NS TOOL

For Crafting Tomorrow

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

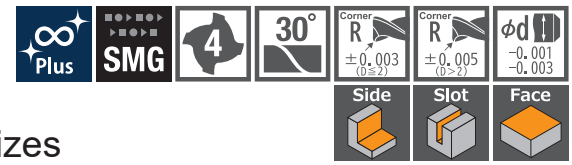
64 sizes added
Total 269 sizes



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



ϕ 0.1 × R0.01 ～ ϕ 6 × R1　　Total 269 sizes

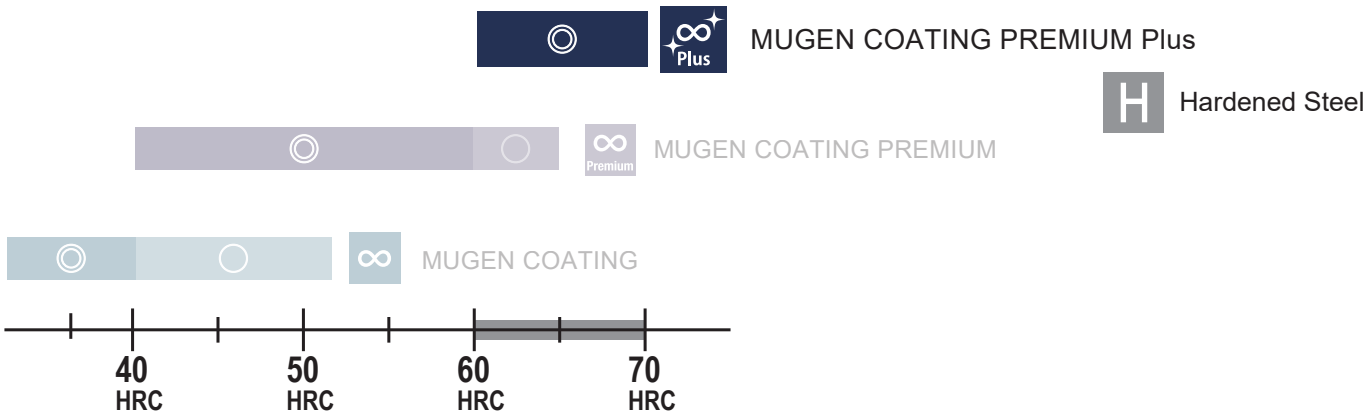


Features

Feature 1 — Long tool life — MUGEN COATING PREMIUM Plus

Optimized for machining hardened steels up to 60 to 70HRC

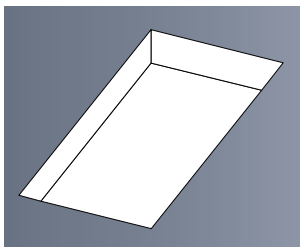
Range of NS TOOL original coating by work material hardness



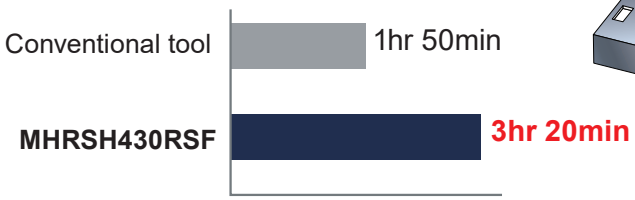
MUGEN COATING PREMIUM Plus with high oxidation resistance and abrasion resistance is suitable for machining above 60HRC.

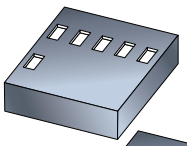
■ Tool life comparison with conventional product on roughing process

Work material ：DC53(60HRC)　Tool size ：φ2×R0.2×6

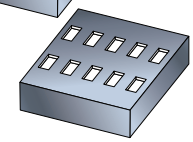


Tool life comparison





Stopped machining at the middle of the 6th pocket



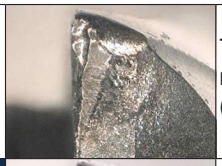
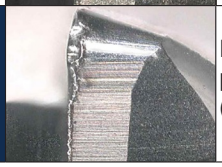
Stopped machining at the 10th pocket

Pocket size : 12 × 21 × 4 [mm]

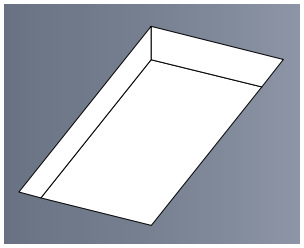
Cutting condition

Spindle speed [min^{-1}]	15,000
Feed [mm/min]	1,800
Depth of cut (ap×ae)[mm]	0.05 × 0.5
Coolant	Oil mist
Machining time	20 min / pc

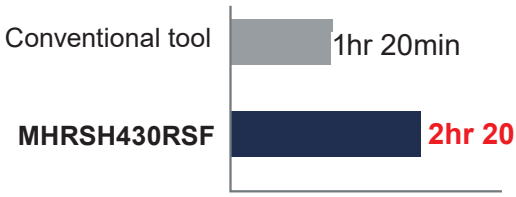
Tool wear comparison

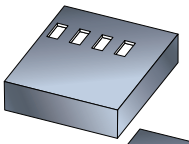
Conventional tool After 1hr 50min machining		Tool life reached its limit during machining of the 6th pocket (1hr 50min)
MHRSH430RSF After 2 hours machining		Further machining remained possible after the 6th pocket (2 hours)

Work material : HAP72(69HRC)　Tool size ：φ2×R0.2×6

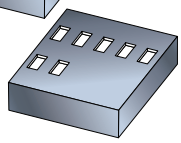


Tool life comparison





Stopped machining at the 4th pocket



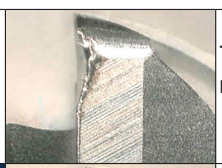
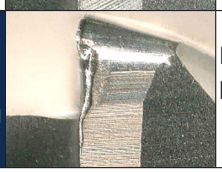
Stopped machining at the 7th pocket

Pocket size : 6 × 11 × 2.5 [mm]

Cutting condition

Spindle speed [min^{-1}]	9,600
Feed [mm/min]	1,000
Depth of cut (ap×ae)[mm]	0.018 × 0.35
Coolant	Oil mist
Machining time	20 min / pc

Tool wear comparison

Conventional tool After 1hr 20min machining		Tool life reached its limit during machining of the 4th pocket (1hr 20min)
MHRSH430RSF After 1hr 20min machining		Further machining remained possible after the 4th pocket (1hr 20min)

Specialized cutting edge and high precision corner R enhance finishing accuracy on hardened steels

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
ϕ 0.1×R0.01 ～ϕ 2×R0.5



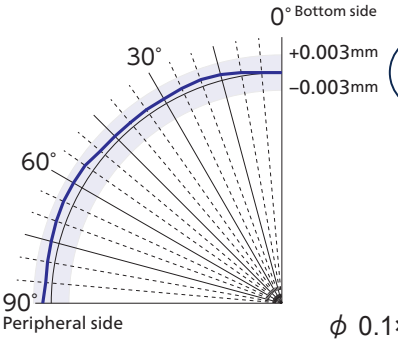
End tooth profile with center tooth
ϕ 3×R0.05 ～ϕ 6×R1

High accuracy corner R

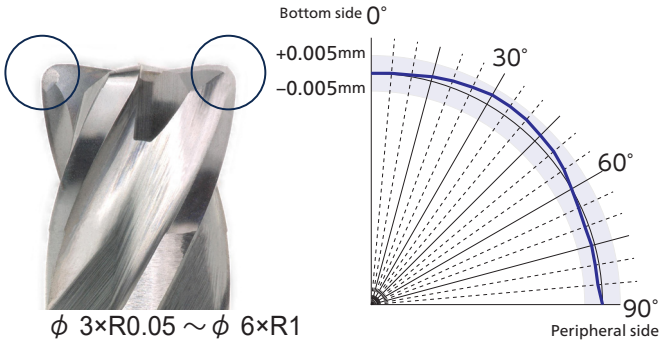


Wiper Strong back taper

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

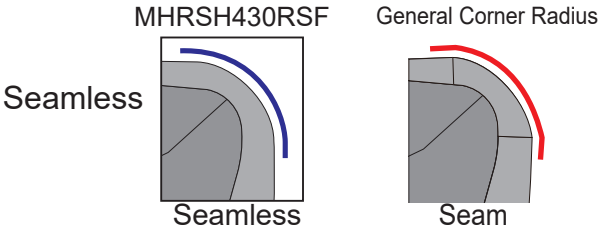


ϕ 0.1×R0.01 ～ϕ 2×R0.5
Corner Radius R ±0.003 mm

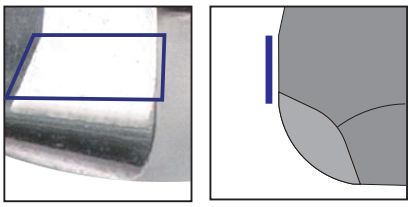


ϕ 3×R0.05 ～ϕ 6×R1
Corner Radius R ±0.005 mm

Corner R and peripheral cutting edge are seamlessly connected, and the smooth cutting edge improves the surface roughness on side machining (D≧ϕ0.4)



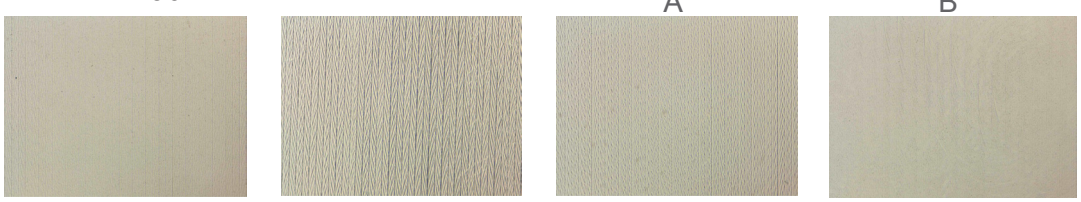
Improves surface roughness on bottom by wiper (D≧ϕ0.4)



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)
Tool size ϕ2×R0.2×6
Magnification rate ×400

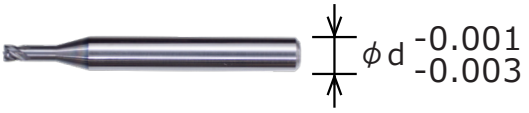


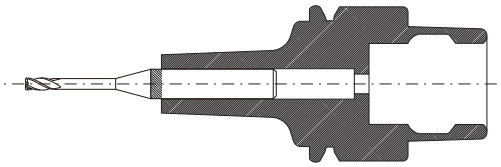
Feature 3 **Improved cutting accuracy** Optimal overhung length by high accuracy short shank

Realized high rigidity and high precision machining

MHRSH430RSF

High precision short shank
High rigidity with shrink fit chuck

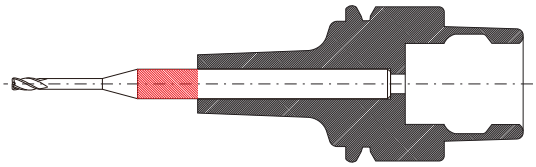




Conventional

Shank tolerance with wide range
long overhung caused lower tool rigidity

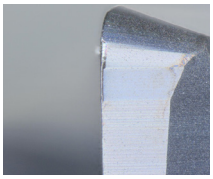




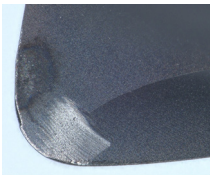
Surface roughness and wear after 60 mins machining

Tool: MHRSH430RSF φ2×R0.2×6
Work material: HAP40 (64HRC)
Spindle speed: 12,000 min^{-1}
Feed: 1,000 mm/min
Depth of cut: ap 0.02×ae 0.05 mm

Tool wear



End tooth
Frank wear width
0.023mm

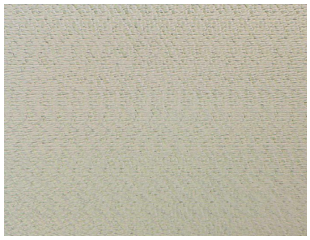




Corner R
R retreat amount
0.003mm

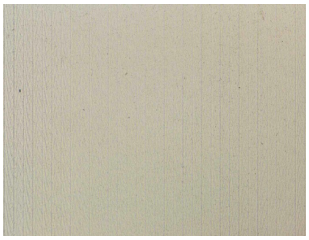
Surface roughness

1 Wall 0°



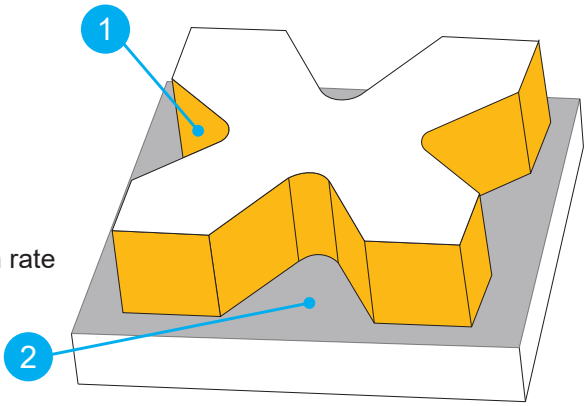
Ra 0.052μm

2 Bottom



Ra 0.010μm

Magnification rate
×400



MHRSH430RSF

Lineup Expansion

Size ϕ 0.1×R0.01 ～ ϕ 6×R1

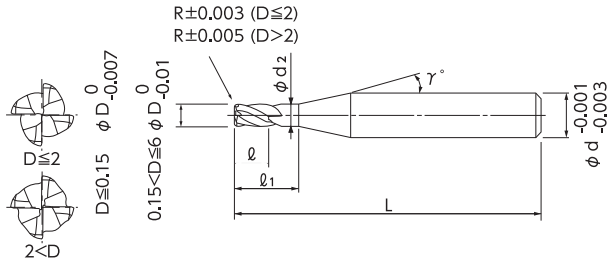
MUGEN COATING PREMIUM Plus

Total 269 sizes

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

Specialized cutting edge and high precision corner R
enhance finishing accuracy on hardened steels



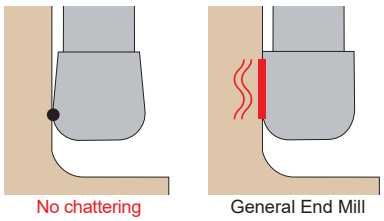


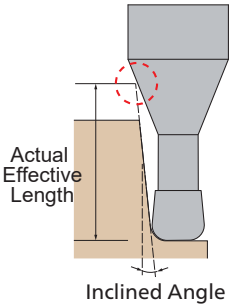
Please be aware of stock since ϕ 0.1- ϕ 2 sizes have no center cutting edge.

- 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 269 sizes in total that lineup from the smallest diameter ϕ 0.1 to ϕ 6.
- Shank diameter tolerance, high accuracy type, is - 0.001mm ～ - 0.003mm.

Work Material

Hardened Steel H
60～70HRC
◎





◆ Release in Dec, 2025.

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°
08-00239-01002	0.1	R0.01	**0.2**	0.08	0.085	15°	4	35	0.23	0.24	0.25	0.26	0.28
◆ 08-00239-01001			**0.25**	0.08	0.085	15°	4	35	0.28	0.29	0.3	0.31	0.34
08-00239-01003			**0.3**	0.08	0.085	15°	4	35	0.33	0.35	0.36	0.37	0.4
◆ 08-00239-01004			**0.4**	0.08	0.085	15°	4	35	0.44	0.45	0.47	0.49	0.52
◆ 08-00239-01005			**0.5**	0.08	0.085	15°	4	35	0.54	0.56	0.58	0.6	0.65
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
◆ 08-00239-01504			**0.4**	0.12	0.135	15°	4	35	0.44	0.45	0.47	0.49	0.52
08-00239-01505			**0.5**	0.12	0.135	15°	4	35	0.54	0.56	0.58	0.6	0.65
◆ 08-00239-01506			**0.6**	0.12	0.135	15°	4	35	0.64	0.67	0.69	0.72	0.77
◆ 08-00239-01507			**0.75**	0.12	0.135	15°	4	35	0.8	0.83	0.86	0.89	0.96
08-00239-01523		R0.02	**0.3**	0.12	0.135	15°	4	35	0.33	0.34	0.36	0.37	0.4
◆ 08-00239-01524			**0.4**	0.12	0.135	15°	4	35	0.44	0.45	0.47	0.48	0.52
08-00239-01525			**0.5**	0.12	0.135	15°	4	35	0.54	0.56	0.58	0.6	0.65
◆ 08-00239-01526			**0.6**	0.12	0.135	15°	4	35	0.64	0.67	0.69	0.71	0.77
◆ 08-00239-01527			**0.75**	0.12	0.135	15°	4	35	0.8	0.83	0.86	0.89	0.96
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
◆ 08-00239-02204			**0.4**	0.15	0.18	15°	4	35	0.45	0.46	0.48	0.49	0.53
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
◆ 08-00239-02404			**0.4**	0.15	0.18	15°	4	35	0.45	0.46	0.47	0.49	0.53
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

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°
	08-00239-03205	0.3	R0.02	0.5	0.25	0.28	15°	4	35	0.55	0.57	0.59	0.61	0.66
◆	08-00239-03206			0.6	0.25	0.28	15°	4	35	0.65	0.68	0.7	0.72	0.78
	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
◆	08-00239-03212			1.25	0.25	0.28	15°	4	35	1.32	1.37	1.42	1.47	1.59
	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
◆	08-00239-03406			0.6	0.25	0.28	15°	4	35	0.65	0.67	0.7	0.72	0.78
	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
◆	08-00239-03412			1.25	0.25	0.28	15°	4	35	1.32	1.37	1.42	1.47	1.58
	08-00239-03415			1.5	0.25	0.28	15°	4	35	1.58	1.64	1.69	1.76	1.89
	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
◆	08-00239-04207			0.75	0.3	0.37	15°	4	35	0.83	0.86	0.89	0.92	0.99
	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
◆	08-00239-04407			0.75	0.3	0.37	15°	4	35	0.83	0.85	0.88	0.91	0.99
	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
◆	08-00239-04505		R0.1	0.5	0.3	0.37	15°	4	35	0.57	0.58	0.6	0.62	0.66
◆	08-00239-04507			0.75	0.3	0.37	15°	4	35	0.82	0.85	0.88	0.91	0.97
◆	08-00239-04510			1	0.3	0.37	15°	4	35	1.08	1.12	1.15	1.19	1.28
◆	08-00239-04515			1.5	0.3	0.37	15°	4	35	1.6	1.65	1.71	1.77	1.91
◆	08-00239-04520			2	0.3	0.37	15°	4	35	2.12	2.19	2.26	2.34	2.53
	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
◆	08-00239-06215			1.5	0.5	0.56	15°	4	35	1.62	1.68	1.74	1.8	1.95
	08-00239-06220			2	0.5	0.56	15°	4	35	2.14	2.21	2.29	2.38	2.57
◆	08-00239-06225			2.5	0.5	0.56	15°	4	35	2.66	2.75	2.85	2.95	3.19
	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
◆	08-00239-06415			1.5	0.5	0.56	15°	4	35	1.62	1.68	1.73	1.8	1.94
	08-00239-06420			2	0.5	0.56	15°	4	35	2.14	2.21	2.29	2.37	2.56
◆	08-00239-06425			2.5	0.5	0.56	15°	4	35	2.65	2.75	2.84	2.95	3.18
	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
◆	08-00239-06515			1.5	0.5	0.56	15°	4	35	1.62	1.67	1.73	1.79	1.93
	08-00239-06520			2	0.5	0.56	15°	4	35	2.14	2.21	2.28	2.37	2.55
◆	08-00239-06525			2.5	0.5	0.56	15°	4	35	2.65	2.74	2.84	2.94	3.17
	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
◆	08-00239-08225			2.5	0.65	0.76	15°	4	35	2.66	2.75	2.85	2.95	3.19
	08-00239-08203			3	0.65	0.76	15°	4	35	3.17	3.28	3.4	3.53	3.81
◆	08-00239-08235			3.5	0.65	0.76	15°	4	35	3.69	3.82	3.95	4.1	4.43
	08-00239-08204			4	0.65	0.76	15°	4	35	4.21	4.35	4.51	4.68	5.06

MHRSH430RSF

Lineup Expansion

MUGEN COATING PREMIUM Plus

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

◆ Release in Dec, 2025.

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°
08-00239-08402	0.8	R0.05	2	0.65	0.76	15°	4	35	2.14	2.21	2.29	2.37	2.56
◆ 08-00239-08425			2.5	0.65	0.76	15°	4	35	2.65	2.75	2.84	2.95	3.18
08-00239-08403			3	0.65	0.76	15°	4	35	3.17	3.28	3.4	3.52	3.81
◆ 08-00239-08435			3.5	0.65	0.76	15°	4	35	3.69	3.82	3.95	4.1	4.43
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
◆ 08-00239-08525			2.5	0.65	0.76	15°	4	35	2.65	2.74	2.84	2.94	3.17
08-00239-08503			3	0.65	0.76	15°	4	35	3.17	3.28	3.39	3.52	3.79
◆ 08-00239-08535			3.5	0.65	0.76	15°	4	35	3.69	3.81	3.95	4.09	4.42
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
◆ 08-00239-08625			2.5	0.65	0.76	15°	4	35	2.65	2.74	2.83	2.93	3.15
08-00239-08603			3	0.65	0.76	15°	4	35	3.17	3.27	3.38	3.5	3.77
◆ 08-00239-08635			3.5	0.65	0.76	15°	4	35	3.68	3.8	3.94	4.08	4.39
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
08-00239-10702		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

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°
08-00239-20204	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
◆ 08-00239-25406	2.5	R0.05	6	2	2.39	15°	4	35	6.41	6.63	6.87	7.12	7.7
◆ 08-00239-25408			8	2	2.39	15°	4	40	8.47	8.77	9.08	9.42	10.18
◆ 08-00239-25410			10	2	2.39	15°	4	40	10.54	10.91	11.3	11.72	12.67
◆ 08-00239-25412			12	2	2.39	15°	4	40	12.61	13.05	13.52	14.02	Free
◆ 08-00239-25506		R0.1	6	2	2.39	15°	4	35	6.41	6.63	6.86	7.12	7.69
◆ 08-00239-25508			8	2	2.39	15°	4	40	8.47	8.77	9.08	9.42	10.17
◆ 08-00239-25510			10	2	2.39	15°	4	40	10.54	10.9	11.29	11.71	12.66
◆ 08-00239-25512			12	2	2.39	15°	4	40	12.61	13.04	13.51	14.01	Free
◆ 08-00239-25606		R0.2	6	2	2.39	15°	4	35	6.4	6.62	6.85	7.1	7.66
◆ 08-00239-25608			8	2	2.39	15°	4	40	8.47	8.76	9.07	9.4	10.15
◆ 08-00239-25610			10	2	2.39	15°	4	40	10.54	10.9	11.28	11.7	12.63
◆ 08-00239-25612			12	2	2.39	15°	4	40	12.6	13.04	13.5	14	Free
◆ 08-00239-25706		R0.3	6	2	2.39	15°	4	35	6.4	6.61	6.84	7.09	7.64
◆ 08-00239-25708			8	2	2.39	15°	4	40	8.47	8.75	9.06	9.39	10.12
◆ 08-00239-25710			10	2	2.39	15°	4	40	10.53	10.89	11.27	11.69	12.61
◆ 08-00239-25712			12	2	2.39	15°	4	40	12.6	13.03	13.49	13.99	Free
◆ 08-00239-25806		R0.5	6	2	2.39	15°	4	35	6.39	6.6	6.82	7.06	7.59
◆ 08-00239-25808			8	2	2.39	15°	4	40	8.46	8.74	9.04	9.36	10.08
◆ 08-00239-25810			10	2	2.39	15°	4	40	10.53	10.88	11.25	11.66	12.56
◆ 08-00239-25812			12	2	2.39	15°	4	40	12.59	13.02	13.47	13.96	Free
08-00239-30404	3	R0.05	4	2.5	2.85	15°	6	45	4.42	4.57	4.73	4.91	5.3
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	13.6	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	4.9	5.29
08-00239-30506			6	2.5	2.85	15°	6	45	6.48	6.71	6.94	7.2	7.78
08-00239-30508			8	2.5	2.85	15°	6	45	8.55	8.84	9.16	9.5	10.26
08-00239-30510			10	2.5	2.85	15°	6	50	10.62	10.98	11.38	11.8	12.75
08-00239-30512			12	2.5	2.85	15°	6	50	12.68	13.12	13.59	14.1	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	6.7	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

MHRSH430RSF

Lineup Expansion

MUGEN COATING PREMIUM Plus

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

◆ Release in Dec, 2025.

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°
08-00239-30704	3	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	12.7
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	16.9	17.52	18.92
08-00239-30804		R0.5	4	2.5	2.85	15°	6	45	4.4	4.54	4.69	4.84	5.2
08-00239-30806			6	2.5	2.85	15°	6	45	6.47	6.68	6.9	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	10.6	10.96	11.33	11.74	12.66
08-00239-30812			12	2.5	2.85	15°	6	50	12.67	13.1	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
◆ 08-00239-40408	4	R0.05	8	3.2	3.8	15°	6	45	8.65	8.95	9.27	9.62	10.39
◆ 08-00239-40412			12	3.2	3.8	15°	6	50	12.78	13.23	13.7	14.22	15.36
◆ 08-00239-40416			16	3.2	3.8	15°	6	55	16.92	17.51	18.14	18.81	Free
◆ 08-00239-40420			20	3.2	3.8	15°	6	55	21.05	21.78	22.57	23.41	Free
08-00239-40508		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	13.7	14.21	15.35
08-00239-40516			16	3.2	3.8	15°	6	55	16.92	17.5	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	17.5	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	13.2	13.65	14.15	15.26
08-00239-40816			16	3.2	3.8	15°	6	55	16.9	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
◆ 08-00239-50525			25	4	4.75	15°	6	55	26.32	27.23	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
◆ 08-00239-50625			25	4	4.75	15°	6	55	26.31	27.22	Free	Free	Free
08-00239-50715		R0.3	15	4	4.75	15°	6	50	15.97	16.52	17.1	Free	Free
08-00239-50720			20	4	4.75	15°	6	55	21.14	21.87	Free	Free	Free
◆ 08-00239-50725			25	4	4.75	15°	6	55	26.31	27.22	Free	Free	Free
08-00239-50815		R0.5	15	4	4.75	15°	6	50	15.97	16.5	17.08	Free	Free
08-00239-50820			20	4	4.75	15°	6	55	21.13	21.85	Free	Free	Free
◆ 08-00239-50825			25	4	4.75	15°	6	55	26.3	27.2	Free	Free	Free
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)×(ℓ1). ※(γ) is reference value.

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^{-1}	mm/min	a_p mm	a_e mm	min^{-1}	mm/min	a_p mm	a_e mm	min^{-1}	mm/min	a_p mm	a_e 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
		0.25	2.5	40,000	180	0.002	0.01	40,000	130	0.002	0.01	40,000	100	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
		0.4	4	40,000	140	0.001	0.01	40,000	100	0.001	0.01	40,000	70	0.001	0.01
		0.5	5	40,000	120	0.001	0.01	40,000	90	0.001	0.01	40,000	60	0.001	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
		0.4	2.7	40,000	200	0.002	0.015	40,000	150	0.002	0.01	40,000	110	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
		0.6	4	40,000	140	0.001	0.015	40,000	100	0.001	0.01	40,000	70	0.001	0.01
		0.75	5	40,000	120	0.001	0.015	40,000	90	0.001	0.01	40,000	60	0.001	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
		0.4	2.7	40,000	200	0.002	0.015	40,000	150	0.002	0.01	40,000	110	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
		0.6	4	40,000	140	0.001	0.015	40,000	100	0.001	0.01	40,000	70	0.001	0.01
		0.75	5	40,000	120	0.001	0.015	40,000	90	0.001	0.01	40,000	60	0.001	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
		0.4	2	30,000	340	0.003	0.02	30,000	260	0.003	0.01	30,000	200	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
		0.4	2	30,000	340	0.003	0.02	30,000	260	0.003	0.01	30,000	200	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
		0.6	2	30,000	580	0.003	0.04	30,000	480	0.003	0.03	30,000	380	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
		1.25	4.2	30,000	400	0.003	0.04	30,000	300	0.003	0.03	30,000	220	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
		0.6	2	30,000	580	0.003	0.04	30,000	480	0.003	0.03	30,000	380	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
		1.25	4.2	30,000	400	0.003	0.04	30,000	300	0.003	0.03	30,000	220	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
		0.75	1.9	28,000	730	0.005	0.05	25,000	620	0.004	0.04	22,000	460	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
		0.75	1.9	28,000	730	0.005	0.05	25,000	620	0.005	0.04	22,000	460	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
	0.1	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
		0.75	1.9	28,000	730	0.005	0.05	25,000	620	0.005	0.04	22,000	460	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	0.02	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
		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

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^{-1}	mm/min	a_p mm	a_e mm	min^{-1}	mm/min	a_p mm	a_e mm	min^{-1}	mm/min	a_p mm	a_e mm
0.5	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
		1.5	2.5	23,000	900	0.006	0.15	20,000	740	0.004	0.1	17,000	540	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
		2.5	4.2	23,000	750	0.005	0.15	20,000	620	0.003	0.1	17,000	460	0.003	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
		1.5	2.5	23,000	900	0.01	0.15	20,000	740	0.008	0.1	17,000	540	0.007	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
		2.5	4.2	23,000	750	0.009	0.15	20,000	620	0.006	0.1	17,000	460	0.005	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
		1.5	2.5	23,000	900	0.01	0.15	20,000	740	0.008	0.1	17,000	540	0.007	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
		2.5	4.2	23,000	750	0.009	0.15	20,000	620	0.006	0.1	17,000	460	0.005	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
0.8	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
		2.5	3.1	23,000	1,350	0.006	0.16	20,000	950	0.004	0.14	17,000	670	0.004	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
		3.5	4.4	23,000	1,250	0.005	0.16	20,000	850	0.003	0.14	17,000	620	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
		2.5	3.1	23,000	1,350	0.017	0.16	20,000	950	0.012	0.14	17,000	670	0.010	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
		3.5	4.4	23,000	1,250	0.015	0.16	20,000	850	0.01	0.14	17,000	620	0.007	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
		2.5	3.1	23,000	1,350	0.017	0.16	20,000	950	0.012	0.14	17,000	670	0.010	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
		3.5	4.4	23,000	1,250	0.015	0.16	20,000	850	0.01	0.14	17,000	620	0.007	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
		2.5	3.1	23,000	1,350	0.017	0.16	20,000	950	0.012	0.14	17,000	670	0.010	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
		3.5	4.4	23,000	1,250	0.015	0.16	20,000	850	0.01	0.14	17,000	620	0.007	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

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^{-1}	mm/min	a_p mm	a_e mm	min^{-1}	mm/min	a_p mm	a_e mm	min^{-1}	mm/min	a_p mm	a_e mm
1	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
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

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^{-1}	mm/min	a_p mm	a_e mm	min^{-1}	mm/min	a_p mm	a_e mm	min^{-1}	mm/min	a_p mm	a_e mm
2.5	0.05	6	2.4	14,000	1,800	0.05	0.5	12,000	1,300	0.03	0.5	9,000	900	0.018	0.5
		8	3.2	12,000	1,700	0.05	0.5	10,000	1,200	0.03	0.5	7,500	800	0.018	0.5
		10	4	11,000	1,500	0.04	0.5	9,000	1,100	0.03	0.5	7,000	750	0.018	0.5
		12	4.8	10,000	1,300	0.03	0.5	8,000	1,000	0.02	0.5	6,700	650	0.012	0.5
	0.1	6	2.4	14,000	1,800	0.06	0.5	12,000	1,300	0.03	0.5	9,000	900	0.018	0.5
		8	3.2	12,000	1,700	0.05	0.5	10,000	1,200	0.03	0.5	7,500	800	0.018	0.5
		10	4	11,000	1,500	0.05	0.5	9,000	1,100	0.03	0.5	7,000	750	0.018	0.5
		12	4.8	10,000	1,300	0.04	0.5	8,000	1,000	0.02	0.5	6,700	650	0.012	0.5
	0.2	6	2.4	14,000	1,800	0.06	0.5	12,000	1,300	0.03	0.5	9,000	900	0.018	0.5
		8	3.2	12,000	1,700	0.05	0.5	10,000	1,200	0.03	0.5	7,500	800	0.018	0.5
		10	4	11,000	1,500	0.05	0.5	9,000	1,100	0.03	0.5	7,000	750	0.018	0.5
		12	4.8	10,000	1,300	0.04	0.5	8,000	1,000	0.02	0.5	6,700	650	0.012	0.5
	0.3	6	2.4	14,000	1,800	0.06	0.5	12,000	1,300	0.03	0.5	9,000	900	0.018	0.5
		8	3.2	12,000	1,700	0.05	0.5	10,000	1,200	0.03	0.5	7,500	800	0.018	0.5
		10	4	11,000	1,500	0.05	0.5	9,000	1,100	0.03	0.5	7,000	750	0.018	0.5
		12	4.8	10,000	1,300	0.04	0.5	8,000	1,000	0.02	0.5	6,700	650	0.012	0.5
	0.5	6	2.4	14,000	1,800	0.06	0.5	12,000	1,300	0.03	0.5	9,000	900	0.018	0.5
		8	3.2	12,000	1,700	0.05	0.5	10,000	1,200	0.03	0.5	7,500	800	0.018	0.5
		10	4	11,000	1,500	0.05	0.5	9,000	1,100	0.03	0.5	7,000	750	0.018	0.5
		12	4.8	10,000	1,300	0.04	0.5	8,000	1,000	0.02	0.5	6,700	650	0.012	0.5
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
		15	5	9,000	1,200	0.03	0.7	7,000	900	0.03	0.6	5,500	650	0.018	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
		15	5	9,000	1,200	0.05	0.7	7,000	900	0.03	0.6	5,500	650	0.018	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
		15	5	9,000	1,200	0.05	0.7	7,000	900	0.03	0.6	5,500	650	0.018	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
		15	5	9,000	1,200	0.05	0.7	7,000	900	0.03	0.6	5,500	650	0.018	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
		15	5	9,000	1,200	0.05	0.7	7,000	900	0.03	0.6	5,500	650	0.018	0.6
4	0.05	8	2	8,500	1,800	0.07	1	7,000	1,300	0.06	0.8	5,500	1,000	0.03	0.8
		12	3	8,500	1,800	0.06	1	7,000	1,300	0.05	0.8	5,500	1,000	0.03	0.8
		16	4	7,500	1,500	0.05	1	5,500	1,000	0.05	0.8	5,200	900	0.024	0.8
		20	5	6,000	1,200	0.04	1	4,500	800	0.04	0.8	4,000	650	0.018	0.8
	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

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^{-1}	mm/min	a_p mm	a_e mm	min^{-1}	mm/min	a_p mm	a_e mm	min^{-1}	mm/min	a_p mm	a_e mm
4	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
		25	5	4,800	1,100	0.06	1.6	4,000	900	0.05	1.2	3,200	550	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
		25	5	4,800	1,100	0.06	1.6	4,000	900	0.05	1.2	3,200	550	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
		25	5	4,800	1,100	0.06	1.6	4,000	900	0.05	1.2	3,200	550	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
		25	5	4,800	1,100	0.06	1.6	4,000	900	0.05	1.2	3,200	550	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：a_p = Axial Depth of Cut / a_e = 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 & a_p 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.

Machining case 1

Sealed mold　VANADIS23 (63HRC)

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

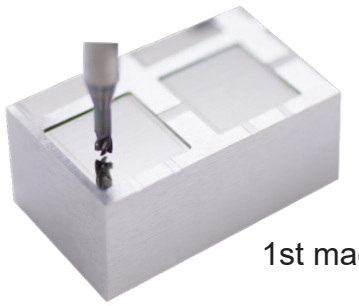
Work material : VANADIS23 (63HRC)

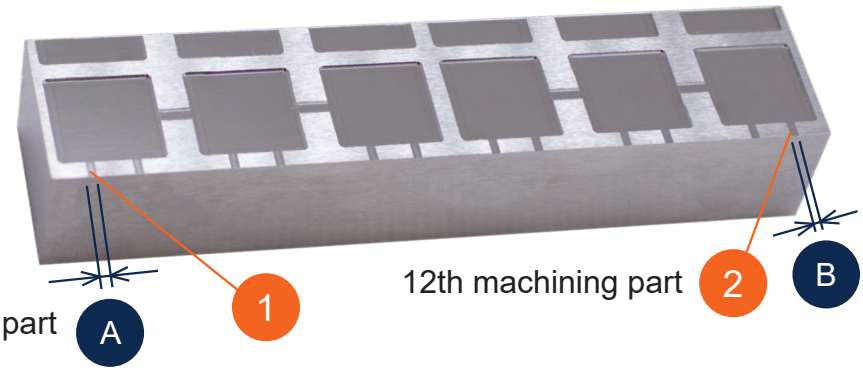
Work size : 20×90×15 mm (Machining depth 0.3 mm)

Coolant : Oil mist

Total machining time : 1hr 44min

Machining at air vent
Comparison between 1st and 12th places





Surface Roughness

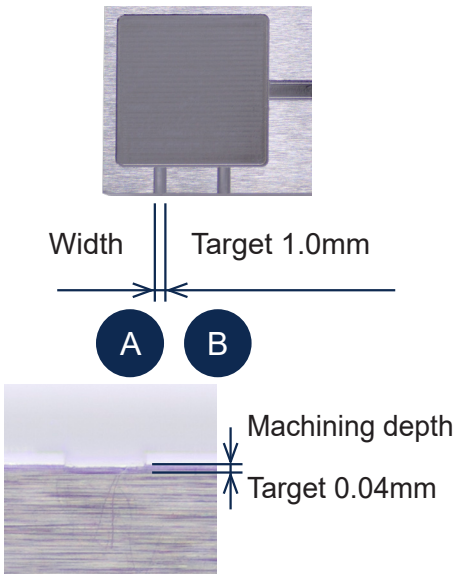
Measuring position	1	2
Ra [μm]	0.055	0.066
Rz [μm]	0.387	0.445

Accuracy

Unit [mm]

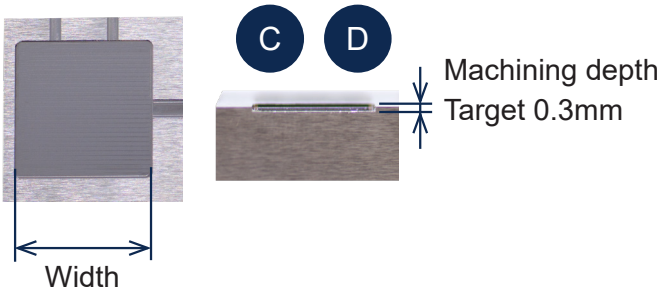
Measuring position	Slot A		Slot B	
	Width	Depth	Width	Depth
After machining	1.001	0.039	0.999	0.041

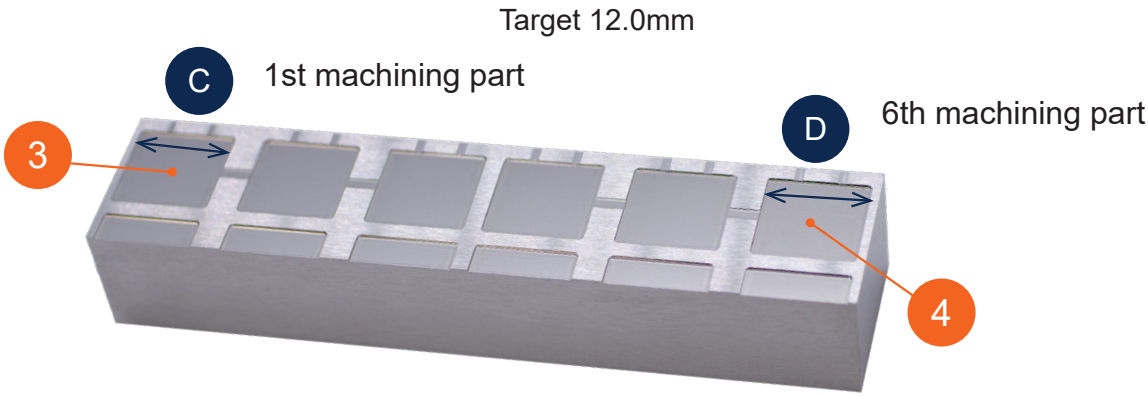
Process	Slot	
	Roughing	Finishing
Tool	MHRSH430RSF ϕ 0.8×R0.02×2	MHRSH430RSF ϕ 0.8×R0.02×2
Spindle speed [min^{-1}]	11,000	11,000
Feed [mm/min]	500	300
Depth of cut $a_p \times a_e$ [mm]	0.003×0.18	0.005×0.01 Side 0.003×0.2 Bottom
Stock [mm]	0.01 Side 0.003 Bottom	-
Machining time	3 min	4 min



Machining at cavity

Comparison between 1st and 6th places





Surface Roughness

Measuring position	3	4
Ra [μm]	0.053	0.051
Rz [μm]	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	MHRSH430RSF ϕ 1.5×R0.1×4	MHRSH430RSF ϕ 1×R0.05×2		MHRSH430RSF ϕ 1×R0.05×2	
Spindle speed [min^{-1}]	11,000	11,000		11,000	
Feed [mm/min]	800	800		800	800
Depth of cut ap × ae [mm]	0.06×0.3	0.01×0.12	ae 0.2	0.01×0.01 Side 0.004×0.2 Bottom	0.01×0.05
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 2

Gear model　HAP40 (64HRC)

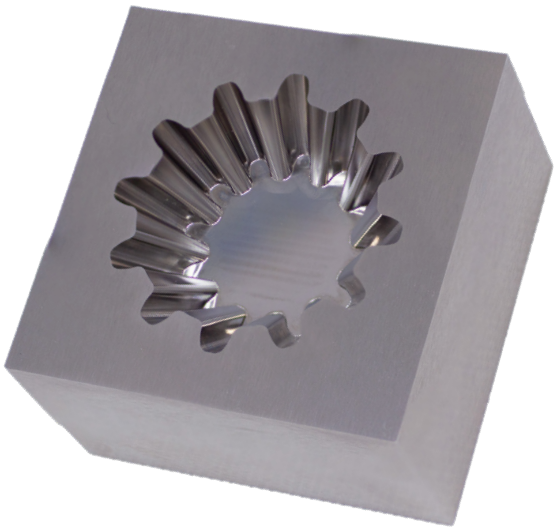
High precision tool design combines MUGEN COATING PREMIUM Plus extends tool life maintain high surface quality and accuracy even after long time machining

Work material： HAP40 (64HRC)

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

Coolant：Oil mist

Total machining time： 7hr 26min



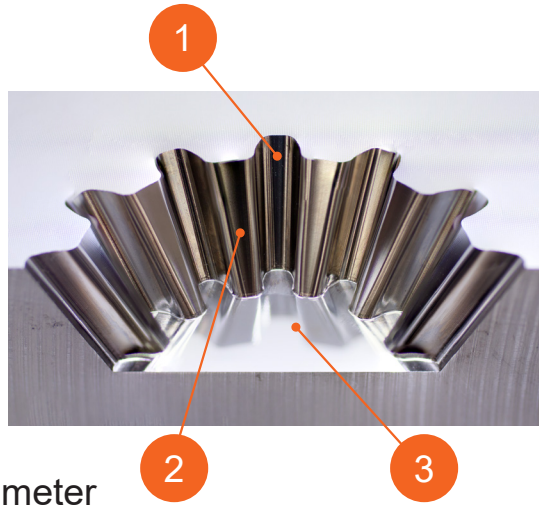


Process	Roughing※	Semi-finishing		Finishing	
		Bottom	Side	Bottom	Side
Tool	MHRSH430RSF ϕ 2×R0.2×6	MHRSH430RSF ϕ 2×R0.2×6		MHRSH430RSF ϕ 2×R0.2×6	
Spindle speed [min^{-1}]	12,000	12,000		12,000	
Feed [mm/min]	1,300	650	1,300	650	1,300
Depth of cut ap × ae [mm]	0.04×0.5	pf 0.1	pf 0.08	pf 0.05	pf 0.04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

※　Using 2 tools for roughing

Surface Roughness

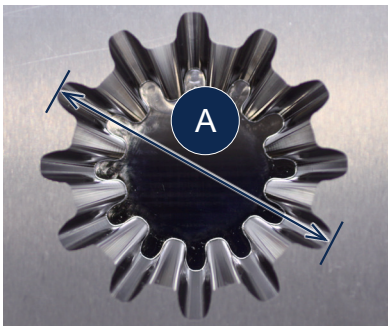
Measuring position	1	2	3
Ra [μm]	0.189	0.228	0.036
Rz [μm]	1.169	1.131	0.352



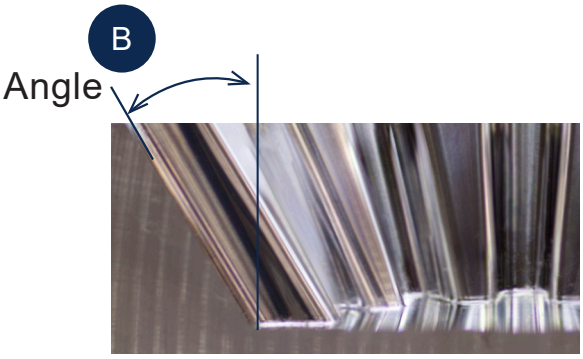
Accuracy

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

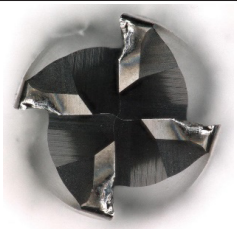
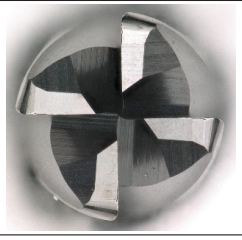
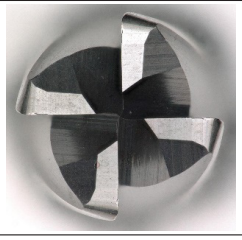
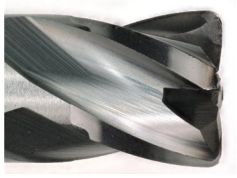
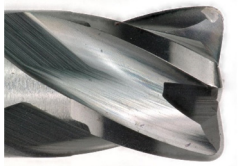
Tip circle diameter



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

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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.

ISO 9001 JQA-QM6096 ISO 14001 JQA-EM3712

26'01

MHRSH430RSF_C1_202601_EN_A

■ Specifications may change without notice for improvement.
■ This print uses environmentally friendly inks.