NS TOOL

CORE LINE

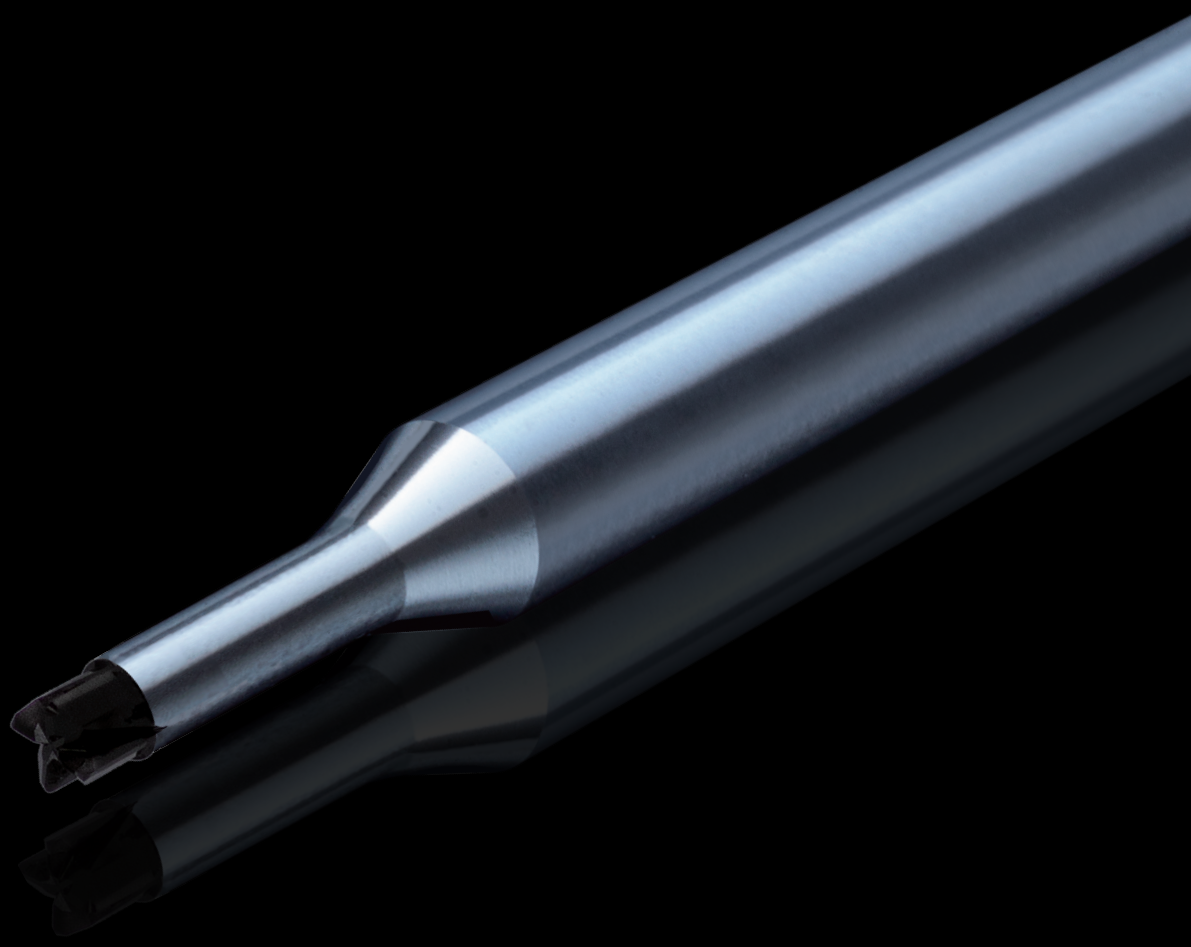
For Crafting Tomorrow

CBN

CBN 4-Flute Long Neck Corner Radius End Mill

SSR400

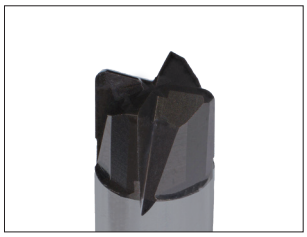
New



CBN 4-Flute Long Neck Corner Radius End Mill

SSR400 New

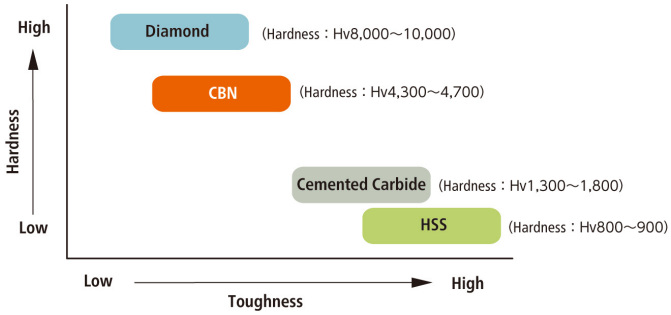
ϕ 0.1×R0.01 ～ ϕ 3×R0.3　　Total 121 sizes



Cutting edge shape

Features

Feature 1　Long tool life　Long tool life due to CBN Sintered Alloy



CBN(Cubic Boron Nitride) sintered alloy is 3 times harder than Tungsten carbide, second hardest material next to diamond, moreover strong heat-resistant and high thermal conductivity. However less tough characteristic of CBN often causes chipping of tool edge easily. Accordingly, CBN is recommended for finishing of hard materials with less cutting load on the tool edge, which guarantees extra long tool life.

Feature 2　Cost reduction　Multi-flute design enables high feed machining

The SSR400 has a significantly improved tool life compared to conventional 2-flute products, reducing the number of used tools and enabling machining in approximately 50% of the time compared to conventional 2-flute products.

■ Cost comparison with conventional 2-flute corner radius end mills

ϕ2 × R0.2 × Under neck length 6

40% cost reduction compares with 2-flute corner radius end mills

※Machine charge fee: JPY 5,000/h

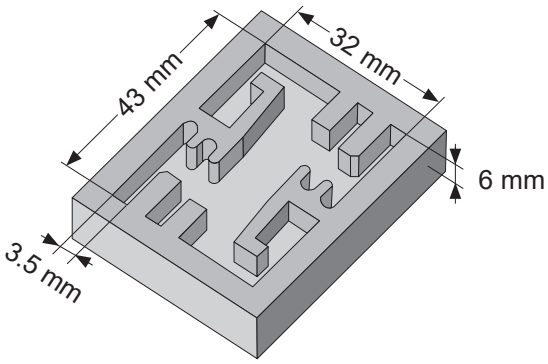
Tool	SSR400 (4-flute)	Conventional
Tool Q'ty [pcs]	1	2
Tool cost	¥ 30,600/pc	¥ 24,000/pc
Machining time [min]	150	300
※Machine charge fee	¥ 12,500	¥ 25,000
Machining cost	¥ 43,100	¥ 73,000

Feature 3 **High efficiency** High-rigidity cutting edge design enables high-efficiency machining

The tool design enhances the cutting edge rigidity, and even with CBN material, it achieves stable machining on high-load workpiece shapes and cutting conditions

■ Tool life comparison with conventional 2-flute products and the other tool brand's products

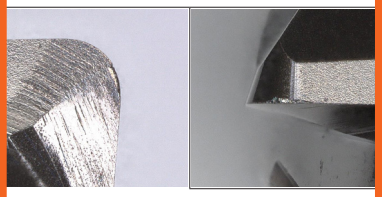
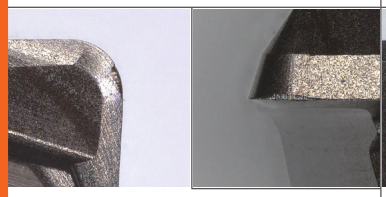
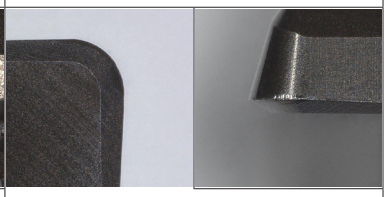
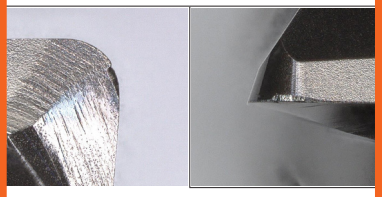
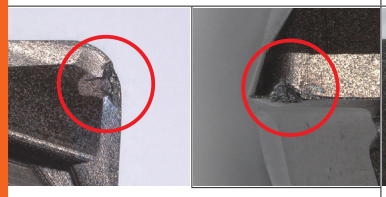
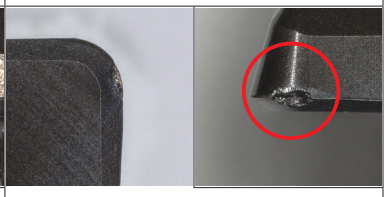
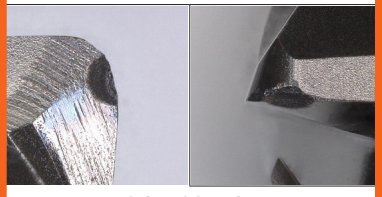
Work material : PD613 (60HRC)
Coolant : Oil mist



Draft angle = 0°
No corner filleting

Process	Finishing (Bottom)		Finishing (Side)	
Tool size	**ϕ2 × R0.2 × 6**			
Spindle speed [min^{-1}]	23,000			
Number of flute	4-flute	2-flute	4-flute	2-flute
Feed [mm/min]	2,500	1,250	2,500	1,250
Cutting depth [mm]	0.03			
Depth of cut [mm]	ae 0.6		ap 0.07	

Even under high-load workpiece geometries, such as sharp corners, SSR400 enables extended machining without major damage

Tool		**SSR400**	Other tool brand	Conventional
Number of flute		4-flute	4-flute	2-flute
Tool wear Cutting distance Machining time	64 m	 37 min	 37 min	 57 min
	256 m	 2 hr 28 min	 2 hr 28 min	 3 hr 42 min
	640 m	 6 hr 10 min	 6 hr 10 min	Major damage at 9 hours 9 hr 8 min

SSR400 New

Size ϕ0.1×R0.01 ～ ϕ3×R0.3

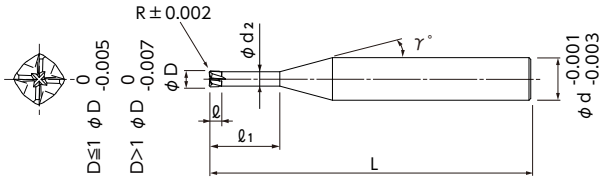
CBN ≦70 HRC

CBN 4-Flute Long Neck Corner Radius End Mill

Total 121 sizes

Tool design with enhanced cutting edge rigidity achieves high efficient machining
4-flute corner radius end mill from Dia. 0.1mm

4 | 0° | Corner R ±0.002 | ϕd -0.001 -0.003 | Slot | Face



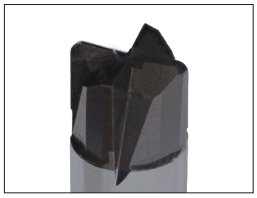
- 4-flute design realizes high feed rate even with small diameter.
- By providing corner R accuracy of ±2μm and actual outer diameter indication supports high precision machining.

Beware of stocks because there is no blade to the shaft center of endteeth.

Actual diameter is indicated in 1 micron units on product label, and enables high precision machining.
※Micron units dimensions cannot be specified.

Work Material

Hardened Steel H
～70HRC
◎



Cutting edge shape

◆Release in Apr, 2025.

Unit [Size : mm]

Code No.	Dia. (D)	Corner Radius (R)	Under Neck Length (ℓ1)	Length of Cut (ℓ)	Neck Dia. (d_2)	Neck Taper Angle (γ)	Shank Dia. (d)	Overall Length (L)
◆ 01-00491-01002	0.1	R0.01	0.2	0.04	0.09	15°	4	50
◆ 01-00491-01003			0.3	0.04	0.09	15°	4	50
◆ 01-00491-01005			0.5	0.04	0.09	15°	4	50
◆ 01-00491-01022		R0.02	0.2	0.04	0.09	15°	4	50
◆ 01-00491-01023			0.3	0.04	0.09	15°	4	50
◆ 01-00491-01025			0.5	0.04	0.09	15°	4	50
◆ 01-00491-01522	0.15	R0.02	0.2	0.06	0.14	15°	4	50
◆ 01-00491-01523			0.3	0.06	0.14	15°	4	50
◆ 01-00491-01525			0.5	0.06	0.14	15°	4	50
◆ 01-00491-01532		R0.03	0.2	0.06	0.14	15°	4	50
◆ 01-00491-01533			0.3	0.06	0.14	15°	4	50
◆ 01-00491-01535			0.5	0.06	0.14	15°	4	50
◆ 01-00491-02203	0.2	R0.02	0.3	0.08	0.19	15°	4	50
◆ 01-00491-02205			0.5	0.08	0.19	15°	4	50
◆ 01-00491-02207			0.75	0.08	0.19	15°	4	50
◆ 01-00491-02210			1	0.08	0.19	15°	4	50
◆ 01-00491-02303		R0.03	0.3	0.08	0.19	15°	4	50
◆ 01-00491-02305			0.5	0.08	0.19	15°	4	50
◆ 01-00491-02307			0.75	0.08	0.19	15°	4	50
◆ 01-00491-02310			1	0.08	0.19	15°	4	50
◆ 01-00491-03205	0.3	R0.02	0.5	0.13	0.285	15°	4	50
◆ 01-00491-03210			1	0.13	0.285	15°	4	50
◆ 01-00491-03215			1.5	0.13	0.285	15°	4	50
◆ 01-00491-03220			2	0.13	0.285	15°	4	50
◆ 01-00491-03305		R0.03	0.5	0.13	0.285	15°	4	50
◆ 01-00491-03310			1	0.13	0.285	15°	4	50
◆ 01-00491-03315			1.5	0.13	0.285	15°	4	50
◆ 01-00491-03320			2	0.13	0.285	15°	4	50
◆ 01-00491-04205	0.4	R0.02	0.5	0.24	0.37	15°	4	50
◆ 01-00491-04210			1	0.24	0.37	15°	4	50
◆ 01-00491-04215			1.5	0.24	0.37	15°	4	50
◆ 01-00491-04220			2	0.24	0.37	15°	4	50

How to Order When you order, indicate SSR400 (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)
01-00491-04305	0.4	R0.03	0.5	0.24	0.37	15°	4	50
01-00491-04310			1	0.24	0.37	15°	4	50
01-00491-04315			1.5	0.24	0.37	15°	4	50
01-00491-04320			2	0.24	0.37	15°	4	50
01-00491-04405		R0.05	0.5	0.24	0.37	15°	4	50
01-00491-04410			1	0.24	0.37	15°	4	50
01-00491-04415			1.5	0.24	0.37	15°	4	50
01-00491-04420			2	0.24	0.37	15°	4	50
01-00491-04505		R0.1	0.5	0.24	0.37	15°	4	50
01-00491-04510			1	0.24	0.37	15°	4	50
01-00491-04515			1.5	0.24	0.37	15°	4	50
01-00491-04520			2	0.24	0.37	15°	4	50
01-00491-05205	0.5	R0.02	0.5	0.3	0.46	15°	4	48
01-00491-05210			1	0.3	0.46	15°	4	50
01-00491-05215			1.5	0.3	0.46	15°	4	50
01-00491-05225			2.5	0.3	0.46	15°	4	50
01-00491-05305		R0.03	0.5	0.3	0.46	15°	4	48
01-00491-05310			1	0.3	0.46	15°	4	50
01-00491-05315			1.5	0.3	0.46	15°	4	50
01-00491-05325			2.5	0.3	0.46	15°	4	50
01-00491-05405		R0.05	0.5	0.3	0.46	15°	4	48
01-00491-05410			1	0.3	0.46	15°	4	50
01-00491-05415			1.5	0.3	0.46	15°	4	50
01-00491-05425			2.5	0.3	0.46	15°	4	50
01-00491-05505		R0.1	0.5	0.3	0.46	15°	4	48
01-00491-05510			1	0.3	0.46	15°	4	50
01-00491-05515			1.5	0.3	0.46	15°	4	50
01-00491-05525			2.5	0.3	0.46	15°	4	50
01-00491-06210	0.6	R0.02	1	0.3	0.56	15°	4	50
01-00491-06215			1.5	0.3	0.56	15°	4	50
01-00491-06225			2.5	0.3	0.56	15°	4	50
01-00491-06410		R0.05	1	0.3	0.56	15°	4	50
01-00491-06415			1.5	0.3	0.56	15°	4	50
01-00491-06425			2.5	0.3	0.56	15°	4	50
01-00491-06510		R0.1	1	0.3	0.56	15°	4	50
01-00491-06515			1.5	0.3	0.56	15°	4	50
01-00491-06525			2.5	0.3	0.56	15°	4	50
01-00491-08420	0.8	R0.05	2	0.56	0.76	15°	4	50
01-00491-08440			4	0.56	0.76	15°	4	53
01-00491-08520		R0.1	2	0.56	0.76	15°	4	50
01-00491-08540			4	0.56	0.76	15°	4	53
01-00491-10202	1	R0.02	2	0.7	0.95	15°	4	50
01-00491-10203			3	0.7	0.95	15°	4	50
01-00491-10205			5	0.7	0.95	15°	4	53
01-00491-10302		R0.03	2	0.7	0.95	15°	4	50
01-00491-10303			3	0.7	0.95	15°	4	50
01-00491-10305			5	0.7	0.95	15°	4	53
01-00491-10402		R0.05	2	0.7	0.95	15°	4	50
01-00491-10403			3	0.7	0.95	15°	4	50
01-00491-10405			5	0.7	0.95	15°	4	53
01-00491-10502		R0.1	2	0.7	0.95	15°	4	50
01-00491-10503			3	0.7	0.95	15°	4	50
01-00491-10505			5	0.7	0.95	15°	4	53
01-00491-10602		R0.2	2	0.7	0.95	15°	4	50
01-00491-10603			3	0.7	0.95	15°	4	50
01-00491-10605			5	0.7	0.95	15°	4	53

SSR400 New

CBN 4-Flute Long Neck Corner Radius End Mill

◆ Release in Apr, 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)
◆ 01-00491-15402	1.5	R0.05	2	1	1.45	15°	4	52
◆ 01-00491-15403			3	1	1.45	15°	4	52
◆ 01-00491-15502		R0.1	2	1	1.45	15°	4	52
◆ 01-00491-15503			3	1	1.45	15°	4	52
◆ 01-00491-15602		R0.2	2	1	1.45	15°	4	52
◆ 01-00491-15603			3	1	1.45	15°	4	52
◆ 01-00491-20404	2	R0.05	4	1.2	1.94	15°	4	53
◆ 01-00491-20406			6	1.2	1.94	15°	4	53
◆ 01-00491-20410			10	1.2	1.94	15°	4	53
◆ 01-00491-20504		R0.1	4	1.2	1.94	15°	4	53
◆ 01-00491-20506			6	1.2	1.94	15°	4	53
◆ 01-00491-20510			10	1.2	1.94	15°	4	53
◆ 01-00491-20604		R0.2	4	1.2	1.94	15°	4	53
◆ 01-00491-20606			6	1.2	1.94	15°	4	53
◆ 01-00491-20610			10	1.2	1.94	15°	4	53
◆ 01-00491-20704		R0.3	4	1.2	1.94	15°	4	53
◆ 01-00491-20706			6	1.2	1.94	15°	4	53
◆ 01-00491-20710			10	1.2	1.94	15°	4	53
◆ 01-00491-20804		R0.5	4	1.2	1.94	15°	4	53
◆ 01-00491-20806			6	1.2	1.94	15°	4	53
◆ 01-00491-20810			10	1.2	1.94	15°	4	53
◆ 01-00491-30406	3	R0.05	6	1.8	2.85	15°	6	53
◆ 01-00491-30409			9	1.8	2.85	15°	6	53
◆ 01-00491-30415			15	1.8	2.85	15°	6	63
◆ 01-00491-30506		R0.1	6	1.8	2.85	15°	6	53
◆ 01-00491-30509			9	1.8	2.85	15°	6	53
◆ 01-00491-30515			15	1.8	2.85	15°	6	63
◆ 01-00491-30606		R0.2	6	1.8	2.85	15°	6	53
◆ 01-00491-30609			9	1.8	2.85	15°	6	53
◆ 01-00491-30615			15	1.8	2.85	15°	6	63
◆ 01-00491-30706		R0.3	6	1.8	2.85	15°	6	53
◆ 01-00491-30709			9	1.8	2.85	15°	6	53
◆ 01-00491-30715			15	1.8	2.85	15°	6	63

How to Order When you order, indicate SSR400 (D)×(R)×(ℓ1).

※ (γ) is reference value.

Work Material				Hardened Steels SKD61・STAVAX (～52HRC)					Hardened Steels SKD11・ELMAX (～62HRC)					High Speed Steels SKH・HAP (～68HRC)				
Dia.	Corner Radius	Under Neck Length	L/D	Spindle Speed	Feed	Depth of Cut		Stock before using this tool	Spindle Speed	Feed	Depth of Cut		Stock before using this tool	Spindle Speed	Feed	Depth of Cut		Stock before using this tool
				min^{-1}	mm/min	a_p mm	a_e mm	mm	min^{-1}	mm/min	a_p mm	a_e mm	mm	min^{-1}	mm/min	a_p mm	a_e mm	mm
0.1	R0.01	0.2	2	50,000	320	0.002	0.015	0.002	50,000	240	0.002	0.010	0.002	50,000	120	0.001	0.010	0.002
		0.3	3	50,000	240	0.001	0.010	0.002	50,000	160	0.001	0.008	0.002	50,000	60	0.001	0.008	0.002
		0.5	5	50,000	200	0.001	0.010	0.002	50,000	140	0.001	0.008	0.002	50,000	50	0.001	0.008	0.002
	R0.02	0.2	2	50,000	400	0.002	0.015	0.002	50,000	300	0.002	0.010	0.002	50,000	200	0.001	0.010	0.002
		0.3	3	50,000	300	0.001	0.010	0.002	50,000	200	0.001	0.008	0.002	50,000	100	0.001	0.008	0.002
		0.5	5	50,000	260	0.001	0.010	0.002	50,000	180	0.001	0.008	0.002	50,000	80	0.001	0.008	0.002
0.15	R0.02	0.2	1.3	50,000	500	0.003	0.020	0.002	50,000	400	0.003	0.020	0.002	50,000	300	0.002	0.015	0.002
		0.3	2	50,000	500	0.003	0.020	0.002	50,000	400	0.003	0.020	0.002	50,000	300	0.002	0.015	0.002
		0.5	3.3	50,000	400	0.002	0.015	0.002	50,000	300	0.002	0.015	0.002	50,000	200	0.001	0.010	0.002
	R0.03	0.2	1.3	50,000	500	0.003	0.020	0.002	50,000	400	0.003	0.020	0.002	50,000	300	0.002	0.015	0.002
		0.3	2	50,000	500	0.003	0.020	0.002	50,000	400	0.003	0.020	0.002	50,000	300	0.002	0.015	0.002
		0.5	3.3	50,000	400	0.002	0.015	0.002	50,000	300	0.002	0.015	0.002	50,000	200	0.001	0.010	0.002
0.2	R0.02	0.3	1.5	50,000	800	0.003	0.030	0.002	50,000	700	0.003	0.030	0.002	50,000	500	0.002	0.020	0.002
		0.5	2.5	50,000	600	0.003	0.030	0.002	50,000	500	0.003	0.030	0.002	50,000	400	0.002	0.020	0.002
		0.75	3.8	50,000	400	0.002	0.020	0.002	50,000	400	0.002	0.020	0.002	50,000	200	0.001	0.010	0.002
		1	5	50,000	360	0.002	0.020	0.002	50,000	360	0.002	0.020	0.002	50,000	180	0.001	0.010	0.002
	R0.03	0.3	1.5	50,000	800	0.003	0.030	0.002	50,000	700	0.003	0.030	0.002	50,000	500	0.002	0.020	0.002
		0.5	2.5	50,000	600	0.003	0.030	0.002	50,000	500	0.003	0.030	0.002	50,000	400	0.002	0.020	0.002
		0.75	3.8	50,000	400	0.002	0.020	0.002	50,000	400	0.002	0.020	0.002	50,000	200	0.001	0.010	0.002
		1	5	50,000	360	0.002	0.020	0.002	50,000	360	0.002	0.020	0.002	50,000	180	0.001	0.010	0.002
0.3	R0.02	0.5	1.7	50,000	1,000	0.003	0.050	0.003	50,000	800	0.003	0.050	0.003	50,000	600	0.002	0.030	0.002
		1	3.3	50,000	800	0.002	0.030	0.003	50,000	600	0.002	0.030	0.003	50,000	400	0.001	0.020	0.002
		1.5	5	50,000	600	0.002	0.030	0.003	50,000	500	0.002	0.030	0.003	50,000	360	0.001	0.020	0.002
		2	6.7	50,000	600	0.002	0.030	0.003	50,000	500	0.002	0.030	0.003	50,000	360	0.001	0.020	0.002
	R0.03	0.5	1.7	50,000	1,000	0.003	0.050	0.003	50,000	800	0.003	0.050	0.003	50,000	600	0.002	0.030	0.002
		1	3.3	50,000	800	0.002	0.030	0.003	50,000	600	0.002	0.030	0.003	50,000	400	0.001	0.020	0.002
		1.5	5	50,000	600	0.002	0.030	0.003	50,000	500	0.002	0.030	0.003	50,000	360	0.001	0.020	0.002
		2	6.7	50,000	600	0.002	0.030	0.003	50,000	500	0.002	0.030	0.003	50,000	360	0.001	0.020	0.002
0.4	R0.02	0.5	1.3	50,000	1,400	0.005	0.100	0.004	50,000	1,200	0.005	0.100	0.004	50,000	800	0.003	0.030	0.003
		1	2.5	50,000	1,400	0.005	0.100	0.004	50,000	1,200	0.005	0.100	0.004	50,000	800	0.003	0.030	0.003
		1.5	3.8	50,000	1,000	0.004	0.050	0.004	50,000	800	0.004	0.050	0.004	50,000	600	0.002	0.020	0.003
		2	5	50,000	800	0.004	0.050	0.004	50,000	700	0.004	0.050	0.004	50,000	500	0.002	0.020	0.003
	R0.03	0.5	1.3	50,000	1,400	0.005	0.100	0.004	50,000	1,200	0.005	0.100	0.004	50,000	800	0.003	0.030	0.003
		1	2.5	50,000	1,400	0.005	0.100	0.004	50,000	1,200	0.005	0.100	0.004	50,000	800	0.003	0.030	0.003
		1.5	3.8	50,000	1,000	0.004	0.050	0.004	50,000	800	0.004	0.050	0.004	50,000	600	0.002	0.020	0.003
		2	5	50,000	800	0.004	0.050	0.004	50,000	700	0.004	0.050	0.004	50,000	500	0.002	0.020	0.003
	R0.05	0.5	1.3	50,000	1,400	0.005	0.100	0.004	50,000	1,200	0.005	0.100	0.004	50,000	800	0.003	0.030	0.003
		1	2.5	50,000	1,400	0.005	0.100	0.004	50,000	1,200	0.005	0.100	0.004	50,000	800	0.003	0.030	0.003
		1.5	3.8	50,000	1,000	0.004	0.050	0.004	50,000	800	0.004	0.050	0.004	50,000	600	0.002	0.020	0.003
		2	5	50,000	800	0.004	0.050	0.004	50,000	700	0.004	0.050	0.004	50,000	500	0.002	0.020	0.003
	R0.1	0.5	1.3	50,000	1,400	0.005	0.100	0.004	50,000	1,200	0.005	0.100	0.004	50,000	800	0.003	0.030	0.003
		1	2.5	50,000	1,400	0.005	0.100	0.004	50,000	1,200	0.005	0.100	0.004	50,000	800	0.003	0.030	0.003
		1.5	3.8	50,000	1,000	0.004	0.050	0.004	50,000	800	0.004	0.050	0.004	50,000	600	0.002	0.020	0.003
		2	5	50,000	800	0.004	0.050	0.004	50,000	700	0.004	0.050	0.004	50,000	500	0.002	0.020	0.003
0.5	R0.02	0.5	1	50,000	1,400	0.005	0.200	0.005	50,000	1,200	0.005	0.200	0.004	50,000	1,000	0.003	0.100	0.003
		1	2	50,000	1,400	0.005	0.200	0.005	50,000	1,200	0.005	0.200	0.004	50,000	1,000	0.003	0.100	0.003
		1.5	3	50,000	1,200	0.004	0.100	0.005	50,000	1,000	0.004	0.100	0.004	50,000	800	0.002	0.050	0.003
		2.5	5	50,000	1,000	0.004	0.100	0.005	50,000	800	0.004	0.100	0.004	50,000	700	0.002	0.050	0.003
	R0.03	0.5	1	50,000	1,400	0.005	0.200	0.005	50,000	1,200	0.005	0.200	0.004	50,000	1,000	0.003	0.100	0.003
		1	2	50,000	1,400	0.005	0.200	0.005	50,000	1,200	0.005	0.200	0.004	50,000	1,000	0.003	0.100	0.003
		1.5	3	50,000	1,200	0.004	0.100	0.005	50,000	1,000	0.004	0.100	0.004	50,000	800	0.002	0.050	0.003
		2.5	5	50,000	1,000	0.004	0.100	0.005	50,000	800	0.004	0.100	0.004	50,000	700	0.002	0.050	0.003

SSR400 New

Recommended Conditions

Work Material				Hardened Steels SKD61・STAVAX (～52HRC)					Hardened Steels SKD11・ELMAX (～62HRC)					High Speed Steels SKH・HAP (～68HRC)				
Dia.	Corner Radius	Under Neck Length	L/D	Spindle Speed	Feed	Depth of Cut		Stock before using this tool	Spindle Speed	Feed	Depth of Cut		Stock before using this tool	Spindle Speed	Feed	Depth of Cut		Stock before using this tool
				min^{-1}	mm/min	a_p mm	a_e mm	mm	min^{-1}	mm/min	a_p mm	a_e mm	mm	min^{-1}	mm/min	a_p mm	a_e mm	mm
0.5	R0.05	0.5	1	50,000	1,400	0.010	0.200	0.005	50,000	1,200	0.010	0.200	0.005	50,000	1,000	0.005	0.150	0.004
		1	2	50,000	1,400	0.010	0.200	0.005	50,000	1,200	0.010	0.200	0.005	50,000	1,000	0.005	0.150	0.004
		1.5	3	50,000	1,200	0.008	0.100	0.005	50,000	1,000	0.008	0.100	0.005	50,000	800	0.004	0.100	0.004
		2.5	5	50,000	1,000	0.008	0.100	0.005	50,000	800	0.008	0.100	0.005	50,000	700	0.004	0.050	0.004
	R0.1	0.5	1	50,000	1,600	0.020	0.200	0.005	50,000	1,600	0.020	0.200	0.005	50,000	1,400	0.010	0.150	0.004
		1	2	50,000	1,600	0.020	0.200	0.005	50,000	1,600	0.020	0.200	0.005	50,000	1,400	0.010	0.150	0.004
		1.5	3	50,000	1,400	0.015	0.100	0.005	50,000	1,400	0.015	0.100	0.005	50,000	1,200	0.008	0.100	0.004
		2.5	5	50,000	1,200	0.015	0.100	0.005	50,000	1,200	0.015	0.100	0.005	50,000	1,000	0.008	0.050	0.004
0.6	R0.02	1	1.7	50,000	1,400	0.005	0.200	0.005	50,000	1,200	0.005	0.200	0.005	50,000	1,000	0.003	0.100	0.003
		1.5	2.5	50,000	1,400	0.005	0.200	0.005	50,000	1,200	0.005	0.200	0.005	50,000	1,000	0.003	0.100	0.003
		2.5	4.2	50,000	1,200	0.004	0.100	0.005	50,000	1,000	0.004	0.100	0.005	50,000	800	0.002	0.050	0.003
	R0.05	1	1.7	50,000	1,400	0.010	0.200	0.006	50,000	1,200	0.010	0.200	0.005	50,000	1,000	0.005	0.150	0.004
		1.5	2.5	50,000	1,400	0.010	0.200	0.006	50,000	1,200	0.010	0.200	0.005	50,000	1,000	0.005	0.100	0.004
		2.5	4.2	50,000	1,200	0.008	0.100	0.006	50,000	1,000	0.008	0.100	0.005	50,000	800	0.004	0.050	0.004
	R0.1	1	1.7	50,000	2,000	0.020	0.200	0.006	50,000	2,000	0.020	0.200	0.005	50,000	1,400	0.010	0.150	0.004
		1.5	2.5	50,000	2,000	0.020	0.200	0.006	50,000	2,000	0.020	0.200	0.005	50,000	1,400	0.010	0.100	0.004
		2.5	4.2	50,000	1,800	0.015	0.100	0.006	50,000	1,800	0.015	0.100	0.005	50,000	1,200	0.008	0.050	0.004
0.8	R0.05	2	2.5	50,000	2,000	0.020	0.300	0.008	50,000	2,000	0.020	0.200	0.007	42,000	1,400	0.010	0.100	0.006
		4	5	50,000	1,600	0.015	0.200	0.008	50,000	1,600	0.015	0.100	0.007	42,000	1,200	0.008	0.050	0.006
	R0.1	2	2.5	50,000	2,800	0.020	0.300	0.008	50,000	2,400	0.020	0.200	0.007	42,000	2,000	0.010	0.100	0.006
		4	5	50,000	2,400	0.015	0.200	0.008	50,000	2,000	0.015	0.100	0.007	42,000	1,600	0.008	0.050	0.006
1	R0.02	2	2	48,000	1,600	0.005	0.400	0.005	48,000	1,600	0.005	0.300	0.005	40,000	1,200	0.005	0.200	0.004
		3	3	48,000	1,400	0.004	0.300	0.005	48,000	1,400	0.004	0.200	0.005	40,000	1,000	0.004	0.100	0.004
		5	5	48,000	1,200	0.004	0.300	0.005	48,000	1,200	0.004	0.200	0.005	40,000	800	0.004	0.100	0.004
	R0.03	2	2	48,000	1,600	0.005	0.400	0.007	48,000	1,600	0.005	0.300	0.006	40,000	1,200	0.005	0.200	0.005
		3	3	48,000	1,400	0.004	0.300	0.007	48,000	1,400	0.004	0.200	0.006	40,000	1,000	0.004	0.100	0.005
		5	5	48,000	1,200	0.004	0.300	0.007	48,000	1,200	0.004	0.200	0.006	40,000	800	0.004	0.100	0.005
	R0.05	2	2	48,000	2,000	0.010	0.400	0.010	48,000	2,000	0.010	0.300	0.009	40,000	1,600	0.010	0.200	0.008
		3	3	48,000	1,800	0.008	0.300	0.010	48,000	1,800	0.008	0.200	0.009	40,000	1,400	0.008	0.100	0.008
		5	5	48,000	1,600	0.008	0.300	0.010	48,000	1,600	0.008	0.200	0.009	40,000	1,200	0.008	0.100	0.008
	R0.1	2	2	48,000	3,000	0.030	0.400	0.010	48,000	2,400	0.030	0.300	0.009	40,000	2,000	0.020	0.200	0.008
		3	3	48,000	2,600	0.020	0.300	0.010	48,000	2,200	0.020	0.200	0.009	40,000	1,800	0.015	0.100	0.008
		5	5	48,000	2,400	0.020	0.300	0.010	48,000	2,000	0.020	0.200	0.009	40,000	1,600	0.015	0.100	0.008
	R0.2	2	2	48,000	3,000	0.030	0.400	0.010	48,000	2,400	0.030	0.300	0.009	40,000	2,000	0.020	0.200	0.008
		3	3	48,000	2,600	0.020	0.300	0.010	48,000	2,200	0.020	0.200	0.009	40,000	1,800	0.015	0.100	0.008
		5	5	48,000	2,400	0.020	0.300	0.010	48,000	2,000	0.020	0.200	0.009	40,000	1,600	0.015	0.100	0.008
1.5	R0.05	2	1.3	32,000	2,400	0.020	0.700	0.012	32,000	2,200	0.010	0.600	0.010	27,000	1,600	0.010	0.300	0.009
		3	2	32,000	2,400	0.020	0.700	0.012	32,000	2,200	0.010	0.600	0.010	27,000	1,600	0.010	0.300	0.009
	R0.1	2	1.3	32,000	4,000	0.040	0.700	0.015	32,000	3,000	0.040	0.600	0.013	27,000	2,400	0.020	0.300	0.011
		3	2	32,000	4,000	0.040	0.700	0.015	32,000	3,000	0.040	0.600	0.013	27,000	2,400	0.020	0.300	0.011
	R0.2	2	1.3	32,000	4,000	0.040	0.700	0.015	32,000	3,000	0.040	0.600	0.013	27,000	2,400	0.020	0.300	0.011
		3	2	32,000	4,000	0.040	0.700	0.015	32,000	3,000	0.040	0.600	0.013	27,000	2,400	0.020	0.300	0.011
2	R0.05	4	2	24,000	2,000	0.020	0.800	0.012	24,000	2,000	0.010	0.700	0.010	20,000	1,600	0.010	0.500	0.009
		6	3	24,000	1,800	0.015	0.600	0.012	24,000	1,800	0.008	0.500	0.010	20,000	1,400	0.008	0.300	0.009
		10	5	24,000	1,600	0.015	0.600	0.012	24,000	1,600	0.008	0.500	0.010	20,000	1,200	0.008	0.300	0.009
	R0.1	4	2	24,000	4,000	0.050	0.800	0.015	24,000	3,000	0.050	0.700	0.013	20,000	2,400	0.020	0.500	0.011
		6	3	24,000	3,600	0.030	0.600	0.015	24,000	2,800	0.030	0.500	0.013	20,000	2,200	0.015	0.300	0.011
		10	5	24,000	3,200	0.030	0.600	0.015	24,000	2,600	0.030	0.500	0.013	20,000	2,000	0.015	0.300	0.011
	R0.2	4	2	24,000	4,000	0.050	0.800	0.015	24,000	3,000	0.050	0.700	0.013	20,000	2,400	0.020	0.500	0.011
		6	3	24,000	3,600	0.030	0.600	0.015	24,000	2,800	0.030	0.500	0.013	20,000	2,200	0.015	0.300	0.011
		10	5	24,000	3,200	0.030	0.600	0.015	24,000	2,600	0.030	0.500	0.013	20,000	2,000	0.015	0.300	0.011

Work Material				Hardened Steels SKD61・STAVAX (～52HRC)					Hardened Steels SKD11・ELMAX (～62HRC)					High Speed Steels SKH・HAP (～68HRC)				
Dia.	Corner Radius	Under Neck Length	L/D	Spindle Speed	Feed	Depth of Cut		Stock before using this tool	Spindle Speed	Feed	Depth of Cut		Stock before using this tool	Spindle Speed	Feed	Depth of Cut		Stock before using this tool
				min^{-1}	mm/min	a_p mm	a_e mm	mm	min^{-1}	mm/min	a_p mm	a_e mm	mm	min^{-1}	mm/min	a_p mm	a_e mm	mm
2	R0.3	4	2	24,000	4,000	0.050	0.800	0.015	24,000	3,000	0.050	0.700	0.013	20,000	2,400	0.020	0.500	0.011
		6	3	24,000	3,600	0.030	0.600	0.015	24,000	2,800	0.030	0.500	0.013	20,000	2,200	0.015	0.300	0.011
		10	5	24,000	3,200	0.030	0.600	0.015	24,000	2,600	0.030	0.500	0.013	20,000	2,000	0.015	0.300	0.011
	R0.5	4	2	24,000	4,000	0.050	0.800	0.015	24,000	3,000	0.050	0.700	0.013	20,000	2,400	0.020	0.500	0.011
		6	3	24,000	3,600	0.030	0.600	0.015	24,000	2,800	0.030	0.500	0.013	20,000	2,200	0.015	0.300	0.011
		10	5	24,000	3,200	0.030	0.600	0.015	24,000	2,600	0.030	0.500	0.013	20,000	2,000	0.015	0.300	0.011
3	R0.05	6	2	22,000	3,000	0.030	1.000	0.012	20,000	2,600	0.020	0.850	0.010	17,000	1,800	0.015	0.600	0.009
		9	3	22,000	2,600	0.020	0.850	0.012	20,000	2,400	0.015	0.700	0.010	17,000	1,600	0.010	0.500	0.009
		15	5	22,000	2,400	0.020	0.850	0.012	20,000	2,200	0.015	0.700	0.010	17,000	1,400	0.010	0.500	0.009
	R0.1	6	2	22,000	4,000	0.050	1.000	0.015	20,000	3,500	0.040	0.850	0.013	17,000	2,200	0.020	0.600	0.011
		9	3	22,000	3,600	0.030	0.850	0.015	20,000	3,200	0.030	0.700	0.013	17,000	2,000	0.015	0.500	0.011
		15	5	22,000	3,200	0.030	0.850	0.015	20,000	2,800	0.030	0.700	0.013	17,000	1,800	0.015	0.500	0.011
	R0.2	6	2	22,000	4,000	0.050	1.000	0.015	20,000	3,500	0.040	0.850	0.013	17,000	2,200	0.020	0.600	0.011
		9	3	22,000	3,600	0.030	0.850	0.015	20,000	3,200	0.030	0.700	0.013	17,000	2,000	0.015	0.500	0.011
		15	5	22,000	3,200	0.030	0.850	0.015	20,000	2,800	0.030	0.700	0.013	17,000	1,800	0.015	0.500	0.011
	R0.3	6	2	22,000	4,000	0.050	1.000	0.015	20,000	3,500	0.040	0.850	0.013	17,000	2,200	0.020	0.600	0.011
		9	3	22,000	3,600	0.030	0.850	0.015	20,000	3,200	0.030	0.700	0.013	17,000	2,000	0.015	0.500	0.011
		15	5	22,000	3,200	0.030	0.850	0.015	20,000	2,800	0.030	0.700	0.013	17,000	1,800	0.015	0.500	0.011

Notes

※1 Depth of Cut: ap=Axial Depth of Cut / ae=Radial Depth of Cut.
※2 Depth of Cut shows the reference value for semi-finishing and finishing.
Adjust milling conditions depending on the rigidity of the machine, work shape and requested accuracy.
※3 Recommend to apply helical or ramping for approaching into axial direction.
※4 Be careful to obtain uniform stock amount on cutting surface before using this tool.
※5 In case of chattering etc., please adjust milling conditions if necessary.
※6 If the cutting load is high at corners, etc., set the milling conditions and tool path carefully to reduce the cutting load.
※7 Increase both spindle speed and feed at the same rate for high efficient machining.
※8 If the maximum spindle speed of the machine tool is lower than the reference value, please reduce the spindle speed and feed rate in the same proportion.
※9 Minimize a possible tool overhang length.
※10 We recommend using oil mist coolant.
※11 The stock allowance for this tool is a guideline, please adjust it according to the machining condition of the previous process and the required accuracy.

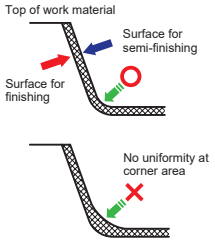
Points in Use

Advice on Cutting Environment

- Minimize the deflection of cutting edge.
- To understand the nature of the expansion of the main spindle and machine posture transformation, and take measures against them.

Advice on Finishing Allowance (stock amount)

- When using small CBN End Mill, uniform finishing allowance (stock amount) is important.
- When tool is used on roughing and semi-finishing and it has a big abrasion, finishing allowance (stock amount) on semi-finishing and finishing is increasing and it affects tool life and cutting accurary.Therefore,it is important to get uniform stock amount in the pre-stage cutting.



Machining case

Tartan Check Pattern Slotting PD613 (57HRC)

By using multi-flute tools, high efficient machining is realized with stable surface quality
Long tool life with minimal tool wear even when machining on difficult-to-cut materials

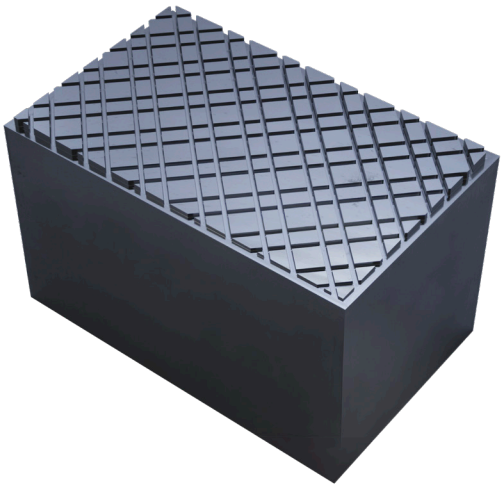
Work material ： PD613（57HRC）

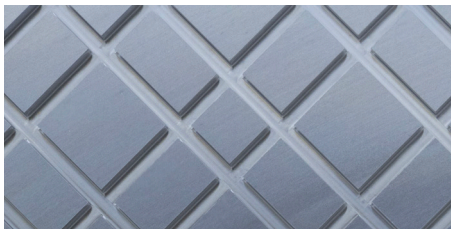
Work size ：50 × 80 × 50 mm

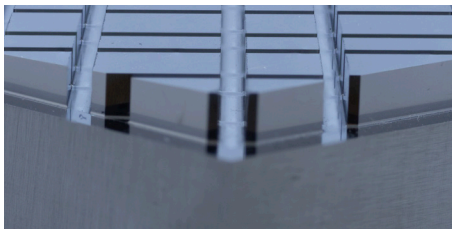
Maximum machining depth ： 3 mm

Coolant ：Oil mist

Total machining time ：12 hr 16 min

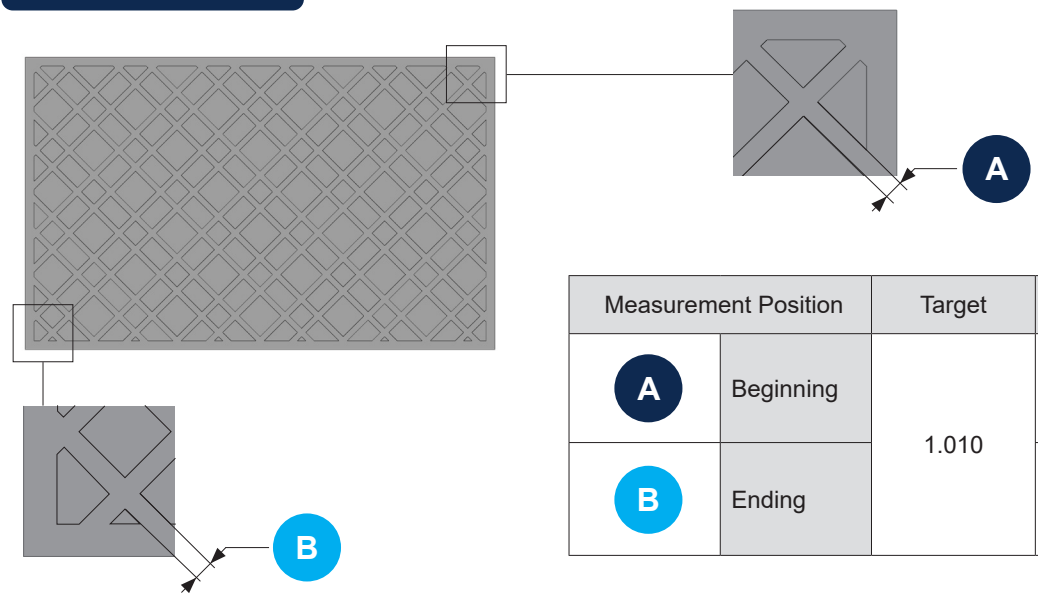






Process	Side	Roughing	Semi-finishing	Finishing (Top)	Slot	Finishing (Side)
Tool	MHDSH445 ϕ3 × 6	MRBSH330 R1 × 3		**SSR400** **ϕ1 × R0.1 × 3**		
Spindle speed [min^{-1}]	8,000	25,000		30,000		
Feed [mm/min]	700	3,800	2,500	1,500		400
Depth of cut [mm] ap × ae	3 × 0.05	0.2 × 0.4	pf 0.05	pf 0.02	0.02	0.05 × 0.005
Stock	-	0.05	0.005	-		
Machining time	12 min	36 min	37 min	2 hr 18 min	2 hr 50 min	5 hr 43 min

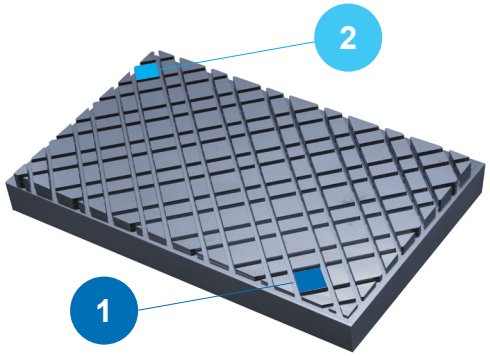
Accuracy



Unit [mm]

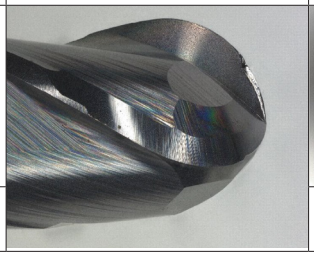
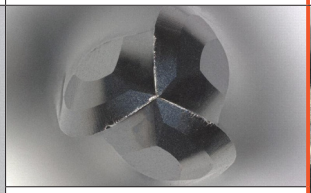
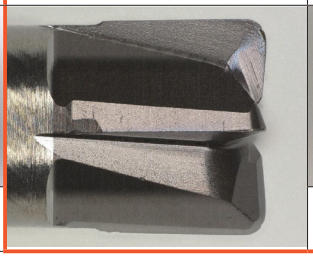
Measurement Position		Target	Actual	Error
A	Beginning	1.010	1.009	**-0.001**
B	Ending		1.010	0

Surface Roughness



Measurement Position		Surface	Surface roughness [μm]
1	Beginning		Ra : 0.086 Rz : 0.628
2	Ending		Ra : 0.108 Rz : 0.877

Tool wear

Process	After roughing and semi-finishing		After slot finishing	
Machining time	1 hr 13 min		**10 hr 51 min**	
Tool	MRBSH330 R1 × 3		**SSR400** **ϕ1 × R0.1 × 3**	
	Rake	End	Rake	End
Tool wear				
Max. wear width		0.041mm		0.036mm

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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 machining 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 water-insoluble fluid could lead to fires due to sparks generated during machining or heat caused by breakage.
   Ensure that you take proper fire-prevention measures.
9) If abnormal sound, etc. occurs during machining, stop the machine immediately.
10) Don't modify tools.

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ISO 9001 ISO 14001