2.85	15°	6	45	6.48	6.69	6.92	7.17	7.73	
◆ 08-00239-30708			8	2.5	2.85	15°	6	45	8.54	8.83	9.14	9.47	10.22	
◆ 08-00239-30710			10	2.5	2.85	15°	6	50	10.61	10.97	11.36	11.77	12.70	
◆ 08-00239-30712			12	2.5	2.85	15°	6	50	12.68	13.11	13.57	14.07	15.19	
◆ 08-00239-30715			15	2.5	2.85	15°	6	55	15.78	16.32	16.90	17.52	18.92	
◆ 08-00239-30804		R0.5	4	2.5	2.85	15°	6	45	4.40	4.54	4.69	4.84	5.20	
◆ 08-00239-30806			6	2.5	2.85	15°	6	45	6.47	6.68	6.90	7.14	7.68	
◆ 08-00239-30808			8	2.5	2.85	15°	6	45	8.54	8.82	9.12	9.44	10.17	
◆ 08-00239-30810			10	2.5	2.85	15°	6	50	10.60	10.96	11.33	11.74	12.66	
◆ 08-00239-30812			12	2.5	2.85	15°	6	50	12.67	13.10	13.55	14.04	15.14	
◆ 08-00239-30815			15	2.5	2.85	15°	6	55	15.77	16.31	16.88	17.49	18.87	
◆ 08-00239-40508	4	R0.1	8	3.2	3.8	15°	6	45	8.65	8.94	9.26	9.61	10.38	
◆ 08-00239-40512			12	3.2	3.8	15°	6	50	12.78	13.22	13.70	14.21	15.35	
◆ 08-00239-40516			16	3.2	3.8	15°	6	55	16.92	17.50	18.13	18.81	Free	
◆ 08-00239-40520			20	3.2	3.8	15°	6	55	21.05	21.78	22.56	23.41	Free	
◆ 08-00239-40608		R0.2	8	3.2	3.8	15°	6	45	8.64	8.94	9.25	9.59	10.36	
◆ 08-00239-40612			12	3.2	3.8	15°	6	50	12.78	13.22	13.69	14.19	15.33	
◆ 08-00239-40616			16	3.2	3.8	15°	6	55	16.91	17.50	18.12	18.79	Free	
◆ 08-00239-40620			20	3.2	3.8	15°	6	55	21.05	21.77	22.55	23.39	Free	
◆ 08-00239-40708		R0.3	8	3.2	3.8	15°	6	45	8.64	8.93	9.24	9.58	10.33	
◆ 08-00239-40712			12	3.2	3.8	15°	6	50	12.77	13.21	13.68	14.18	15.31	
◆ 08-00239-40716			16	3.2	3.8	15°	6	55	16.91	17.49	18.11	18.78	Free	
◆ 08-00239-40720			20	3.2	3.8	15°	6	55	21.04	21.77	22.54	23.38	Free	
◆ 08-00239-40808		R0.5	8	3.2	3.8	15°	6	45	8.63	8.92	9.22	9.55	10.29	
◆ 08-00239-40812			12	3.2	3.8	15°	6	50	12.77	13.20	13.65	14.15	15.26	
◆ 08-00239-40816			16	3.2	3.8	15°	6	55	16.90	17.47	18.09	18.75	Free	
◆ 08-00239-40820			20	3.2	3.8	15°	6	55	21.04	21.75	22.52	23.35	Free	
◆ 08-00239-50515		5	R0.1	15	4	4.75	15°	6	50	15.98	16.53	17.13	Free	Free
◆ 08-00239-50520				20	4	4.75	15°	6	55	21.15	21.88	Free	Free	Free
◆ 08-00239-50615			R0.2	15	4	4.75	15°	6	50	15.98	16.53	17.12	Free	Free
◆ 08-00239-50620				20	4	4.75	15°	6	55	21.14	21.87	Free	Free	Free
◆ 08-00239-50715			R0.3	15	4	4.75	15°	6	50	15.97	16.52	17.10	Free	Free
◆ 08-00239-50720				20	4	4.75	15°	6	55	21.14	21.87	Free	Free	Free
◆ 08-00239-50815			R0.5	15	4	4.75	15°	6	50	15.97	16.50	17.08	Free	Free
◆ 08-00239-50820				20	4	4.75	15°	6	55	21.13	21.85	Free	Free	Free

## MUGEN COATING PREMIUM Plus

4-Flute Long Neck Corner Radius End Mill with short shank for Hardened Steel and High accuracy cutting

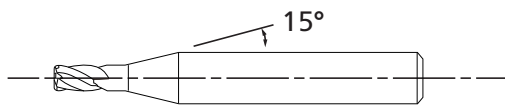
Unit [Size : mm]

Code No.	Dia. (D)	Corner Radius (R)	Under Neck Length ( $\varnothing 1$ )	Length of Cut ( $\varnothing$ )	Neck Dia. (d2)	Neck Taper Angle ( $\gamma$ )	Shank Dia. (d)	Overall Length (L)	Actual effective length depending on inclined angle of workpiece				
									30°	1°	1°30'	2°	3°
◆ 08-00239-60512	6	R0.1	12	5	5.7	-	6	45	Free	Free	Free	Free	Free
◆ 08-00239-60518			18	5	5.7	-	6	50	Free	Free	Free	Free	Free
◆ 08-00239-60524			24	5	5.7	-	6	60	Free	Free	Free	Free	Free
◆ 08-00239-60530			30	5	5.7	-	6	65	Free	Free	Free	Free	Free
◆ 08-00239-60612		R0.2	12	5	5.7	-	6	45	Free	Free	Free	Free	Free
◆ 08-00239-60618			18	5	5.7	-	6	50	Free	Free	Free	Free	Free
◆ 08-00239-60624			24	5	5.7	-	6	60	Free	Free	Free	Free	Free
◆ 08-00239-60630			30	5	5.7	-	6	65	Free	Free	Free	Free	Free
◆ 08-00239-60712		R0.3	12	5	5.7	-	6	45	Free	Free	Free	Free	Free
◆ 08-00239-60718			18	5	5.7	-	6	50	Free	Free	Free	Free	Free
◆ 08-00239-60724			24	5	5.7	-	6	60	Free	Free	Free	Free	Free
◆ 08-00239-60730			30	5	5.7	-	6	65	Free	Free	Free	Free	Free
◆ 08-00239-60812		R0.5	12	5	5.7	-	6	45	Free	Free	Free	Free	Free
◆ 08-00239-60818			18	5	5.7	-	6	50	Free	Free	Free	Free	Free
◆ 08-00239-60824			24	5	5.7	-	6	60	Free	Free	Free	Free	Free
◆ 08-00239-60830			30	5	5.7	-	6	65	Free	Free	Free	Free	Free
◆ 08-00239-60912		R1	12	5	5.7	-	6	45	Free	Free	Free	Free	Free
◆ 08-00239-60918			18	5	5.7	-	6	50	Free	Free	Free	Free	Free
◆ 08-00239-60924			24	5	5.7	-	6	60	Free	Free	Free	Free	Free
◆ 08-00239-60930			30	5	5.7	-	6	65	Free	Free	Free	Free	Free

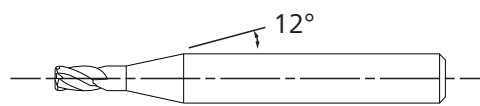
### How to Order

When you order, indicate MHRSH430RSF (D)×(R)×( $\varnothing 1$ ). ※( $\gamma$ ) is reference value.

Neck taper angle ( $\gamma$ ) of MHRSH430RSF is 15°. Our other products have a neck taper angle ( $\gamma$ ) of 12°.



MHRSH430RSF



Our other products have a neck taper angle ( $\gamma$ ) of 12°

## Recommended Milling Conditions

Work Material				High Speed Steels / Hardened Steels SKH51・SKD11 (~62HRC)				High Speed Steels SKH55・HAP40 (~66HRC)				High Speed Steels SKH57・HAP72 (~70HRC)				
Dia.	Corner Radius	Under Neck Length	L/D	Spindle Speed	Feed	Depth of Cut		Spindle Speed	Feed	Depth of Cut		Spindle Speed	Feed	Depth of Cut		
				min <sup>-1</sup>	mm/min	a <sub>p</sub> mm	a <sub>e</sub> mm	min <sup>-1</sup>	mm/min	a <sub>p</sub> mm	a <sub>e</sub> mm	min <sup>-1</sup>	mm/min	a <sub>p</sub> mm	a <sub>e</sub> mm	
0.1	0.01	0.2	2	40,000	200	0.002	0.01	40,000	150	0.002	0.01	40,000	120	0.002	0.01	
		0.3	3	40,000	160	0.002	0.01	40,000	120	0.002	0.01	40,000	90	0.002	0.01	
0.15	0.01	0.3	2	40,000	240	0.002	0.015	40,000	180	0.002	0.01	40,000	140	0.002	0.01	
		0.5	3.3	40,000	160	0.002	0.015	40,000	120	0.002	0.01	40,000	90	0.002	0.01	
	0.02	0.3	2	40,000	240	0.002	0.015	40,000	180	0.002	0.01	40,000	140	0.002	0.01	
		0.5	3.3	40,000	160	0.002	0.015	40,000	120	0.002	0.01	40,000	90	0.002	0.01	
0.2	0.02	0.3	1.5	30,000	360	0.003	0.02	30,000	280	0.003	0.01	30,000	220	0.003	0.01	
		0.5	2.5	30,000	320	0.003	0.02	30,000	240	0.003	0.01	30,000	180	0.003	0.01	
		0.75	3.8	30,000	270	0.003	0.02	30,000	190	0.003	0.01	30,000	150	0.003	0.01	
		1	5	30,000	240	0.002	0.02	30,000	160	0.002	0.01	30,000	120	0.002	0.01	
	0.05	0.3	1.5	30,000	360	0.003	0.02	30,000	280	0.003	0.01	30,000	220	0.003	0.01	
		0.5	2.5	30,000	320	0.003	0.02	30,000	240	0.003	0.01	30,000	180	0.003	0.01	
		0.75	3.8	30,000	270	0.003	0.02	30,000	190	0.003	0.01	30,000	150	0.003	0.01	
		1	5	30,000	240	0.003	0.02	30,000	160	0.003	0.01	30,000	120	0.003	0.01	
	0.3	0.02	0.5	1.7	30,000	600	0.003	0.04	30,000	500	0.003	0.03	30,000	400	0.003	0.03
			0.75	2.5	30,000	560	0.003	0.04	30,000	460	0.003	0.03	30,000	360	0.003	0.03
			1	3.3	30,000	500	0.003	0.04	30,000	400	0.003	0.03	30,000	300	0.003	0.03
			1.5	5	30,000	320	0.003	0.04	30,000	240	0.003	0.03	30,000	180	0.003	0.03
0.05		0.5	1.7	30,000	600	0.003	0.04	30,000	500	0.003	0.03	30,000	400	0.003	0.03	
		0.75	2.5	30,000	560	0.003	0.04	30,000	460	0.003	0.03	30,000	360	0.003	0.03	
		1	3.3	30,000	500	0.003	0.04	30,000	400	0.003	0.03	30,000	300	0.003	0.03	
		1.5	5	30,000	320	0.003	0.04	30,000	240	0.003	0.03	30,000	180	0.003	0.03	
0.4	0.02	0.5	1.3	28,000	760	0.005	0.05	25,000	650	0.004	0.04	22,000	480	0.004	0.04	
		1	2.5	28,000	700	0.005	0.05	25,000	600	0.004	0.04	22,000	450	0.004	0.04	
		1.5	3.8	28,000	600	0.005	0.05	25,000	520	0.004	0.04	22,000	390	0.004	0.04	
		2	5	25,000	500	0.005	0.05	25,000	440	0.003	0.04	22,000	330	0.003	0.04	
	0.05	0.5	1.3	28,000	760	0.005	0.05	25,000	650	0.005	0.04	22,000	480	0.005	0.04	
		1	2.5	28,000	700	0.005	0.05	25,000	600	0.005	0.04	22,000	450	0.005	0.04	
		1.5	3.8	28,000	600	0.005	0.05	25,000	520	0.005	0.04	22,000	390	0.005	0.04	
		2	5	25,000	500	0.005	0.05	25,000	440	0.005	0.04	22,000	330	0.005	0.04	
		0.5	1	2	23,000	900	0.006	0.1	20,000	800	0.004	0.08	18,000	600	0.004	0.08
			1.5	3	23,000	800	0.006	0.1	20,000	640	0.004	0.08	18,000	480	0.004	0.08
0.5	0.02	2	4	23,000	720	0.005	0.1	20,000	600	0.003	0.08	18,000	450	0.003	0.08	
		2.5	5	23,000	680	0.005	0.1	20,000	580	0.003	0.08	18,000	420	0.003	0.08	
		0.05	1	2	23,000	900	0.007	0.1	20,000	800	0.005	0.08	18,000	600	0.005	0.08
			1.5	3	23,000	800	0.007	0.1	20,000	640	0.005	0.08	18,000	480	0.005	0.08
	2		4	23,000	720	0.007	0.1	20,000	600	0.005	0.08	18,000	450	0.005	0.08	
	2.5		5	23,000	680	0.006	0.1	20,000	580	0.004	0.08	18,000	420	0.004	0.08	
	0.1	1	2	23,000	900	0.007	0.1	20,000	800	0.005	0.08	18,000	600	0.005	0.08	
		1.5	3	23,000	800	0.007	0.1	20,000	640	0.005	0.08	18,000	480	0.005	0.08	
		2	4	23,000	720	0.007	0.1	20,000	600	0.005	0.08	18,000	450	0.005	0.08	
		2.5	5	23,000	680	0.006	0.1	20,000	580	0.004	0.08	18,000	420	0.004	0.08	
	0.6	0.02	1	1.7	23,000	1,000	0.006	0.15	20,000	850	0.004	0.1	17,000	640	0.004	0.1
			2	3.3	23,000	800	0.006	0.15	20,000	640	0.004	0.1	17,000	480	0.004	0.1
3			5	23,000	700	0.005	0.15	20,000	600	0.003	0.1	17,000	450	0.003	0.1	
0.05		1	1.7	23,000	1,000	0.01	0.15	20,000	850	0.01	0.1	17,000	640	0.008	0.1	
		2	3.3	23,000	800	0.01	0.15	20,000	640	0.007	0.1	17,000	480	0.006	0.1	
		3	5	23,000	700	0.008	0.15	20,000	600	0.006	0.1	17,000	450	0.005	0.1	
0.1		1	1.7	23,000	1,000	0.01	0.15	20,000	850	0.01	0.1	17,000	640	0.008	0.1	
		2	3.3	23,000	800	0.01	0.15	20,000	640	0.007	0.1	17,000	480	0.006	0.1	
		3	5	23,000	700	0.008	0.15	20,000	600	0.006	0.1	17,000	450	0.005	0.1	

## Recommended Milling Conditions

Work Material				High Speed Steels / Hardened Steels SKH51・SKD11 (～62HRC)				High Speed Steels SKH55・HAP40 (～66HRC)				High Speed Steels SKH57・HAP72 (～70HRC)				
Dia.	Corner Radius	Under Neck Length	L/D	Spindle Speed	Feed	Depth of Cut		Spindle Speed	Feed	Depth of Cut		Spindle Speed	Feed	Depth of Cut		
				min <sup>-1</sup>	mm/min	a <sub>p</sub> mm	a <sub>e</sub> mm	min <sup>-1</sup>	mm/min	a <sub>p</sub> mm	a <sub>e</sub> mm	min <sup>-1</sup>	mm/min	a <sub>p</sub> mm	a <sub>e</sub> mm	
0.8	0.02	2	2.5	23,000	1,400	0.006	0.16	20,000	1,000	0.005	0.14	17,000	700	0.005	0.14	
		3	3.8	23,000	1,300	0.005	0.16	20,000	900	0.003	0.14	17,000	650	0.003	0.14	
		4	5	23,000	1,200	0.005	0.16	20,000	800	0.003	0.14	17,000	600	0.003	0.14	
	0.05	2	2.5	23,000	1,400	0.02	0.16	20,000	1,000	0.015	0.14	17,000	700	0.012	0.14	
		3	3.8	23,000	1,300	0.015	0.16	20,000	900	0.01	0.14	17,000	650	0.008	0.14	
		4	5	23,000	1,200	0.015	0.16	20,000	800	0.01	0.14	17,000	600	0.006	0.14	
	0.1	2	2.5	23,000	1,400	0.02	0.16	20,000	1,000	0.015	0.14	17,000	700	0.012	0.14	
		3	3.8	23,000	1,300	0.015	0.16	20,000	900	0.01	0.14	17,000	650	0.008	0.14	
		4	5	23,000	1,200	0.015	0.16	20,000	800	0.01	0.14	17,000	600	0.006	0.14	
	0.2	2	2.5	23,000	1,400	0.02	0.16	20,000	1,000	0.015	0.14	17,000	700	0.012	0.14	
		3	3.8	23,000	1,300	0.015	0.16	20,000	900	0.01	0.14	17,000	650	0.008	0.14	
		4	5	23,000	1,200	0.015	0.16	20,000	800	0.01	0.14	17,000	600	0.006	0.14	
1	0.02	2	2	21,000	2,000	0.01	0.25	17,000	1,400	0.008	0.2	15,000	1,000	0.005	0.2	
		3	3	20,000	1,800	0.01	0.25	16,000	1,300	0.008	0.2	14,000	900	0.005	0.2	
		4	4	18,000	1,500	0.008	0.25	14,000	1,100	0.005	0.2	12,000	750	0.003	0.2	
		5	5	16,000	1,400	0.005	0.25	13,000	1,000	0.003	0.2	11,000	650	0.003	0.2	
	0.05	2	2	21,000	2,000	0.04	0.25	17,000	1,400	0.03	0.2	15,000	1,000	0.018	0.2	
		3	3	20,000	1,800	0.04	0.25	16,000	1,300	0.03	0.2	14,000	900	0.018	0.2	
		4	4	18,000	1,500	0.03	0.25	14,000	1,100	0.02	0.2	12,000	750	0.012	0.2	
		5	5	16,000	1,400	0.02	0.25	13,000	1,000	0.01	0.2	11,000	650	0.006	0.2	
	0.1	2	2	21,000	2,000	0.04	0.25	17,000	1,400	0.03	0.2	15,000	1,000	0.018	0.2	
		3	3	20,000	1,800	0.04	0.25	16,000	1,300	0.03	0.2	14,000	900	0.018	0.2	
		4	4	18,000	1,500	0.03	0.25	14,000	1,100	0.02	0.2	12,000	750	0.012	0.2	
		5	5	16,000	1,400	0.02	0.25	13,000	1,000	0.01	0.2	11,000	650	0.006	0.2	
	0.2	2	2	21,000	2,000	0.04	0.25	17,000	1,400	0.03	0.2	15,000	1,000	0.018	0.2	
		3	3	20,000	1,800	0.04	0.25	16,000	1,300	0.03	0.2	14,000	900	0.018	0.2	
		4	4	18,000	1,500	0.03	0.25	14,000	1,100	0.02	0.2	12,000	750	0.012	0.2	
		5	5	16,000	1,400	0.02	0.25	13,000	1,000	0.01	0.2	11,000	650	0.006	0.2	
	0.3	2	2	21,000	2,000	0.04	0.25	17,000	1,400	0.03	0.2	15,000	1,000	0.018	0.2	
		3	3	20,000	1,800	0.04	0.25	16,000	1,300	0.03	0.2	14,000	900	0.018	0.2	
		4	4	18,000	1,500	0.03	0.25	14,000	1,100	0.02	0.2	12,000	750	0.012	0.2	
		5	5	16,000	1,400	0.02	0.25	13,000	1,000	0.01	0.2	11,000	650	0.006	0.2	
	1.5	0.02	3	2	20,000	2,000	0.01	0.4	16,000	1,400	0.008	0.3	14,000	1,000	0.006	0.3
			4	2.7	18,000	1,700	0.01	0.4	14,000	1,200	0.008	0.3	12,000	800	0.006	0.3
			6	4	16,000	1,500	0.008	0.4	13,000	1,100	0.005	0.3	11,000	750	0.004	0.3
			8	5.3	14,000	1,300	0.008	0.4	11,000	900	0.003	0.3	10,000	600	0.003	0.3
0.05		3	2	20,000	2,000	0.04	0.4	16,000	1,400	0.03	0.3	14,000	1,000	0.018	0.3	
		4	2.7	18,000	1,700	0.04	0.4	14,000	1,200	0.03	0.3	12,000	800	0.018	0.3	
		6	4	16,000	1,500	0.03	0.4	13,000	1,100	0.02	0.3	11,000	750	0.012	0.3	
		8	5.3	14,000	1,300	0.025	0.4	11,000	900	0.01	0.3	10,000	600	0.006	0.3	
0.1		3	2	20,000	2,000	0.04	0.4	16,000	1,400	0.03	0.3	14,000	1,000	0.018	0.3	
		4	2.7	18,000	1,700	0.04	0.4	14,000	1,200	0.03	0.3	12,000	800	0.018	0.3	
		6	4	16,000	1,500	0.03	0.4	13,000	1,100	0.02	0.3	11,000	750	0.012	0.3	
		8	5.3	14,000	1,300	0.025	0.4	11,000	900	0.01	0.3	10,000	600	0.006	0.3	
0.2		3	2	20,000	2,000	0.04	0.4	16,000	1,400	0.03	0.3	14,000	1,000	0.018	0.3	
		4	2.7	18,000	1,700	0.04	0.4	14,000	1,200	0.03	0.3	12,000	800	0.018	0.3	
		6	4	16,000	1,500	0.03	0.4	13,000	1,100	0.02	0.3	11,000	750	0.012	0.3	
		8	5.3	14,000	1,300	0.025	0.4	11,000	900	0.01	0.3	10,000	600	0.006	0.3	
0.3		3	2	20,000	2,000	0.04	0.4	16,000	1,400	0.03	0.3	14,000	1,000	0.018	0.3	
		4	2.7	18,000	1,700	0.04	0.4	14,000	1,200	0.03	0.3	12,000	800	0.018	0.3	
		6	4	16,000	1,500	0.03	0.4	13,000	1,100	0.02	0.3	11,000	750	0.012	0.3	
		8	5.3	14,000	1,300	0.025	0.4	11,000	900	0.01	0.3	10,000	600	0.006	0.3	
0.5		3	2	20,000	2,000	0.04	0.4	16,000	1,400	0.03	0.3	14,000	1,000	0.018	0.3	
		4	2.7	18,000	1,700	0.04	0.4	14,000	1,200	0.03	0.3	12,000	800	0.018	0.3	
		6	4	16,000	1,500	0.03	0.4	13,000	1,100	0.02	0.3	11,000	750	0.012	0.3	
		8	5.3	14,000	1,300	0.025	0.4	11,000	900	0.01	0.3	10,000	600	0.006	0.3	



## Recommended Milling Conditions

Work Material				High Speed Steels / Hardened Steels SKH51·SKD11 (~62HRC)				High Speed Steels SKH55·HAP40 (~66HRC)				High Speed Steels SKH57·HAP72 (~70HRC)			
Dia.	Corner Radius	Under Neck Length	L/D	Spindle Speed	Feed	Depth of Cut		Spindle Speed	Feed	Depth of Cut		Spindle Speed	Feed	Depth of Cut	
				min <sup>-1</sup>	mm/min	a <sub>p</sub> mm	a <sub>e</sub> mm	min <sup>-1</sup>	mm/min	a <sub>p</sub> mm	a <sub>e</sub> mm	min <sup>-1</sup>	mm/min	a <sub>p</sub> mm	a <sub>e</sub> mm
2	0.02	4	2	17,000	2,000	0.012	0.5	14,000	1,400	0.008	0.35	12,000	1,000	0.006	0.35
		6	3	15,000	1,800	0.012	0.5	12,000	1,200	0.008	0.35	11,000	900	0.006	0.35
		8	4	14,000	1,500	0.01	0.5	11,000	1,100	0.005	0.35	10,000	750	0.004	0.35
		10	5	12,000	1,300	0.01	0.5	10,000	1,000	0.003	0.35	9,000	650	0.003	0.35
	0.05	4	2	17,000	2,000	0.05	0.5	14,000	1,400	0.03	0.35	12,000	1,000	0.018	0.35
		6	3	15,000	1,800	0.05	0.5	12,000	1,200	0.03	0.35	11,000	900	0.018	0.35
		8	4	14,000	1,500	0.04	0.5	11,000	1,100	0.02	0.35	10,000	750	0.012	0.35
		10	5	12,000	1,300	0.04	0.5	10,000	1,000	0.02	0.35	9,000	650	0.012	0.35
	0.1	4	2	17,000	2,000	0.05	0.5	14,000	1,400	0.03	0.35	12,000	1,000	0.018	0.35
		6	3	15,000	1,800	0.05	0.5	12,000	1,200	0.03	0.35	11,000	900	0.018	0.35
		8	4	14,000	1,500	0.04	0.5	11,000	1,100	0.02	0.35	10,000	750	0.012	0.35
		10	5	12,000	1,300	0.04	0.5	10,000	1,000	0.02	0.35	9,000	650	0.012	0.35
	0.2	4	2	17,000	2,000	0.05	0.5	14,000	1,400	0.03	0.35	12,000	1,000	0.018	0.35
		6	3	15,000	1,800	0.05	0.5	12,000	1,200	0.03	0.35	11,000	900	0.018	0.35
		8	4	14,000	1,500	0.04	0.5	11,000	1,100	0.02	0.35	10,000	750	0.012	0.35
		10	5	12,000	1,300	0.04	0.5	10,000	1,000	0.02	0.35	9,000	650	0.012	0.35
	0.3	4	2	17,000	2,000	0.05	0.5	14,000	1,400	0.03	0.35	12,000	1,000	0.018	0.35
		6	3	15,000	1,800	0.05	0.5	12,000	1,200	0.03	0.35	11,000	900	0.018	0.35
		8	4	14,000	1,500	0.04	0.5	11,000	1,100	0.02	0.35	10,000	750	0.012	0.35
		10	5	12,000	1,300	0.04	0.5	10,000	1,000	0.02	0.35	9,000	650	0.012	0.35
0.5	4	2	17,000	2,000	0.05	0.5	14,000	1,400	0.03	0.35	12,000	1,000	0.018	0.35	
	6	3	15,000	1,800	0.05	0.5	12,000	1,200	0.03	0.35	11,000	900	0.018	0.35	
	8	4	14,000	1,500	0.04	0.5	11,000	1,100	0.02	0.35	10,000	750	0.012	0.35	
	10	5	12,000	1,300	0.04	0.5	10,000	1,000	0.02	0.35	9,000	650	0.012	0.35	
3	0.05	4	1.3	13,000	2,000	0.05	0.7	10,000	1,400	0.05	0.6	8,000	1,100	0.03	0.6
		6	2	11,500	1,700	0.05	0.7	9,500	1,300	0.05	0.6	7,500	1,000	0.03	0.6
		8	2.7	10,500	1,500	0.05	0.7	8,000	1,100	0.05	0.6	6,000	800	0.03	0.6
		10	3.3	10,000	1,350	0.05	0.7	7,500	1,000	0.05	0.6	6,000	750	0.03	0.6
		12	4	10,000	1,350	0.04	0.7	7,500	1,000	0.04	0.6	6,000	750	0.024	0.6
	0.1	4	1.3	13,000	2,000	0.07	0.7	10,000	1,400	0.05	0.6	8,000	1,100	0.03	0.6
		6	2	11,500	1,700	0.07	0.7	9,500	1,300	0.05	0.6	7,500	1,000	0.03	0.6
		8	2.7	10,500	1,500	0.07	0.7	8,000	1,100	0.05	0.6	6,000	800	0.03	0.6
		10	3.3	10,000	1,350	0.07	0.7	7,500	1,000	0.05	0.6	6,000	750	0.03	0.6
		12	4	10,000	1,350	0.06	0.7	7,500	1,000	0.04	0.6	6,000	750	0.024	0.6
	0.2	4	1.3	13,000	2,000	0.07	0.7	10,000	1,400	0.05	0.6	8,000	1,100	0.03	0.6
		6	2	11,500	1,700	0.07	0.7	9,500	1,300	0.05	0.6	7,500	1,000	0.03	0.6
		8	2.7	10,500	1,500	0.07	0.7	8,000	1,100	0.05	0.6	6,000	800	0.03	0.6
		10	3.3	10,000	1,350	0.07	0.7	7,500	1,000	0.05	0.6	6,000	750	0.03	0.6
		12	4	10,000	1,350	0.06	0.7	7,500	1,000	0.04	0.6	6,000	750	0.024	0.6
	0.3	4	1.3	13,000	2,000	0.07	0.7	10,000	1,400	0.05	0.6	8,000	1,100	0.03	0.6
		6	2	11,500	1,700	0.07	0.7	9,500	1,300	0.05	0.6	7,500	1,000	0.03	0.6
		8	2.7	10,500	1,500	0.07	0.7	8,000	1,100	0.05	0.6	6,000	800	0.03	0.6
		10	3.3	10,000	1,350	0.07	0.7	7,500	1,000	0.05	0.6	6,000	750	0.03	0.6
		12	4	10,000	1,350	0.06	0.7	7,500	1,000	0.04	0.6	6,000	750	0.024	0.6
0.5	4	1.3	13,000	2,000	0.07	0.7	10,000	1,400	0.05	0.6	8,000	1,100	0.03	0.6	
	6	2	11,500	1,700	0.07	0.7	9,500	1,300	0.05	0.6	7,500	1,000	0.03	0.6	
	8	2.7	10,500	1,500	0.07	0.7	8,000	1,100	0.05	0.6	6,000	800	0.03	0.6	
	10	3.3	10,000	1,350	0.07	0.7	7,500	1,000	0.05	0.6	6,000	750	0.03	0.6	
	12	4	10,000	1,350	0.06	0.7	7,500	1,000	0.04	0.6	6,000	750	0.024	0.6	
0.5	4	1.3	13,000	2,000	0.07	0.7	10,000	1,400	0.05	0.6	8,000	1,100	0.03	0.6	
	6	2	11,500	1,700	0.07	0.7	9,500	1,300	0.05	0.6	7,500	1,000	0.03	0.6	
	8	2.7	10,500	1,500	0.07	0.7	8,000	1,100	0.05	0.6	6,000	800	0.03	0.6	
	10	3.3	10,000	1,350	0.07	0.7	7,500	1,000	0.05	0.6	6,000	750	0.03	0.6	
	15	5	9,000	1,200	0.05	0.7	7,000	900	0.03	0.6	5,500	650	0.018	0.6	

## Recommended Milling Conditions

Work Material				High Speed Steels / Hardened Steels SKH51・SKD11 (~62HRC)				High Speed Steels SKH55・HAP40 (~66HRC)				High Speed Steels SKH57・HAP72 (~70HRC)			
Dia.	Corner Radius	Under Neck Length	L/D	Spindle Speed	Feed	Depth of Cut		Spindle Speed	Feed	Depth of Cut		Spindle Speed	Feed	Depth of Cut	
				min <sup>-1</sup>	mm/min	ap mm	ae mm	min <sup>-1</sup>	mm/min	ap mm	ae mm	min <sup>-1</sup>	mm/min	ap mm	ae mm
4	0.1	8	2	8,500	1,800	0.08	1	7,000	1,300	0.06	0.8	5,500	1,000	0.036	0.8
		12	3	8,500	1,800	0.07	1	7,000	1,300	0.05	0.8	5,500	1,000	0.03	0.8
		16	4	7,500	1,500	0.06	1	5,500	1,000	0.05	0.8	5,200	900	0.03	0.8
		20	5	6,000	1,200	0.06	1	4,500	800	0.05	0.8	4,000	650	0.03	0.8
	0.2	8	2	8,500	1,800	0.08	1	7,000	1,300	0.06	0.8	5,500	1,000	0.036	0.8
		12	3	8,500	1,800	0.07	1	7,000	1,300	0.05	0.8	5,500	1,000	0.03	0.8
		16	4	7,500	1,500	0.06	1	5,500	1,000	0.05	0.8	5,200	900	0.03	0.8
		20	5	6,000	1,200	0.06	1	4,500	800	0.05	0.8	4,000	650	0.03	0.8
	0.3	8	2	8,500	1,800	0.08	1	7,000	1,300	0.06	0.8	5,500	1,000	0.036	0.8
		12	3	8,500	1,800	0.07	1	7,000	1,300	0.05	0.8	5,500	1,000	0.03	0.8
		16	4	7,500	1,500	0.06	1	5,500	1,000	0.05	0.8	5,200	900	0.03	0.8
		20	5	6,000	1,200	0.06	1	4,500	800	0.05	0.8	4,000	650	0.03	0.8
0.5	8	2	8,500	1,800	0.08	1	7,000	1,300	0.06	0.8	5,500	1,000	0.036	0.8	
	12	3	8,500	1,800	0.07	1	7,000	1,300	0.05	0.8	5,500	1,000	0.03	0.8	
	16	4	7,500	1,500	0.06	1	5,500	1,000	0.05	0.8	5,200	900	0.03	0.8	
	20	5	6,000	1,200	0.06	1	4,500	800	0.05	0.8	4,000	650	0.03	0.8	
5	0.1	15	3	7,000	1,700	0.08	1.6	5,500	1,300	0.06	1.2	4,400	900	0.036	1.2
		20	4	6,000	1,400	0.07	1.6	5,000	1,100	0.05	1.2	4,000	750	0.03	1.2
	0.2	15	3	7,000	1,700	0.08	1.6	5,500	1,300	0.06	1.2	4,400	900	0.036	1.2
		20	4	6,000	1,400	0.07	1.6	5,000	1,100	0.05	1.2	4,000	750	0.03	1.2
	0.3	15	3	7,000	1,700	0.08	1.6	5,500	1,300	0.06	1.2	4,400	900	0.036	1.2
		20	4	6,000	1,400	0.07	1.6	5,000	1,100	0.05	1.2	4,000	750	0.03	1.2
	0.5	15	3	7,000	1,700	0.08	1.6	5,500	1,300	0.06	1.2	4,400	900	0.036	1.2
		20	4	6,000	1,400	0.07	1.6	5,000	1,100	0.05	1.2	4,000	750	0.03	1.2
6	0.1	12	2	5,500	1,800	0.08	2	4,500	1,400	0.06	1.5	3,600	1,000	0.036	1.5
		18	3	5,000	1,500	0.08	2	4,000	1,100	0.06	1.5	3,000	800	0.036	1.5
		24	4	4,500	1,300	0.07	2	3,500	900	0.05	1.5	2,700	700	0.036	1.5
		30	5	3,000	800	0.07	2	3,000	650	0.05	1.5	2,300	500	0.03	1.5
	0.2	12	2	5,500	1,800	0.08	2	4,500	1,400	0.06	1.5	3,600	1,000	0.036	1.5
		18	3	5,000	1,500	0.08	2	4,000	1,100	0.06	1.5	3,000	800	0.036	1.5
		24	4	4,500	1,300	0.07	2	3,500	900	0.05	1.5	2,700	700	0.036	1.5
		30	5	3,000	800	0.07	2	3,000	650	0.05	1.5	2,300	500	0.03	1.5
	0.3	12	2	5,500	1,800	0.08	2	4,500	1,400	0.06	1.5	3,600	1,000	0.036	1.5
		18	3	5,000	1,500	0.08	2	4,000	1,100	0.06	1.5	3,000	800	0.036	1.5
		24	4	4,500	1,300	0.07	2	3,500	900	0.05	1.5	2,700	700	0.036	1.5
		30	5	3,000	800	0.07	2	3,000	650	0.05	1.5	2,300	500	0.03	1.5
0.5	12	2	5,500	1,800	0.08	2	4,500	1,400	0.06	1.5	3,600	1,000	0.036	1.5	
	18	3	5,000	1,500	0.08	2	4,000	1,100	0.06	1.5	3,000	800	0.036	1.5	
	24	4	4,500	1,300	0.07	2	3,500	900	0.05	1.5	2,700	700	0.036	1.5	
	30	5	3,000	800	0.07	2	3,000	650	0.05	1.5	2,300	500	0.03	1.5	
1	12	2	5,500	1,800	0.08	2	4,500	1,400	0.06	1.5	3,600	1,000	0.036	1.5	
	18	3	5,000	1,500	0.08	2	4,000	1,100	0.06	1.5	3,000	800	0.036	1.5	
	24	4	4,500	1,300	0.07	2	3,500	900	0.05	1.5	2,700	700	0.036	1.5	
	30	5	3,000	800	0.07	2	3,000	650	0.05	1.5	2,300	500	0.03	1.5	

### Notes

- ※1 Depth of Cut : ap = Axial Depth of Cut / ae = Radial Depth of Cut.
- ※2 Adjust milling condition according to machine rigidity and clamp condition of work material.
- ※3 In case of chattering etc., please adjust cutting conditions if necessary.
- ※4 At point where cutting load is high such as at corners, pay attention to setting cutting conditions and tool paths particularly.
- ※5 Recommend to apply helical or ramping for approaching into axial direction.
- ※6 For slotting, recommend reciprocating milling by adjusting feed & ap in below 50% of recommended milling condition.
- ※7 Adjust both spindle speed and feed at the same rate.
- ※8 A shrink fit type is recommended for tool holder. When using collet type or others, strictly adhere to minimum gripping length.
- ※9 We recommend using oil mist coolant.

## SKH55 (64HRC) Two-stage pocket model

Achieved stable machining accuracy on hardened steels from the beginning to the end by long tool life

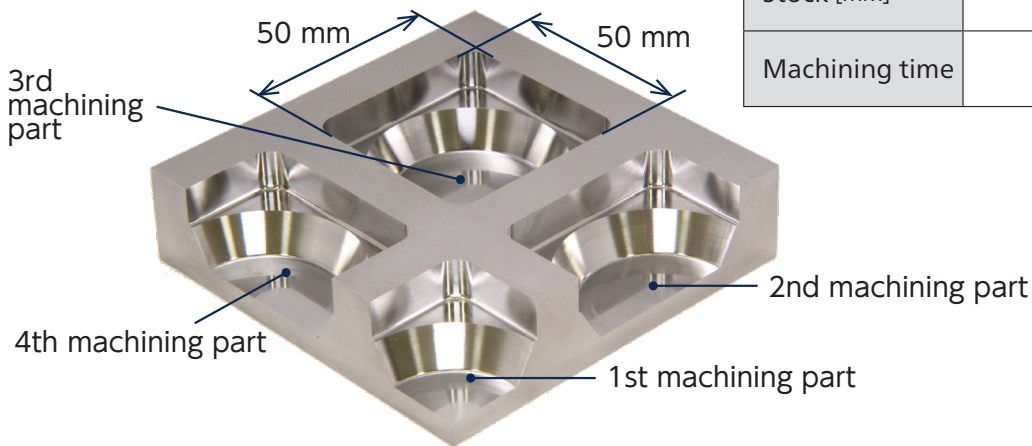
Work material : **SKH55 (64HRC)**

Work size : 100 × 100 × 25 mm  
(Machining depth 19 mm)

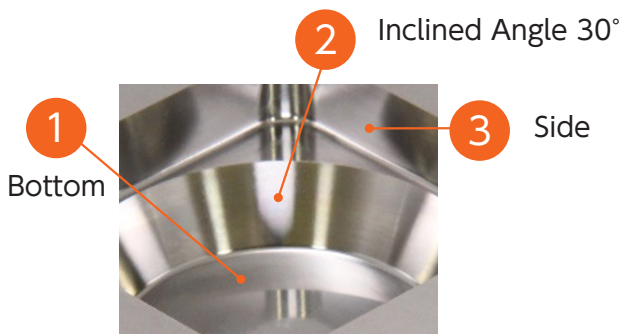
Coolant : Oil mist

Total machining time : 2hr 59min (Finishing only)

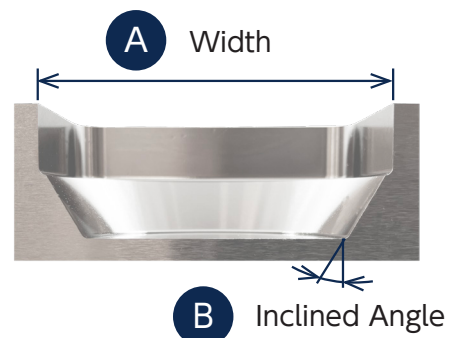
Process	Finishing (Side)	Finishing (Bottom)
Tool	MHRSH430RSF φ6 × R1 × 24	
Spindle speed [min <sup>-1</sup> ]	4,000	
Feed [mm/min]	600	
Depth of cut ap × ae [mm]	pf 0.1	pf 0.2
Stock [mm]	0.03	
Machining time	2 hr 59 min	



### Surface Roughness



### Accuracy



Measuring position		1	2	3
2nd	Ra [μm]	0.05	0.35	0.42
4th		0.06	0.49	0.28

Measuring position		A	B
Target		50.000 mm	30° 0' 0"
2nd	Actual	49.990 mm	30° 0' 43"
4th	Actual	49.983 mm	30° 0' 23"

# Machining case 2

## VANADIS23 (63HRC) Sealed mold

Realized stable dimension accuracy on machining hardened steels  
 By adopting wiper at the end cutting edge achieves high precision surface roughness on plane machining

Work material : **VANADIS23 (63HRC)**

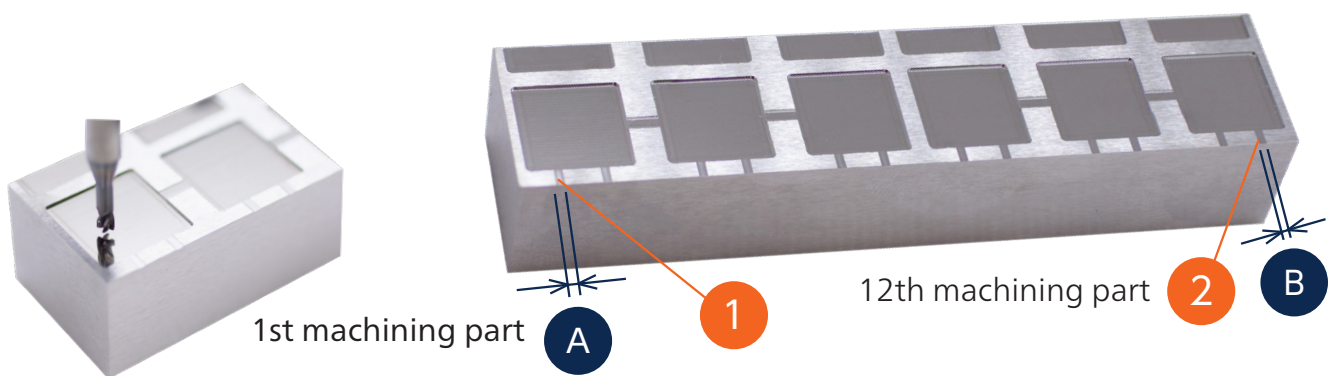
Work size : 20×90×15 mm (Machining depth 0.3 mm)

Coolant : Oil mist

Total machining time : 1hr 44min

Machining at air vent

Comparison between 1st and 12th places



### Surface Roughness

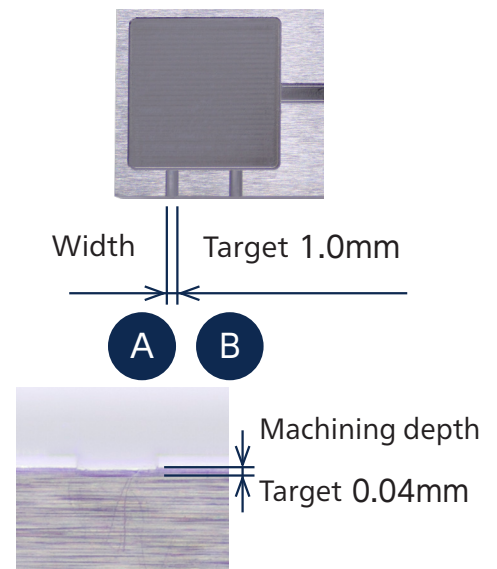
Measuring position	1	2
Ra [ $\mu\text{m}$ ]	0.055	0.066
Rz [ $\mu\text{m}$ ]	0.387	0.445

### Accuracy

Measuring position	Groove A		Groove B	
	Width	Depth	Width	Depth
After machining	1.001	0.039	0.999	0.041

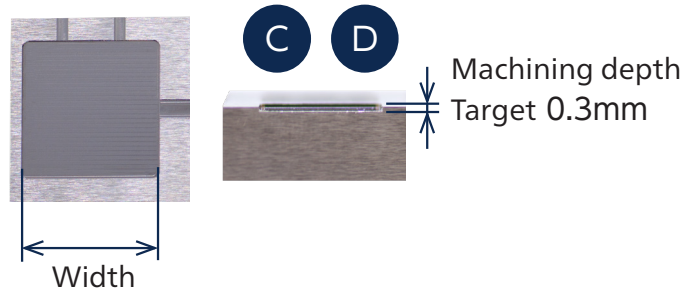
Unit [mm]

Process	Groove	
	Roughing	Finishing
Tool	MHRSH430RSF $\phi 0.8 \times R0.02 \times 2$	MHRSH430RSF $\phi 0.8 \times R0.02 \times 2$
Spindle speed [min <sup>-1</sup> ]	11,000	11,000
Feed [mm/min]	500	300
Depth of cut $a_p \times a_e$ [mm]	0.003×0.18	0.005×0.01 Side 0.003×0.2 Bottom
Stock [mm]	0.01 Side 0.003 Bottom	-
Machining time	3 min	4 min

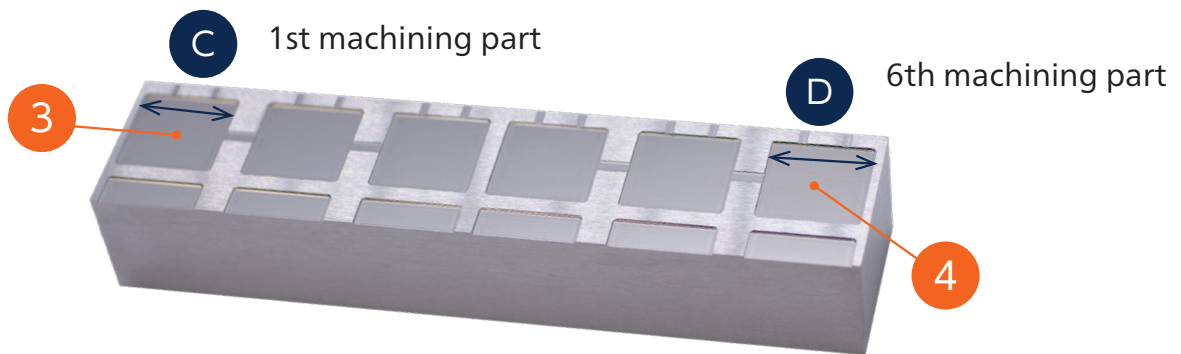




**Machining at cavity**  
Comparison between 1st and 6th places



Target 12.0mm



### Surface Roughness

Measuring position	3	4
Ra [ $\mu\text{m}$ ]	0.053	0.051
Rz [ $\mu\text{m}$ ]	0.370	0.336

### Accuracy

Unit [mm]

Measuring position	Cavity C		Cavity D	
	Width	Depth	Width	Depth
After machining	11.999	0.298	11.998	0.296

Process	Cavity				
	Roughing	Stock removal	Bottom Semi-finishing	Finishing	Corner finishing
Tool	MHRSH43ORSF $\phi 1.5 \times R0.1 \times 4$	MHRSH43ORSF $\phi 1 \times R0.05 \times 2$		MHRSH43ORSF $\phi 1 \times R0.05 \times 2$	
Spindle speed [ $\text{min}^{-1}$ ]	11,000	11,000		11,000	
Feed [mm/min]	800	800		800	800
Depth of cut $a_p \times a_e$ [mm]	$0.06 \times 0.3$	$0.01 \times 0.12$	ae 0.2	$0.01 \times 0.01$ Side $0.004 \times 0.2$ Bottom	$0.01 \times 0.05$
Stock [mm]	0.01 Side 0.004 Bottom	0.01 Side 0.004 Bottom	0.004 Bottom	-	-
Machining time	40 min	14 min	8 min	26 min	9 min

# Machining case 3

**HAP40 (64HRC)** Gear model

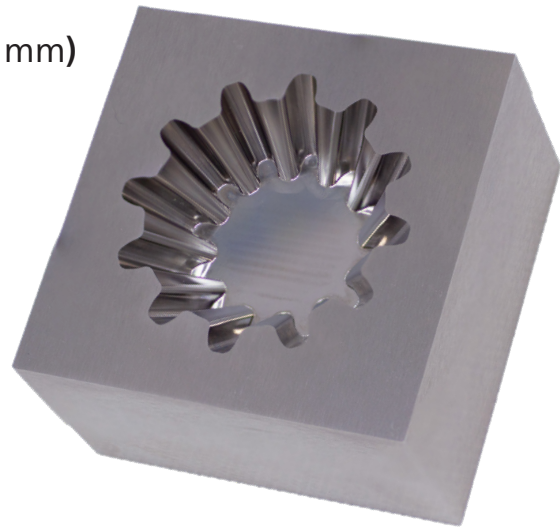
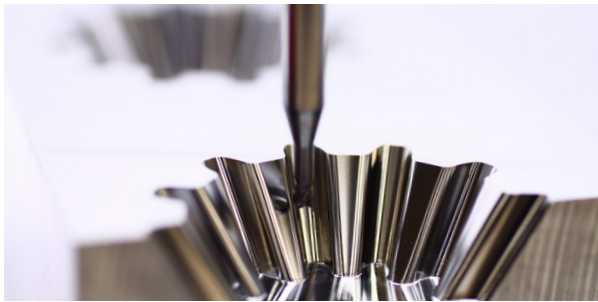
High precision tool design combines MUGEN COATING PREMIUM Plus extends tool life maintain high surface quality and accuracy even after long time machining

Work material : **HAP40 (64HRC)**

Work size : 50×50 mm (Machining depth 10 mm)

Coolant : Oil mist

Total machining time : 7hr 26min

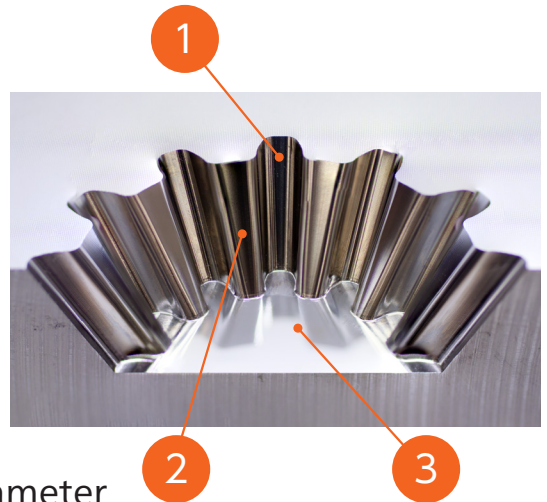


Process	Roughing※	Semi-finishing		Finishing	
		Bottom	Side	Bottom	Side
Tool	MHRSH430RSF φ2×R0.2×6	MHRSH430RSF φ2×R0.2×6		MHRSH430RSF φ2×R0.2×6	
Spindle speed [min <sup>-1</sup> ]	12,000	12,000		12,000	
Feed [mm/min]	1,300	650	1,300	650	1,300
Depth of cut ap × ae [mm]	0.04×0.5	pf 0.1	pf 0.08	pf 0.05	pf 0.04
Stock [mm]	0.03	0.01		-	
Machining time	4hr 25min	1hr 5min		1hr 56min	

※ Using 2 tools for roughing

## Surface Roughness

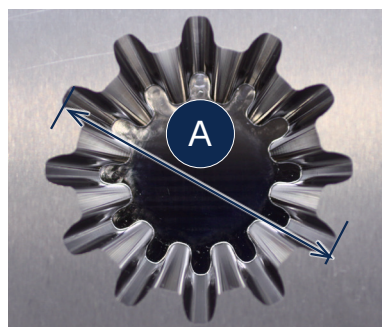
Measuring position	1	2	3
Ra [ $\mu\text{m}$ ]	0.189	0.228	0.036
Rz [ $\mu\text{m}$ ]	1.169	1.131	0.352



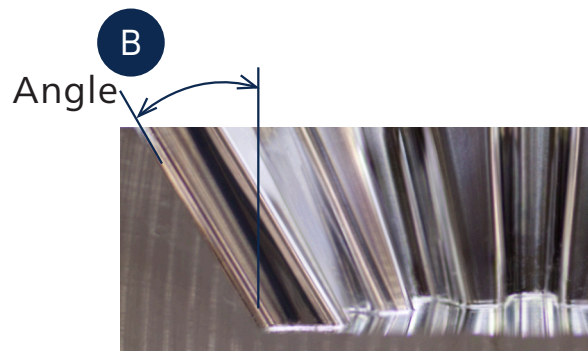
## Accuracy

Measuring position	A
Target	37.100 mm
Actual	37.099 mm
Error	0.001 mm

Tip circle diameter



Measuring position	B
Target	30°45'
Actual	30°44'48''
Error	0°0'12''



## Cutting edge condition after machining

	Roughing	Semi-finishing	Finishing
Bottom edge			
Peripheral cutting edge Rake face			

Realized stable machining on HAP40 (64HRC) for about 2 hours  
Maintain high accuracy with less wear even after semi-finishing and finishing

## NS TOOL CO.,LTD.

www.ns-tool.com

6F., Sumitomo Fudosan Oimachi Ekimae Bldg.,  
1-28-1 Oi, Shinagawa-ku, Tokyo 140-0014, Japan  
TEL. +81-3-3774-2459 FAX. +81-3-3774-2460

## NS TOOL USA, INC.

us.ns-tool.com

2265 Building # 3, Star CT.,  
Rochester Hills, MI 48309, USA  
TEL. +1-248-829-1960



### CAUTION

### Attention on Safety

- 1) When removing tools from cases, be careful of getting-out of tools and don't touch directly the cutting edges.
- 2) Never touch the cutting edges directly with bare hand.
- 3) Use safety covers and eye protection, as tools may be broken.
- 4) Use holders, etc. that match the tools and nature of the processing operations. The tool should be firmly attached to the holder to prevent shaking.
- 5) The work materials clamp firmly.
- 6) Make sure of dimensions of tools and work pieces before starting operation.
- 7) It is necessary to adjust conditions according to the dimensions of work materials and the machine.
- 8) Select a cutting fluid appropriate to the particular usage. Using a non-water cutting fluid could lead to fires due to sparks generated during processing or heat caused by breakage. Ensure that you take proper fire-prevention measures.
- 9) If abnormal sound, etc. occurs during processing, stop the machine immediately.
- 10) Don't modify tools.

113.17

22'12



Specifications may change without notice for improvement.