Size φ2～φ12

CRRS

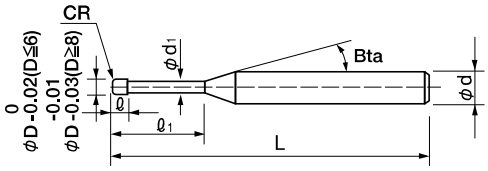
Super MG | UT COAT | 45° | R | R ±0.01 (φ2～φ6) | R ±0.015 (φ8～φ12) | Shank Dia 0/-0.005 | Back Taper Geometry | Variable Pitch

Material Applications（★ Highly Recommended ● Recommended ○ Suggested）

Work Material																
Carbon Steels	Alloy Steels	Prehardened Steels	Hardened Steels					Cast Iron	Aluminum Alloys	Graphite	Copper	Plastics	Glass Filled Plastics	Titanium Alloys	Heat Resistant Alloys	Cemented Carbide	Hard Brittle (Non-Metallic) Materials
S45C S55C	SK / SCM SUS	NAK HPM	～50HRC	～55HRC	～60HRC	～65HRC	～70HRC										
●	●	●	●	●				○	○		●			●	●		

Features

Broad application range from Copper and Raw Materials to Hardened Steels (55HRC). UTCOAT offers long tool life. Variable pitch, high helix and positive rake angle offer stable milling. Reduced cutting resistance when using a helical approach or inclined angles.



The shank taper angle shown is not an exact value and to avoid contact with the work piece, we recommend the user controls the precise value of this angle. Shank taper angle should not make contact with the work piece.

Total 24 models

Unit（mm）

Model Number	Outside Diameter φD	Corner Radius CR	Effective Length ℓ1	Length of Cut ℓ	Neck Diameter φd1	Shank Taper Angle Bta	Overall Length L	Shank Diameter φd	Suggested Retail Price ¥
CRRS 4020-05-06	2	R0.5	6	2	1.91	16°	70	4	10,500
CRRS 4030-08-09	3	R0.8	9	3	2.92	16°	70	6	10,800
CRRS 4040-03-12	4	R0.3	12	4	3.82	16°	60	6	11,600
CRRS 4040-05-12-4		R0.5				—	70	4	10,000
CRRS 4040-05-12						16°	60	6	11,600
CRRS 4040-10-12-4		R1				—	70	4	10,000
CRRS 4040-10-12						16°	70	6	11,600
CRRS 4050-12-15	5	R1.2	15	5	4.82	16°	70	6	12,000
CRRS 4060-03-18	6	R0.3	18	6	5.82	—	90	6	13,400
CRRS 4060-05-18		R0.5					60	6	13,400
CRRS 4060-10-18		R1					60	6	13,400
CRRS 4060-15-18		R1.5					90	6	13,400
CRRS 4080-03-24	8	R0.3	24	8	7.82	—	100	8	16,700
CRRS 4080-05-26		R0.5	26				70	8	16,700
CRRS 4080-10-26		R1					70	8	16,700
CRRS 4080-20-24		R2	24				100	8	16,700
CRRS 4100-03-30	10	R0.3	30	10	9.82	—	110	10	22,000
CRRS 4100-05-30		R0.5					80	10	22,000
CRRS 4100-10-30		R1					80	10	22,000
CRRS 4100-20-30		R2					110	10	22,000
CRRS 4120-03-36	12	R0.3	36	12	11.82	—	120	12	27,700
CRRS 4120-05-36		R0.5					120	12	27,700
CRRS 4120-10-36		R1					120	12	27,700
CRRS 4120-20-36		R2					120	12	27,700

Milling Conditions for CRRS

◆Roughing

WORK MATERIAL			CARBON STEELS S45C / S55C (~225HB)				ALLOY STEELS SK / SCM / SUS (225~325HB) *Use cutting oils for Stainless Steels.				PREHARDENED STEELS HARDENED STEELS NAK / HPM / SKD / SKT / STAVAX (30~55HRC) *Recommend oil mist.			
Model Number	Outside Diameter (mm)	Corner Radius (mm)	Spindle Speed (min^{-1})	Feed Rate (mm/min)	a_p Axial Depth (mm)	a_e Radial Depth (mm)	Spindle Speed (min^{-1})	Feed Rate (mm/min)	a_p Axial Depth (mm)	a_e Radial Depth (mm)	Spindle Speed (min^{-1})	Feed Rate (mm/min)	a_p Axial Depth (mm)	a_e Radial Depth (mm)
4020-05-06	2	R0.5	30,000	7,200	0.08	0.8	30,000	7,200	0.04	0.66	24,000	7,000	0.02	0.59
4030-08-09	3	R0.8	20,000	8,400	0.09	1.2	20,000	7,200	0.04	1.08	16,000	7,000	0.04	0.88
4040-03-12	4	R0.3	15,000	9,600	0.09	1.6	15,000	7,200	0.05	1.32	12,000	7,000	0.05	1.17
4040-05-12-4		R0.5	15,000	9,600	0.1	1.6	15,000	7,200	0.05	1.35	12,000	7,000	0.05	1.26
4040-05-12			15,000	9,600	0.1	1.6	15,000	7,200	0.05	1.35	12,000	7,000	0.05	1.26
4040-10-12-4		R1	15,000	9,600	0.11	1.6	15,000	7,200	0.05	1.53	12,000	7,000	0.06	1.33
4040-10-12			15,000	9,600	0.11	1.6	15,000	7,200	0.05	1.53	12,000	7,000	0.06	1.33
4050-12-15	5	R1.2	12,000	10,800	0.13	2	12,000	7,200	0.06	1.8	9,600	6,300	0.06	1.54
4060-03-18	6	R0.3	10,000	12,000	0.13	2.4	10,000	7,200	0.07	1.94	8,000	5,250	0.07	1.63
4060-05-18		R0.5	10,000	12,000	0.14	2.4	10,000	7,200	0.07	1.98	8,000	5,250	0.07	1.75
4060-10-18		R1	10,000	12,000	0.15	2.4	10,000	7,200	0.07	2.16	8,000	5,250	0.08	1.75
4060-15-18		R1.5	10,000	12,000	0.17	2.4	10,000	7,200	0.08	2.34	8,000	5,250	0.11	1.75
4080-03-24	8	R0.3	7,500	12,000	0.17	2.86	7,500	7,200	0.08	2.76	6,000	4,100	0.15	1.77
4080-05-26		R0.5	7,500	12,000	0.18	2.64	7,500	7,200	0.08	2.61	6,000	4,100	0.14	1.76
4080-10-26		R1	7,500	12,000	0.18	2.72	7,500	7,200	0.09	2.7	6,000	4,100	0.16	1.76
4080-20-24		R2	7,500	12,000	0.22	2.88	7,500	7,200	0.1	2.79	6,000	4,100	0.18	1.96
4100-03-30	10	R0.3	6,000	12,000	0.2	3.04	5,000	5,400	0.14	2.82	4,800	4,100	0.18	1.89
4100-05-30		R0.5	6,000	12,000	0.22	3.04	5,000	5,400	0.14	2.88	4,800	4,100	0.18	2.03
4100-10-30		R1	6,000	12,000	0.24	3.28	5,000	5,400	0.14	2.97	4,800	4,100	0.19	2.1
4100-20-30		R2	6,000	12,000	0.26	3.44	5,000	5,400	0.14	3.06	4,800	4,100	0.2	2.45
4120-03-36	12	R0.3	5,000	12,000	0.21	3.32	3,000	4,320	0.18	2.9	4,000	4,100	0.19	2.15
4120-05-36		R0.5	5,000	12,000	0.24	3.32	3,000	4,320	0.18	2.96	4,000	4,100	0.19	2.32
4120-10-36		R1	5,000	12,000	0.26	3.59	3,000	4,320	0.18	3.06	4,000	4,100	0.2	2.4
4120-20-36		R2	5,000	12,000	0.28	3.76	3,000	4,320	0.18	3.15	4,000	4,100	0.21	2.8

WORK MATERIAL			TITANIUM / TITANIUM ALLOYS Ti-6Al-4V				HEAT RESISTANT ALLOYS Inconel718			
Model Number	Outside Diameter (mm)	Corner Radius (mm)	Spindle Speed (min^{-1})	Feed Rate (mm/min)	a_p Axial Depth (mm)	a_e Radial Depth (mm)	Spindle Speed (min^{-1})	Feed Rate (mm/min)	a_p Axial Depth (mm)	a_e Radial Depth (mm)
4020-05-06	2	R0.5	21,420	4,010	0.03	0.33	5,140	810	0.03	0.33
4030-08-09	3	R0.8	14,280	4,010	0.03	0.54	3,430	810	0.03	0.54
4040-03-12	4	R0.3	10,710	4,010	0.04	0.66	2,570	810	0.04	0.66
4040-05-12-4		R0.5	10,710	4,010	0.04	0.68	2,570	810	0.04	0.68
4040-05-12			10,710	4,010	0.04	0.68	2,570	810	0.04	0.68
4040-10-12-4		R1	10,710	4,010	0.04	0.77	2,570	810	0.04	0.77
4040-10-12			10,710	4,010	0.04	0.77	2,570	810	0.04	0.77
4050-12-15	5	R1.2	8,570	4,010	0.04	0.9	2,060	810	0.04	0.9
4060-03-18	6	R0.3	7,140	4,010	0.05	1	1,740	810	0.05	1
4060-05-18		R0.5	7,140	4,010	0.05	1	1,740	810	0.05	1
4060-10-18		R1	7,140	4,010	0.05	1.08	1,740	810	0.05	1.08
4060-15-18		R1.5	7,140	4,010	0.05	1.08	1,740	810	0.05	1.08
4080-03-24	8	R0.3	5,360	4,000	0.05	1.28	1,580	800	0.05	1.28
4080-05-26		R0.5	5,360	4,000	0.05	1.31	1,580	800	0.05	1.31
4080-10-26		R1	5,360	4,000	0.05	1.35	1,580	800	0.05	1.35
4080-20-24		R2	5,360	4,000	0.05	1.4	1,580	800	0.05	1.4
4100-03-30	10	R0.3	3,570	3,010	0.09	1.41	1,050	550	0.09	1.41
4100-05-30		R0.5	3,570	3,010	0.09	1.44	1,050	550	0.09	1.44
4100-10-30		R1	3,570	3,010	0.09	1.49	1,050	550	0.09	1.49
4100-20-30		R2	3,570	3,010	0.09	1.53	1,050	550	0.09	1.53
4120-03-36	12	R0.3	2,140	2,400	0.12	1.45	640	410	0.12	1.45
4120-05-36		R0.5	2,140	2,400	0.12	1.48	640	410	0.12	1.48
4120-10-36		R1	2,140	2,400	0.12	1.53	640	410	0.12	1.53
4120-20-36		R2	2,140	2,400	0.12	1.58	640	410	0.12	1.58

Milling Conditions for CRRS

◆Finishing (Flat / Inclined surface)

WORK MATERIAL			CARBON STEELS S45C / S55C (~225HB)				ALLOY STEELS SK / SCM / SUS (225~325HB) *Use cutting oils for Stainless Steels.				PREHARDENED STEELS HARDENED STEELS NAK / HPM / SKD / SKT / STAVAX (30~55HRC) *Recommend oil mist.			
Model Number	Outside Diameter (mm)	Corner Radius (mm)	Spindle Speed (min^{-1})	Feed Rate (mm/min)	a_p Axial Depth (mm)	a_e Radial Depth (mm)	Spindle Speed (min^{-1})	Feed Rate (mm/min)	a_p Axial Depth (mm)	a_e Radial Depth (mm)	Spindle Speed (min^{-1})	Feed Rate (mm/min)	a_p Axial Depth (mm)	a_e Radial Depth (mm)
4020-05-06	**2**	R0.5	30,000	1,720	0.1	0.06	30,000	1,510	0.05	0.05	24,000	1,070	0.05	0.04
4030-08-09	**3**	R0.8	20,000	1,890	0.1	0.09	20,000	1,660	0.05	0.08	16,000	1,160	0.05	0.07
4040-03-12	**4**	R0.3	15,000	1,050	0.1	0.07	15,000	910	0.05	0.06	12,000	620	0.05	0.05
4040-05-12-4		R0.5	15,000	1,360	0.1	0.09	15,000	1,180	0.05	0.08	12,000	810	0.05	0.07
4040-05-12			15,000	1,360	0.1	0.09	15,000	1,180	0.05	0.08	12,000	810	0.05	0.07
4040-10-12-4		R1	15,000	1,920	0.1	0.13	15,000	1,670	0.05	0.11	12,000	1,150	0.05	0.1
4040-10-12			15,000	1,920	0.1	0.13	15,000	1,670	0.05	0.11	12,000	1,150	0.05	0.1
4050-12-15	**5**	R1.2	12,000	1,910	0.1	0.16	12,000	1,630	0.05	0.14	9,600	1,120	0.05	0.12
4060-03-18	**6**	R0.3	10,000	890	0.2	0.09	10,000	760	0.1	0.08	8,000	510	0.1	0.06
4060-05-18		R0.5	10,000	1,150	0.2	0.12	10,000	990	0.1	0.1	8,000	670	0.1	0.08
4060-10-18		R1	10,000	1,630	0.2	0.16	10,000	1,400	0.1	0.14	8,000	950	0.1	0.12
4060-15-18		R1.5	10,000	2,000	0.2	0.2	10,000	1,720	0.1	0.17	8,000	1,170	0.1	0.15
4080-03-24	**8**	R0.3	7,500	1,170	0.2	0.11	7,500	1,050	0.1	0.09	6,000	720	0.1	0.08
4080-05-26		R0.5	7,500	990	0.2	0.13	7,500	860	0.1	0.11	6,000	580	0.1	0.1
4080-10-26		R1	7,500	1,410	0.2	0.19	7,500	1,210	0.1	0.16	6,000	830	0.1	0.14
4080-20-24		R2	7,500	1,990	0.2	0.27	7,500	1,720	0.1	0.23	6,000	1,170	0.1	0.2
4100-03-30	**10**	R0.3	6,000	720	0.2	0.12	5,000	510	0.1	0.1	4,800	400	0.1	0.08
4100-05-30		R0.5	6,000	940	0.2	0.16	5,000	660	0.1	0.13	4,800	520	0.1	0.11
4100-10-30		R1	6,000	1,330	0.2	0.22	5,000	940	0.1	0.19	4,800	740	0.1	0.15
4100-20-30		R2	6,000	1,890	0.2	0.32	5,000	1,340	0.1	0.27	4,800	1,050	0.1	0.22
4120-03-36	**12**	R0.3	5,000	680	0.2	0.14	3,000	330	0.1	0.1	4,000	360	0.1	0.09
4120-05-36		R0.5	5,000	880	0.2	0.18	3,000	430	0.1	0.14	4,000	480	0.1	0.12
4120-10-36		R1	5,000	1,240	0.2	0.24	3,000	610	0.1	0.2	4,000	680	0.1	0.16
4120-20-36		R2	5,000	1,760	0.2	0.35	3,000	870	0.1	0.29	4,000	960	0.1	0.24

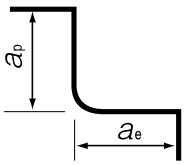
WORK MATERIAL			TITANIUM / TITANIUM ALLOYS Ti-6Al-4V				HEAT RESISTANT ALLOYS Inconel718			
Model Number	Outside Diameter (mm)	Corner Radius (mm)	Spindle Speed (min^{-1})	Feed Rate (mm/min)	a_p Axial Depth (mm)	a_e Radial Depth (mm)	Spindle Speed (min^{-1})	Feed Rate (mm/min)	a_p Axial Depth (mm)	a_e Radial Depth (mm)
4020-05-06	**2**	R0.5	21,420	840	0.04	0.03	5,140	170	0.04	0.03
4030-08-09	**3**	R0.8	14,280	920	0.04	0.04	3,430	190	0.04	0.04
4040-03-12	**4**	R0.3	10,710	510	0.04	0.03	2,570	100	0.04	0.03
4040-05-12-4		R0.5	10,710	660	0.04	0.04	2,570	130	0.04	0.04
4040-05-12			10,710	660	0.04	0.04	2,570	130	0.04	0.04
4040-10-12-4		R1	10,710	930	0.04	0.06	2,570	190	0.04	0.06
4040-10-12			10,710	930	0.04	0.06	2,570	190	0.04	0.06
4050-12-15	**5**	R1.2	8,570	910	0.03	0.07	2,060	180	0.03	0.07
4060-03-18	**6**	R0.3	7,140	420	0.07	0.04	1,740	90	0.07	0.04
4060-05-18		R0.5	7,140	550	0.07	0.05	1,740	110	0.07	0.05
4060-10-18		R1	7,140	780	0.07	0.07	1,740	160	0.07	0.07
4060-15-18		R1.5	7,140	960	0.06	0.08	1,740	190	0.06	0.08
4080-03-24	**8**	R0.3	5,360	400	0.06	0.04	1,580	80	0.06	0.04
4080-05-26		R0.5	5,360	480	0.06	0.06	1,580	100	0.06	0.06
4080-10-26		R1	5,360	670	0.06	0.08	1,580	130	0.06	0.08
4080-20-24		R2	5,360	960	0.05	0.12	1,580	190	0.05	0.12
4100-03-30	**10**	R0.3	3,570	280	0.06	0.05	1,050	50	0.06	0.05
4100-05-30		R0.5	3,570	370	0.06	0.07	1,050	70	0.06	0.07
4100-10-30		R1	3,570	520	0.06	0.1	1,050	100	0.06	0.1
4100-20-30		R2	3,570	750	0.06	0.14	1,050	140	0.06	0.14
4120-03-36	**12**	R0.3	2,140	240	0.07	0.05	640	40	0.07	0.05
4120-05-36		R0.5	2,140	310	0.07	0.07	640	50	0.07	0.07
4120-10-36		R1	2,140	400	0.07	0.11	640	70	0.07	0.12
4120-20-36		R2	2,140	520	0.07	0.17	640	100	0.07	0.17

Milling Conditions for CRRS

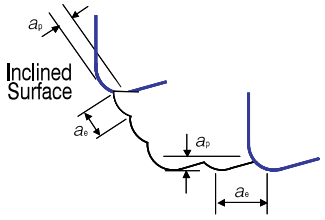
Please adjust milling parameter referring following table.

D : Outside Diameter (mm)
L : Overhang Length (mm)

Roughing Parameter



Finishing Parameter
(Flat / Inclined Surface)



D : ϕ2.0~3.0

Overhang Length L/D	Spindle Speed (min^{-1})	Feed Rate (mm/min)	a_p Axial Depth (mm)	a_e Radial Depth (mm)
L/D≦6	×1	×1	×1	×1
L/D=7	×0.8	×0.8	×0.8	×0.9
L/D=8	×0.7	×0.7	×0.7	×0.9
L/D=9	×0.7	×0.7	×0.6	×0.8
L/D=10	×0.6	×0.6	×0.6	×0.7

D : ϕ4.0~6.0

Overhang Length L/D	Spindle Speed (min^{-1})	Feed Rate (mm/min)	a_p Axial Depth (mm)	a_e Radial Depth (mm)
L/D≦4	×1	×1	×1	×1
L/D=5	×0.9	×0.8	×0.9	×0.9
L/D=6	×0.8	×0.7	×0.8	×0.9
L/D=7	×0.7	×0.6	×0.6	×0.8
L/D=8	×0.5	×0.4	×0.6	×0.7

D : ϕ8.0~12.0

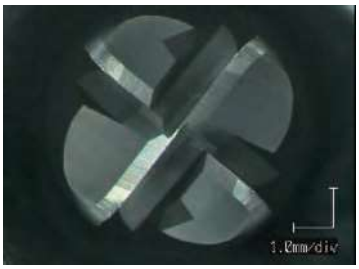
Overhang Length L/D	Spindle Speed (min^{-1})	Feed Rate (mm/min)	a_p Axial Depth (mm)	a_e Radial Depth (mm)
L/D≦4	×1	×1	×1	×1
L/D=5	×0.7	×0.6	×0.6	×0.8
L/D=6	×0.5	×0.4	×0.5	×0.7

Note:
・Decrease both spindle speed and feed rate proportionally when the milling parameters exceed the machine's maximum spindle speed.
・Decrease the feed rate more than 50% from the milling parameters when slot milling.
・Only adjust the spindle speed to calculate milling conditions based on the overhang length in finishing process.
・Every coolant offers stable milling.
・Recommend wet coolant for Stainless Steels.

Tools After Milling by Different Work Materials　CRRS φ6 × CR0.5

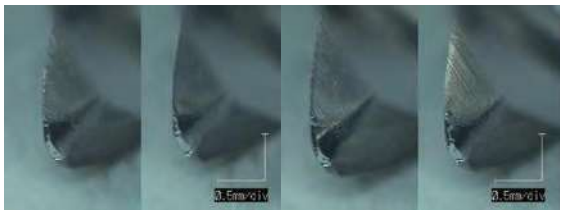
Spindle Speed	Feed Rate	a_p	a_e	Overhang Length	Cycle Time	Coolant
10,000 min^{-1}	12,000 mm/min	0.14 mm	2.4 mm	24 mm	90 min	Air Blow (Nozzle)

S50C



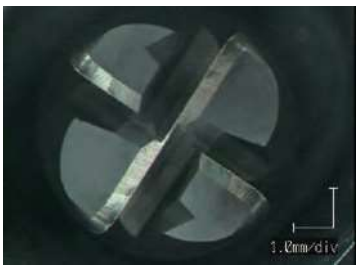
Relief Wear Width

0.070 mm



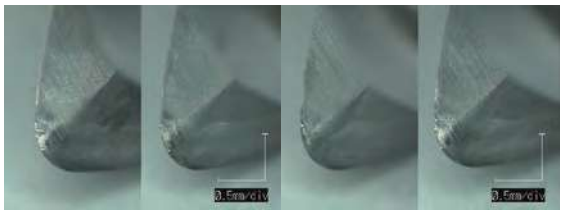
Spindle Speed	Feed Rate	a_p	a_e	Overhang Length	Cycle Time	Coolant
10,000 min^{-1}	7,200 mm/min	0.07 mm	1.98 mm	24 mm	84 min	Water Soluble

SUS304



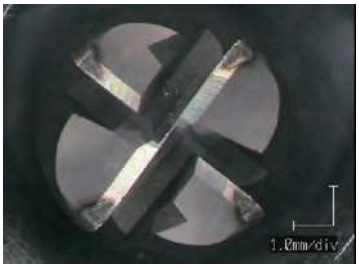
Relief Wear Width

0.032 mm



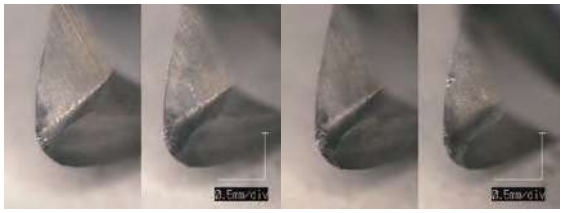
Spindle Speed	Feed Rate	a_p	a_e	Overhang Length	Cycle Time	Coolant
8,000 min^{-1}	5,250 mm/min	0.07 mm	1.75 mm	24 mm	56 min	Oil Mist

STAVAX（52HRC）



Relief Wear Width

0.087 mm



CRRS ϕ6 × CR0.3 Milling Example — Ti-6Al-4V

Spindle Speed	Feed Rate	a_p	a_e	Cycle Time	Coolant
7,150 min^{-1}	4,000 mm/min	0.05 mm	1 mm	67 min	Water Soluble (Through-spindle)

Square pocket size 100 × 25 × 4 mm

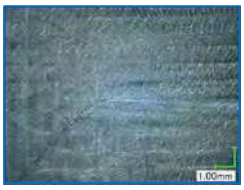
No vibration and chattering. No burrs or chattering on workpiece. No tool damage and tool wear within normal range.

End profile

Whole workpiece surface

Workpiece surface (red close-up)

Workpiece surface (blue close-up)



Rake face (Main flute)

Rake face (Sub flute)

Peripheral relief (Main flute)

Peripheral relief (Sub flute)

CRRS ϕ6 × CR1.5 Milling Example — Inconel718

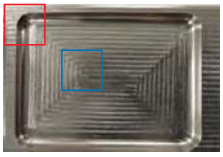
Spindle Speed	Feed Rate	a_p	a_e	Cycle Time	Coolant
1,740 min^{-1}	820 mm/min	0.06 mm	1.1 mm	63 min	Water Soluble (Through-spindle)

Square pocket size 40 × 30 × 3 mm

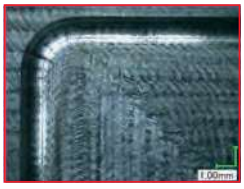
No vibration and chattering. No burrs or chattering on workpiece. Chipping on rake face due to wear on the bottom cutting edge. Acceptable given the 60min milling of Inconel.

End profile

Whole workpiece surface



Workpiece surface (red close-up)



Workpiece surface (blue close-up)

Rake face (Main flute)

Rake face (Sub flute)

Peripheral relief (Main flute)

Peripheral relief (Sub flute)