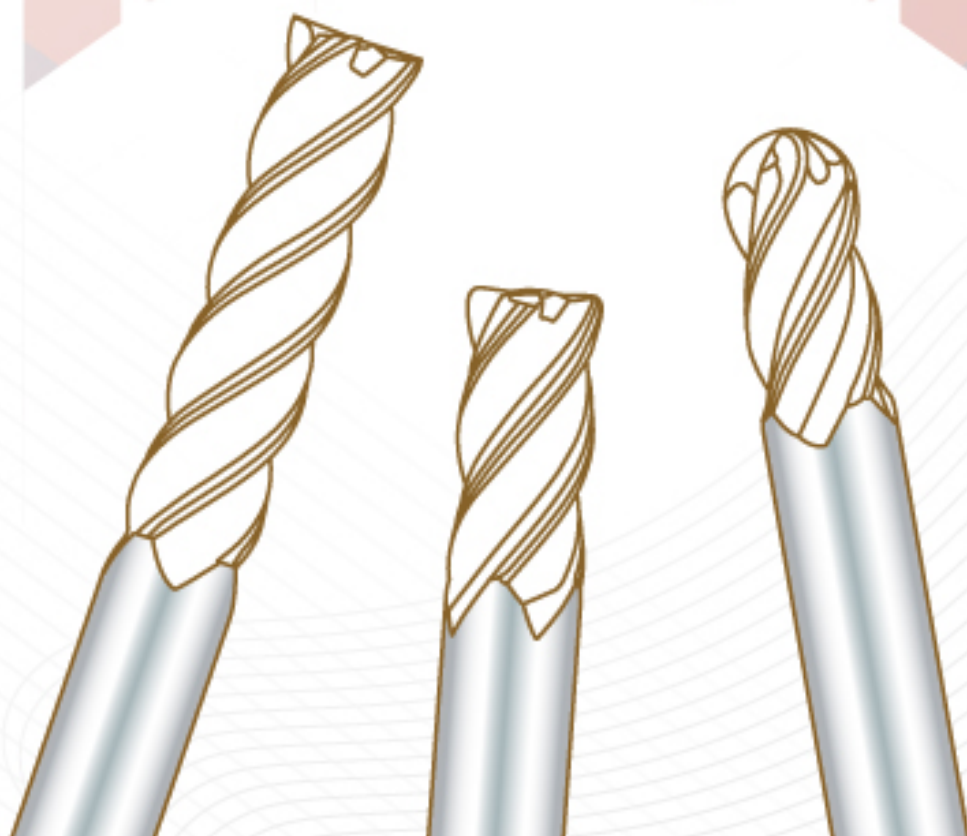




X600⁺ Series **Solid Carbide**

End Mills



Guide Page

Carbide Material & Types of tool ①

Series ②

Code No. ③

Description ④

Icon ⑤

Diameter tolerance ⑥

Specification Table ⑦

DIN Standard ⑧

Cutting Suitability ⑨

Work Material ⑩

UMG Carbide - High-Speed Square End Mill

X600⁺ - 11374TO

③

• Square - 4-Flute x 2.5D

• Helix 37°

④

⑤

⑥

CED Tolerance(mm)

1~3	0~-0.014
3~6	0~-0.018
6~10	0~-0.002
10~12	0~-0.025

(unit : mm)

⑦

Code No.	CED	CEL	SD	OAL	Flute
X600 ⁺ -11374TO	1	3	4	50	4
	2	5	4	50	
	3	8	4	50	
	4	10	4	50	
	5	13	6	50	
	6	15	6	50	
	8	20	8	60	
	10	25	10	75	
12	30	12	75		

⑧

Code No.	CED	CEL	SD	OAL	Flute
X600 ⁺ -11374TO	3	8	6	57	4
	4	11	6	57	
	5	13	6	57	
	6	13	6	57	

⑨

Depth of cut	a _p	a _e	a _p	a _e	a _p	a _e	a _p	a _e
12	3,400	820	3,060	620	2,430	340	1,900	230
	a_p 1.5D a_e 0.2D		a_p 1.5D a_e 0.1D		a_p 1.5D a_e 0.05D		a_p 1.5D a_e 0.03D	

⑩

Work Material

P			H		
G1	G2	G3	G14	G15	G16
•	•	•	•	•	•

⑨

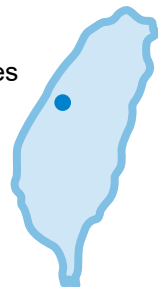
- Please select high rigid tool holder and collet chuck during machining.
- Please select the suitable coolant fluid.
- For dry cutting, please use air blow for chip removal and cooling.
- These cutting data are for reference only. Please adjust the cutting speed according to machine capability and working conditions.
- If vibrations occur during cutting process, adjust and reduce the cutting speed.

About Us

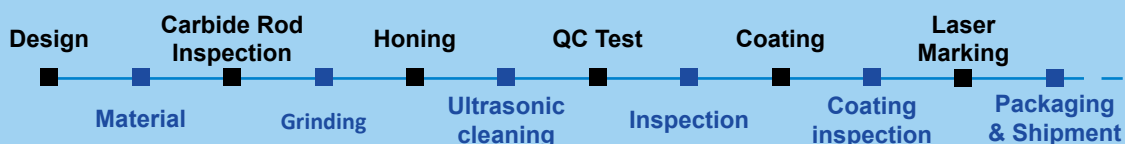
Founded in **1986**, **CITY TOOLS** is a leading solid carbide cutting tool manufacturer located in Taiwan.

ISO9001:2000 certified, our products are widely used in Aerospace, Medical, Automotive, Electronic industry, Mechanical parts, Molds & Die, Woodworking, Plastic and all kinds of Metal / Non-Metal processing industrial.

In order to improve our production quality, we imported advanced CNC grinding machines from Germany. We use advanced inspection equipment to conduct 100% inspections at every stage of production to ensure quality and provide customers with perfect service.



Manufacturing



Walter Grinding Machine

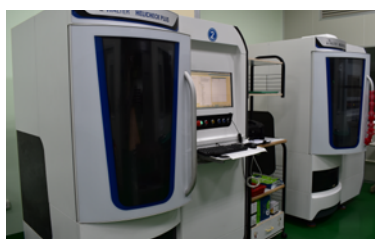
Production | *Ensure accuracy quality tools and Increase productivity*



Quality Management

Full inspection on each tool with precised accuracy

| *100% comprehensive inspection with precised accuracy*

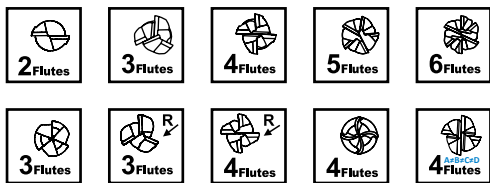


Icon Guide

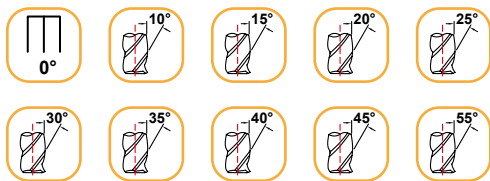
Type of Flute



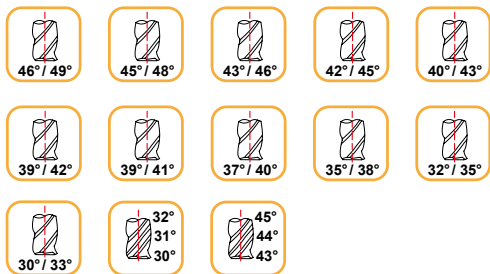
Type of Uneven Flute



Helix angle



Variable helix angle



Honing Process



Type of cutting edge



IE



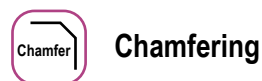
Processing direction



Work piece material hardness



Angle & Type of Cutting Edge



Icon Guide

Type of Coating



Code	Name	Oxidation Temperature	Surface Hardness(Hv)	Coefficient of Friction	Coating Thickness(μm)
TA	AlTiCrN	900°C	3200	0.5	0.1~0.4
TN	TiAlN	800°C	2600	0.4	0.1~0.4
TB	AlTiSiN-B	1100°C	3500	0.45	0.1~0.4
TO	AlTiSiN	1000°C	3200	0.45	0.1~0.4
Z3	AlTiSiZrN	1000°C	3000	0.4	0.1~0.4
DLC	Diamod	550°C	2500	0.1	0.8
TS	TA-C	1100°C	5500	0.1	0.1~1

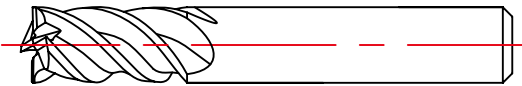
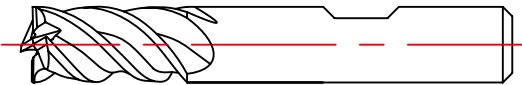
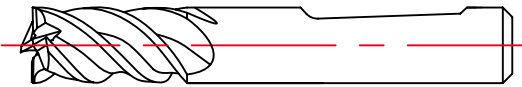
※ Actual coating color may have slight difference due to coating temperature.

Solid Carbide Material

icon	Grade	Grain size	Cobalt	Hardness
	Ultrafine Micro Grain Carbide	0.2um~0.3um	8.2%	HRA93.7
	Ultra Micro Grain Carbide	0.4um~0.5um	12%	HRA92.7
	Super Micro Grain Carbide	0.6um~0.8um	10%	HRA92.3
	High Speed Steel	---	8%	HRC66~68

Icon Guide

Optional Weldon Shank HB, HE Service

Form HA, plain	
Form HB, with drive flat	
Form HE, with whistle notch flat	

Type of cutting edge

	Gashland Edge: The tools with Gashland Edge have reduced corner sharpness, increasing strength and preventing chipping to enhance tool life.
	Sharp Edge: The sharp edge blade is used for cleaning pin corners on the workpiece, which are left uncleaned by tools with Gashland Edge.

Honing Process

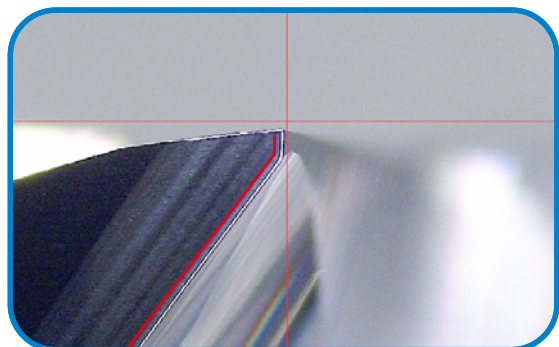
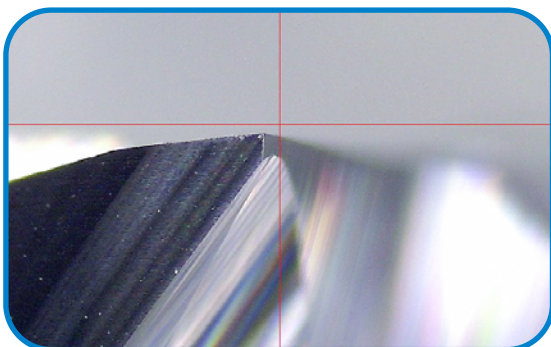
The honing process creates a micro R on the edge, it's enable to reduce chipping, enhancing coating adhesion and prolonging tool life.



without honing



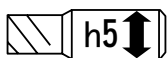
with honing



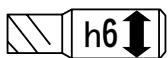
Material CHART

ISO	Group	Material	Tensile Strength N/mm2	Hardness HB
P	G1	Non-alloyed Steel, cast steel, free cutting steel	420 - 848	125 - 300
	G2	<24HRC Low-alloyed Steel, cast steel	600 - 1200	200 - 300
	G3	<30HRC Hi-alloyed Steel, cast steel, tool steel	680-1100	200- 325
M	G4	Stainless Steel, cast steel	600 - 820	180 - 240
K	G5	Gray Cast Iron, Ductile cast iron, Malleable cast iron		130 - 260
N	G6	Aluminium		60 - 130
	G7	Copper		90 - 110
	G8	Plastics, Hard rubber		
	G9	FRP CFRP Composite Material		
	G10	Graphite		
S	G11	High Temp Alloys		200 - 280
	G12	Nickel		320 - 350
	G13	Titanium	400 - 1,050	
H	G14	30-38HRC Hardened Steel		
	G15	38-48HRC Hardened Steel		
	G16	48-56HRC Hardened Steel		
	G17	56-65HRC Hardened Steel		

High Precision Shank Tolerance

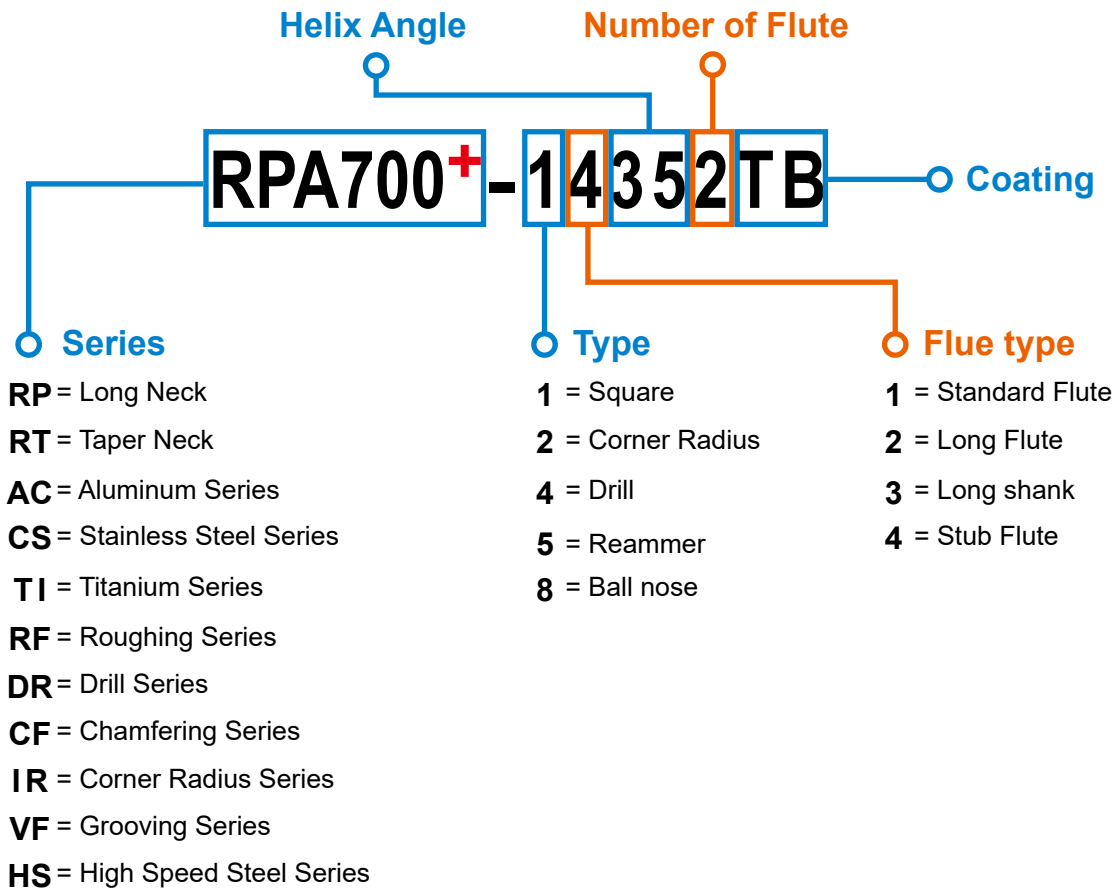


The h5 high precision tolerance, optimum concentricity and runout for precision chucks.



h6 high precision tolerance for HSS series, optimum concentricity and runout for precision chucks.

Coding Principle



A700IE+-11384TH

I = Uneven flute
E = Variable helix angle

S500M+-11302TN

M = Miniature

AC100RN+-11403

R = Heavy Duty Operation

N = Sharp edge

X600⁺ Series

Mold Processing & Parts Processing

Appearance	Code No	Description	Size	Pg
	X600 ⁺ -11374TO	Square - 4-Flute x 2.5D / Helix 37°	Ø1~Ø12	11
	X600 ⁺ -11374TO	Square - 4-Flute x 3D / Helix 37°	Ø1~Ø20	13
	X600 ⁺ -12456TO	Square - 6-Flute x 4D Long Flute Helix 45°	Ø6~Ø20	15
	X600M ⁺ -14352TO	Square - 2-Flute x 1D / Helix 35° / Miniature	Ø0.2~Ø0.9	17
	X600 ⁺ -81372TO	Ball Nose - 2-Flute x 2D / Helix 37°	0.5R~6R	19
	X600 ⁺ -81404TO	Ball Nose - 4-Flute x 2D / Helix 40°	3R~10R	21
	X600 ⁺ -83372TO	Ball Nose - 2-Flute x 1D / Long Shank Helix 37°	0.5R~6R	23
	X600 ⁺ -83404TO	Ball Nose - 4-Flute x 2D / Long Shank Helix 40°	3R~10R	25
	X600M ⁺ -84352TO	Ball Nose - 2-Flute x 1D / Helix 35° Miniature	0.1R~0.45R	27
	X600 ⁺ -21454TO	Corner Radius - 4-Flute x 3D / Helix 45°	Ø1~Ø12	29
	X600IE ⁺ -11374TO	Square - 4-Flute x 2.5D Uneven Flute / Variable Helix 37°/40°	Ø1~Ø20	31
	X600IE ⁺ -12394TO	Square - 4-Flute x 4D / Long Flute Uneven Flute / Variable Helix 39°/42°	Ø4~Ø20	33
	X600IE ⁺ -81374TO	Ball Nose - 4-Flute x 2D Uneven Flute / Variable Helix 37°/40°	3R~10R	35
	X600IE ⁺ -21374TO	Corner Radius - 4-Flute x 2.5D Uneven Flute / Variable Helix 37°/40°	Ø1~Ø12	37

X600⁺ Series

Mold Processing & Parts Processing



Variable Helix Angle & Uneven Flute

High Speed Cutting, enable to reduce vibration and noise



Cutting edge with Gashland

Enable to reduce chipping with longer tool life



Optional Coating

Optional 3 types of selectable coating



Ultrafine Micro Grain Carbide

Suitable for work material ~ HRC60

Types of Flute



Types of Uneven Flute



Optional DIN Weldon Shank



Honing Process



with honing



without honing

Special & Custom Tooling Services

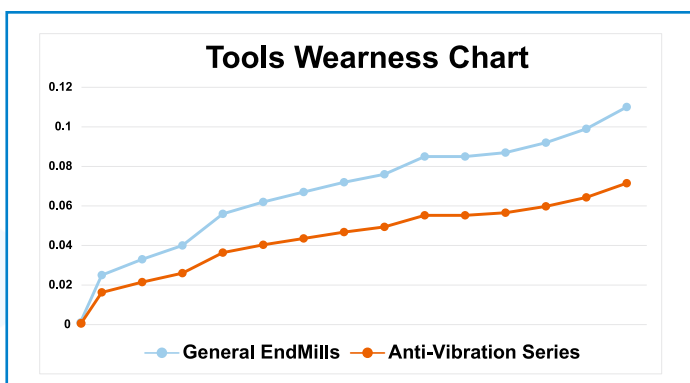
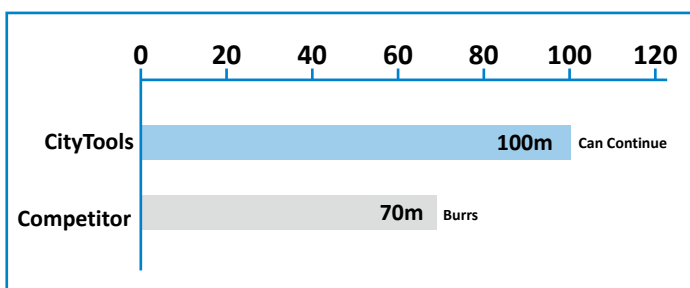
Customized acceptable !

From **Coating**, **flute**, **Helix angle**, **cutting length**, to **total length**.

Smooth cutting & Longer Tool Life

X600IE with Uneven Flute/Variable Helix angle geometry design, TO coating (AlTiCrSiN) layer with high temperature resistance and high hardness, resulting in better cutting stability and increasing longer tool life 30%.

Suitable for Mild steels, Cast Irons, Hardened steels with longer tool life.



Tool	X600IE ⁺ -11374TO
Tool Size	Ø10
Work Material	S50C
Milling Method	Side Milling
Cutting Speed	3870 rev/min
Feed Rate	850 (0.055 mm/t)
Depth of Cut	Ap=15mm, Ae=1mm
Coolant	Air Cooling
Machine	Vertical Machining Center

Unique heat resistance coating reduce wear reduction

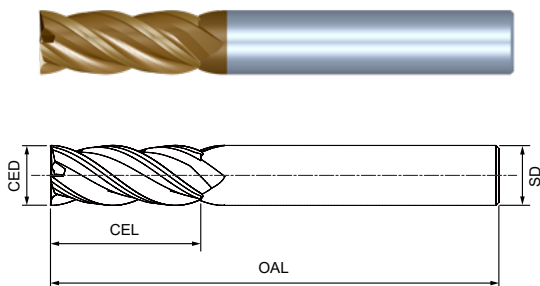
Longer Tool life and Better Surface

Under the same condition of cutting, the wear resistance of X600IE+-11394TO is about 30% lower and get longer tool life comparing with competitor brand.

UMG Carbide - High-Speed Square End Mill

X600⁺ - 11374TO

- ♦ Square - 4-Flute x 2.5D
- ♦ Helix 37°



CED Tolerance(mm)	
1~3	0~-0.014
3~6	0~-0.018
6~10	0~-0.002
10~12	0~-0.025

(unit : mm)

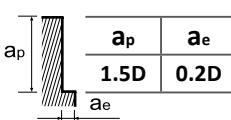
Code No.	CED	CEL	SD	OAL	Flute
X600 ⁺ -11374TO	1	3	4	50	4
	2	5	4	50	
	3	8	4	50	
	4	10	4	50	
	5	13	6	50	
	6	15	6	50	
	8	20	8	60	
	10	25	10	75	
	12	30	12	75	

Code No.	CED	CEL	SD	OAL	Flute
X600 ⁺ -11374TO	3	8	6	57	4
	4	11	6	57	
	5	13	6	57	
	6	13	6	57	
	8	19	8	63	
	10	22	10	72	
	12	26	12	83	

※ Customized Special sizes, Coating type and Inches are available to order.

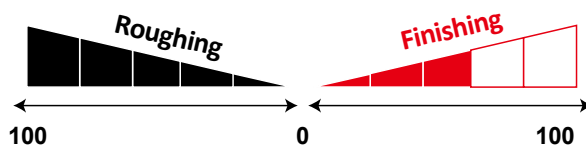
Recommended Cutting Condition

Side Milling

Work Material	Alloyed Steel 25~35HRC		Hardened Steel 35~45HRC		Hardened Steel 45~55HRC		Hardened Steel 55~60HRC													
Cutting Condition	Speed RPM/ min	Feed mm/ min	Speed RPM/ min	Feed mm/ min	Speed RPM/ min	Feed mm/ min	Speed RPM/ min	Feed mm/ min												
CED	a_p : 1.5D	a_e : 0.2D	a_p : 1.5D	a_e : 0.1D	a_p : 1.5D	a_e : 0.05D	a_p : 1.5D	a_e : 0.03D												
1	30,200	470	27,180	360	21,600	250	17,000	170												
2	18,600	580	16,740	440	12,240	210	9,700	150												
3	13,700	690	12,330	520	9,270	240	7,400	230												
4	10,300	740	9,270	560	6,900	360	5,500	250												
5	8,200	790	7,380	600	5,670	400	4,500	280												
6	5,900	990	5,310	750	4,590	480	3,600	340												
8	5,100	990	4,590	750	3,600	470	2,880	330												
10	4,100	880	3,690	670	2,880	450	2,300	320												
12	3,400	820	3,060	620	2,430	340	1,900	230												
Depth of cut			<table><tr><td>a_p</td><td>a_e</td></tr><tr><td>1.5D</td><td>0.1D</td></tr></table>		a_p	a_e	1.5D	0.1D	<table><tr><td>a_p</td><td>a_e</td></tr><tr><td>1.5D</td><td>0.05D</td></tr></table>		a_p	a_e	1.5D	0.05D	<table><tr><td>a_p</td><td>a_e</td></tr><tr><td>1.5D</td><td>0.03D</td></tr></table>		a_p	a_e	1.5D	0.03D
					a_p	a_e														
1.5D	0.1D																			
a_p	a_e																			
1.5D	0.05D																			
a_p	a_e																			
1.5D	0.03D																			

Work Material

P			H		
G1	G2	G3	G14	G15	G16
•	•	•	•	•	•

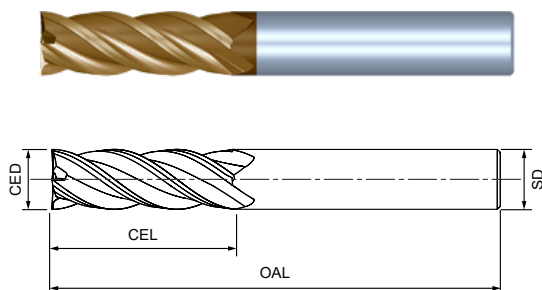


1. Please select high rigid tool holder and collet chuck during machining.
2. Please select the suitable coolant fluid.
3. For dry cutting, please use air blow for chip removal and cooling.
4. These cutting data are for reference only. Please adjust the cutting speed according to machine capability and working conditions.
5. If vibrations occur during cutting process, adjust and reduce the cutting speed.

UMG Carbide - High-Speed Square End Mill

X600⁺ - 11374TO

- ♦ Square - 4-Flute x 3D
- ♦ Helix 37°



CED Tolerance(mm)	
1~3	0~-0.014
3~6	0~-0.018
6~10	0~-0.02
10~18	0~-0.025
18~20	0~-0.03

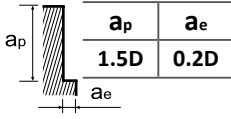
(unit : mm)

Code No.	CED	CEL	SD	OAL	Flute
X600 ⁺ -11374TO	1	3	4	50	4
	2	6	4	50	
	3	9	4	50	
	4	12	4	50	
	5	15	6	50	
	6	18	6	50	
	8	24	8	65	
	10	30	10	75	
	12	36	12	80	
	16	48	16	100	
	20	60	20	125	

Code No.	CED	CEL	SD	OAL	Flute
X600 ⁺ -11374TO	3	9	6	57	4
	4	12	6	65	
	5	15	6	65	
	6	18	6	65	
	8	24	8	75	
	10	30	10	80	
	12	36	12	93	

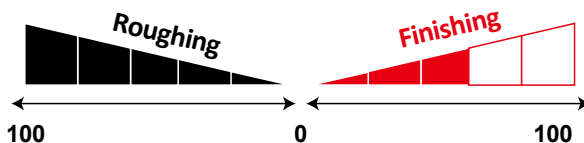
※ Customized Special sizes, Coating type and Inches are available to order.

Side Milling

Work Material	Alloyed Steel 25~35HRC		Hardened Steel 35~45HRC		Hardened Steel 45~55HRC		Hardened Steel 55~60HRC													
Cutting Condition	Speed RPM/ min	Feed mm/ min	Speed RPM/ min	Feed mm/ min	Speed RPM/ min	Feed mm/ min	Speed RPM/ min	Feed mm/ min												
CED	a_p : 1.5D	a_e : 0.2D	a_p : 1.5D	a_e : 0.1D	a_p : 1.5D	a_e : 0.05D	a_p : 1.5D	a_e : 0.03D												
1	30,200	470	27,180	360	21,600	250	17,000	170												
2	18,600	580	16,740	440	12,240	210	9,700	150												
3	13,700	690	12,330	520	9,270	240	7,400	230												
4	10,300	740	9,270	560	6,900	360	5,500	250												
5	8,200	790	7,380	600	5,670	400	4,500	280												
6	5,900	990	5,310	750	4,590	480	3,600	340												
8	5,100	990	4,590	750	3,600	470	2,880	330												
10	4,100	880	3,690	670	2,880	450	2,300	320												
12	3,400	820	3,060	620	2,430	340	1,900	230												
16	2,600	610	2,340	460	1,890	270	1,500	190												
20	2,050	490	1,840	370	1,500	190	1,200	140												
Depth of cut			<table><tr><td>a_p</td><td>a_e</td></tr><tr><td>1.5D</td><td>0.1D</td></tr></table>		a_p	a_e	1.5D	0.1D	<table><tr><td>a_p</td><td>a_e</td></tr><tr><td>1.5D</td><td>0.05D</td></tr></table>		a_p	a_e	1.5D	0.05D	<table><tr><td>a_p</td><td>a_e</td></tr><tr><td>1.5D</td><td>0.03D</td></tr></table>		a_p	a_e	1.5D	0.03D
					a_p	a_e														
					1.5D	0.1D														
a_p	a_e																			
1.5D	0.05D																			
a_p	a_e																			
1.5D	0.03D																			

Work Material

P			H		
G1	G2	G3	G14	G15	G16
•	•	•	•	•	•

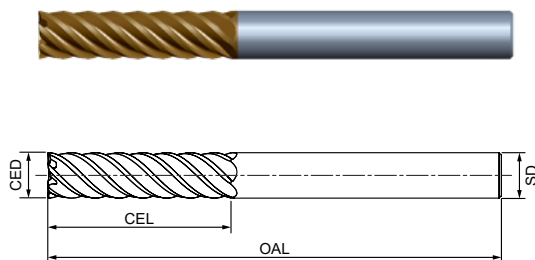


1. Please select high rigid tool holder and collet chuck during machining.
2. Please select the suitable coolant fluid.
3. For dry cutting, please use air blow for chip removal and cooling.
4. These cutting data are for reference only. Please adjust the cutting speed according to machine capability and working conditions.
5. If vibrations occur during cutting process, adjust and reduce the cutting speed.

UMG Carbide - High-Speed Finishing Long Flute End Mill

X600⁺ - 12466TO

- ♦ Square - 6-Flute x 4D / Long Flute
- ♦ Helix 46°



CED Tolerance(mm)	
6~10	0~-0.02
10~16	0~-0.025
16~20	0~-0.03

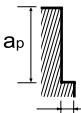
(unit : mm)

Code No.	CED	CEL	SD	OAL	Flute
X600 ⁺ -12466TO	6	24	6	65	6
	8	32	8	90	
	10	40	10	100	
	12	48	12	110	
	16	64	16	140	
	20	80	20	160	

Code No.	CED	CEL	SD	OAL	Flute
X600 ⁺ -12466TO	6	24	6	65	6
	8	32	8	80	
	10	40	10	90	
	12	48	12	100	

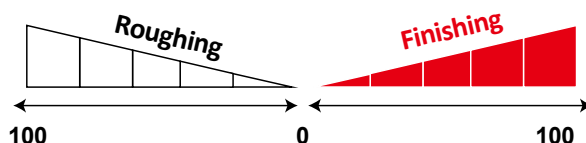
※ Customized Special sizes, Coating type and Inches are available to order.

Side Milling

Work Material	Alloyed Steel 25~35HRC		Hardened Steel 35~45HRC		Hardened Steel 45~55HRC		Hardened Steel 55~60HRC													
Cutting Condition	Speed RPM/ min	Feed mm/ min	Speed RPM/ min	Feed mm/ min	Speed RPM/ min	Feed mm/ min	Speed RPM/ min	Feed mm/ min												
CED	a _p : 2.5D	a _e : 0.05D	a _p : 2.5D	a _e : 0.03D	a _p : 2.5D	a _e : 0.02D	a _p : 2.5D	a _e : 0.01D												
6	6,400	1,200	5,760	1,080	4,300	910	4,300	450												
8	4,800	1,400	4,000	1,190	3,200	910	2,900	450												
10	3,400	1,300	2,800	1,170	2,500	910	2,600	450												
12	2,900	1,250	2,750	1,100	2,100	880	2,190	450												
16	2,100	1,150	1,800	1,000	1,620	800	1,600	430												
20	1,900	1,100	1,600	990	1,300	780	1,300	480												
Depth of cut			<table><tr><td>a_p</td><td>a_e</td></tr><tr><td>2.5D</td><td>0.03D</td></tr></table>		a _p	a _e	2.5D	0.03D	<table><tr><td>a_p</td><td>a_e</td></tr><tr><td>2.5D</td><td>0.02D</td></tr></table>		a _p	a _e	2.5D	0.02D	<table><tr><td>a_p</td><td>a_e</td></tr><tr><td>2.5D</td><td>0.01D</td></tr></table>		a _p	a _e	2.5D	0.01D
					a _p	a _e														
2.5D	0.03D																			
a _p	a _e																			
2.5D	0.02D																			
a _p	a _e																			
2.5D	0.01D																			

Work Material

P			H			
G1	G2	G3	G14	G15	G16	G17
●	●	●	●	●	●	○

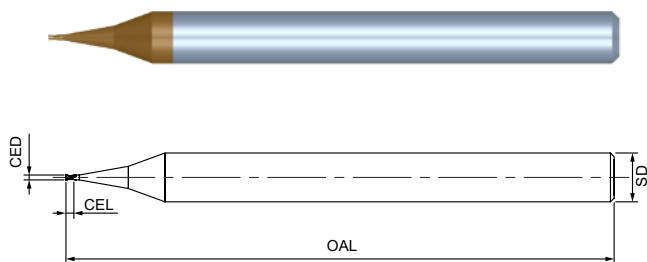


1. Please select high rigid tool holder and collet chuck during machining.
2. Please select the suitable coolant fluid.
3. For dry cutting, please use air blow for chip removal and cooling.
4. These cutting data are for reference only. Please adjust the cutting speed according to machine capability and working conditions.
5. If vibrations occur during cutting process, adjust and reduce the cutting speed.

UMG Carbide - High-Speed Miniature End Mill

X600M⁺ - 14352TO

- ♦ Square - 2-Flute x 1D / Miniature
- ♦ Helix 35°



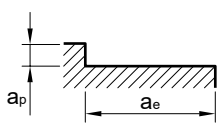
CED Tolerance(mm)	
0.2~0.9	0~-0.014

(unit : mm)

Code No.	CED	CEL	SD	OAL	Flute
X600M ⁺ -14352TO	0.2	0.2	4	45	2
	0.3	0.3	4	45	
	0.4	0.4	4	45	
	0.5	0.5	4	45	
	0.6	0.6	4	45	
	0.7	0.7	4	45	
	0.8	0.8	4	45	
	0.9	0.9	4	45	

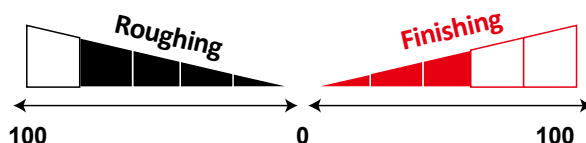
※ Customized Special sizes, Coating type and Inches are available to order.

Side Milling

Work Material	Alloyed Steel 25~35HRC		Hardened Steel 35~45HRC		Hardened Steel 45~55HRC		Hardened Steel 55~60HRC	
Cutting Condition	Speed RPM/ min	Feed mm/ min	Speed RPM/ min	Feed mm/ min	Speed RPM/ min	Feed mm/ min	Speed RPM/ min	Feed mm/ min
CED	a_p : 0.05D	a_e : 0.6D	a_p : 0.04D	a_e : 0.5D	a_p : 0.03D	a_e : 0.4D	a_p : 0.02D	a_e : 0.2D
0.2	40,000	300	38,000	270	33,700	215	31,500	190
0.3	36,000	400	34,000	360	30,000	285	28,000	220
0.4	28,000	420	27,000	378	24,000	300	22,400	240
0.5	28,000	520	27,000	440	24,000	350	22,400	280
0.6	28,000	600	27,000	570	24,000	450	22,400	360
0.7	28,000	600	27,000	570	24,000	450	22,400	360
0.8	28,000	680	27,000	610	24,000	480	22,400	380
0.9	28,000	700	27,000	620	24,000	550	22,400	450
Depth of cut								
	a_p	a_e	a_p	a_e	a_p	a_e	a_p	a_e
	0.05D	0.6D	0.04D	0.5D	0.03D	0.4D	0.02D	0.2D

Work Material

P			H		
G1	G2	G3	G14	G15	G16
•	•	•	•	•	•

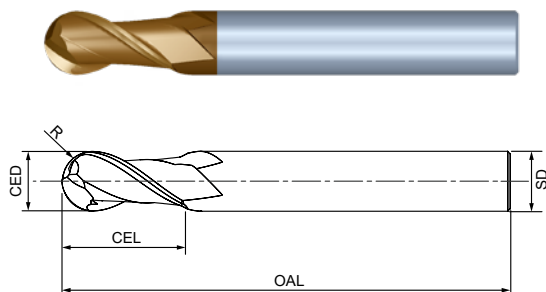


1. Please select high rigid tool holder and collet chuck during machining.
2. Please select the suitable coolant fluid.
3. For dry cutting, please use air blow for chip removal and cooling.
4. These cutting data are for reference only. Please adjust the cutting speed according to machine capability and working conditions.
5. If vibrations occur during cutting process, adjust and reduce the cutting speed.

UMG Carbide - High-Speed Ball End Mill

X600⁺ - 81372TO

- ♦ Ball Nose - 2-Flute x 2D
- ♦ Helix 37°



CED Tolerance(mm)	
R	±0.02

(unit : mm)

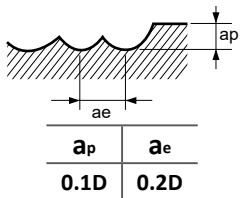
Code No.	Radius	CEL	SD	OAL	Flute
X600 ⁺ -81372TO	0.5R	2	4	50	2
	1R	4	4	50	
	1.5R	6	4	50	
	2R	8	4	50	
	2.5R	10	6	50	
	3R	12	6	50	
	4R	16	8	60	
	5R	20	10	75	
	6R	24	12	75	

Code No.	Radius	CEL	SD	OAL	Flute
X600 ⁺ -81372TO	1.5R	6	6	57	2
	2R	8	6	57	
	2.5R	10	6	57	
	3R	12	6	57	
	4R	16	8	63	
	5R	20	10	72	
	6R	24	12	83	

※ Customized Special sizes, Coating type and Inches are available to order.

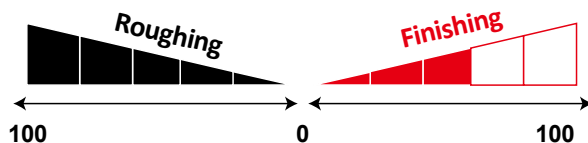
Recommended Cutting Condition

General Milling

Work Material	Alloyed Steel 25~35HRC		Hardened Steel 35~45HRC		Hardened Steel 45~55HRC		Hardened Steel 55~60HRC													
Cutting Condition	Speed RPM/ min	Feed mm/ min	Speed RPM/ min	Feed mm/ min	Speed RPM/ min	Feed mm/ min	Speed RPM/ min	Feed mm/ min												
R	a_p : 0.1D	a_e : 0.2D	a_p : 0.08D	a_e : 0.2D	a_p : 0.05D	a_e : 0.1D	a_p : 0.03D	a_e : 0.1D												
0.5R	29,000	590	28,000	350	23,000	290	20,000	220												
1.0R	21,000	850	17,000	520	13,800	350	12,420	260												
1.5R	14,000	840	11,700	540	10,000	430	9,000	310												
2R	10,000	840	9,000	520	7,700	410	6,930	320												
2.5R	8,600	830	7,200	510	6,100	470	5,490	360												
3R	7,200	830	5,800	490	5,100	390	4,590	430												
4R	5,400	810	4,400	490	3,800	550	3,420	430												
5R	4,300	810	3,500	490	3,000	390	2,700	400												
6R	3,600	810	2,900	490	2,500	390	2,250	310												
Depth of cut			<table><tr><td>a_p</td><td>a_e</td></tr><tr><td>0.08D</td><td>0.2D</td></tr></table>		a_p	a_e	0.08D	0.2D	<table><tr><td>a_p</td><td>a_e</td></tr><tr><td>0.05D</td><td>0.1D</td></tr></table>		a_p	a_e	0.05D	0.1D	<table><tr><td>a_p</td><td>a_e</td></tr><tr><td>0.03D</td><td>0.1D</td></tr></table>		a_p	a_e	0.03D	0.1D
	a_p	a_e																		
	0.08D	0.2D																		
a_p	a_e																			
0.05D	0.1D																			
a_p	a_e																			
0.03D	0.1D																			

Work Material

P			H		
G1	G2	G3	G14	G15	G16
•	•	•	•	•	•

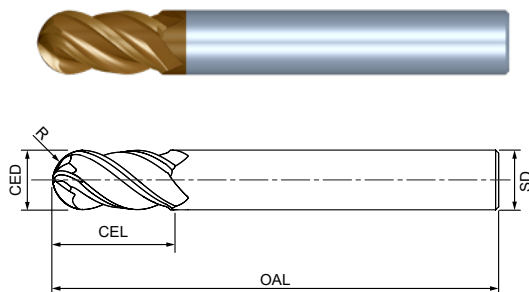


1. Please select high rigid tool holder and collet chuck during machining.
2. Please select the suitable coolant fluid.
3. For dry cutting, please use air blow for chip removal and cooling.
4. These cutting data are for reference only. Please adjust the cutting speed according to machine capability and working conditions.
5. If vibrations occur during cutting process, adjust and reduce the cutting speed.

UMG Carbide - High-Speed Ball End Mill

X600⁺ - 81404TO

- ♦ Ball Nose - 4-Flute x 2D
- ♦ Helix 40°



CED Tolerance(mm)	
R	±0.02

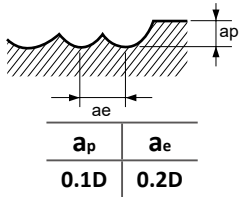
h5 (unit : mm)

Code No.	Radius	CEL	SD	OAL	Flute
X600 ⁺ -81404TO	3R	12	6	50	4
	4R	16	8	60	
	5R	20	10	75	
	6R	24	12	75	
	8R	32	16	100	
	10R	40	20	100	

Code No.	Radius	CEL	SD	OAL	Flute
X600 ⁺ -81404TO	3R	12	6	57	4
	4R	16	8	63	
	5R	20	10	72	
	6R	24	12	83	

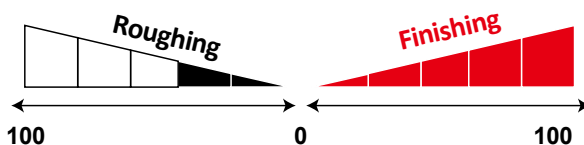
※ Customized Special sizes, Coating type and Inches are available to order.

General Milling

Work Material	Alloyed Steel 25~35HRC		Hardened Steel 35~45HRC		Hardened Steel 45~55HRC		Hardened Steel 55~60HRC													
Cutting Condition	Speed RPM/ min	Feed mm/ min	Speed RPM/ min	Feed mm/ min	Speed RPM/ min	Feed mm/ min	Speed RPM/ min	Feed mm/ min												
R	a_p : 0.1D	a_e : 0.2D	a_p : 0.08D	a_e : 0.2D	a_p : 0.05D	a_e : 0.1D	a_p : 0.03D	a_e : 0.1D												
3R	7,980	1,400	1,780	1,120	6,000	780	4,800	540												
4R	5,900	1,400	5,300	1,120	4,500	780	3,600	540												
5R	4,700	1,400	4,200	1,120	3,360	780	2,600	540												
6R	4,000	1,400	5,900	1,120	3,000	780	2,400	540												
8R	2,900	1,400	2,650	1,120	2,200	780	1,760	540												
10R	2,300	1,200	2,130	960	1,700	670	1,360	470												
Depth of cut			<table><tr><td>a_p</td><td>a_e</td></tr><tr><td>0.08D</td><td>0.2D</td></tr></table>		a_p	a_e	0.08D	0.2D	<table><tr><td>a_p</td><td>a_e</td></tr><tr><td>0.05D</td><td>0.1D</td></tr></table>		a_p	a_e	0.05D	0.1D	<table><tr><td>a_p</td><td>a_e</td></tr><tr><td>0.03D</td><td>0.1D</td></tr></table>		a_p	a_e	0.03D	0.1D
	a_p	a_e																		
	0.08D	0.2D																		
a_p	a_e																			
0.05D	0.1D																			
a_p	a_e																			
0.03D	0.1D																			
<table><tr><td>a_p</td><td>a_e</td></tr><tr><td>0.1D</td><td>0.2D</td></tr></table>	a_p	a_e	0.1D	0.2D																
a_p	a_e																			
0.1D	0.2D																			

Work Material

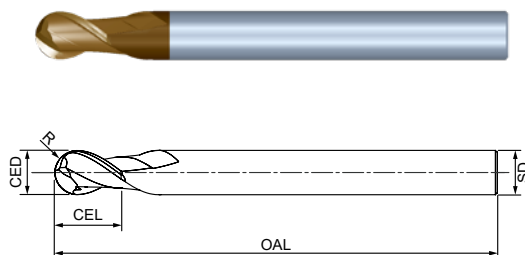
P			H			
G1	G2	G3	G14	G15	G16	G17
●	●	●	●	●	●	○



1. Please select high rigid tool holder and collet chuck during machining.
2. Please select the suitable coolant fluid.
3. For dry cutting, please use air blow for chip removal and cooling.
4. These cutting data are for reference only. Please adjust the cutting speed according to machine capability and working conditions.
5. If vibrations occur during cutting process, adjust and reduce the cutting speed.

X600⁺ - 83372TO

- ♦ Ball Nose - 2-Flute x 1D / Long Shank
- ♦ Helix 37°



CED Tolerance(mm)	
R	±0.02

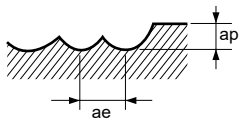
h5 (unit : mm)

Code No.	Radius	CEL	SD	OAL	Flute
X600 ⁺ -83372TO	0.5R	1	4	75	2
	1R	2	4	75	
	1.5R	3	4	75	
	2R	4	4	75	
	2.5R	5	6	75	
	3R	6	6	75	
	4R	8	8	100	
	5R	10	10	100	
	6R	12	12	100	

Code No.	Radius	CEL	SD	OAL	Flute
X600 ⁺ -83372TO	1.5R	3	6	80	2
	2R	4	6	80	
	2.5R	5	6	80	
	3R	6	6	80	
	4R	8	8	90	
	5R	10	10	100	
	6R	12	12	120	

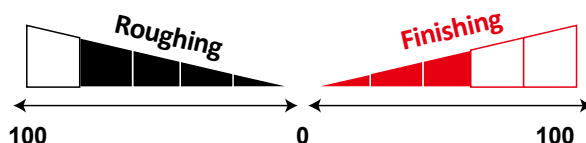
※ Customized Special sizes, Coating type and Inches are available to order.

General Milling

Work Material	Alloyed Steel 25~35HRC		Hardened Steel 35~45HRC		Hardened Steel 45~55HRC		Hardened Steel 55~60HRC													
Cutting Condition	Speed RPM/ min	Feed mm/ min	Speed RPM/ min	Feed mm/ min	Speed RPM/ min	Feed mm/ min	Speed RPM/ min	Feed mm/ min												
R	a_p : 0.1D	a_e : 0.2D	a_p : 0.08D	a_e : 0.2D	a_p : 0.05D	a_e : 0.1D	a_p : 0.03D	a_e : 0.1D												
0.5R	34,000	670	33,600	400	27,600	320	25,000	240												
1.0R	25,000	890	20,400	530	16,560	380	14,900	280												
1.5R	16,000	900	14,040	550	12,000	470	10,900	340												
2R	12,000	920	10,800	550	9,240	450	8,300	360												
2.5R	9,600	930	8,640	540	7,320	510	6,500	400												
3R	8,640	910	6,960	540	6,120	430	5,500	470												
4R	6,480	890	5,280	530	4,560	430	4,100	470												
5R	5,160	890	4,200	530	3,600	430	3,200	440												
6R	4,320	890	3,480	530	3,000	430	2,700	340												
Depth of cut			<table><tr><td>a_p</td><td>a_e</td></tr><tr><td>0.08D</td><td>0.2D</td></tr></table>		a_p	a_e	0.08D	0.2D	<table><tr><td>a_p</td><td>a_e</td></tr><tr><td>0.05D</td><td>0.1D</td></tr></table>		a_p	a_e	0.05D	0.1D	<table><tr><td>a_p</td><td>a_e</td></tr><tr><td>0.03D</td><td>0.1D</td></tr></table>		a_p	a_e	0.03D	0.1D
	a_p	a_e																		
	0.08D	0.2D																		
a_p	a_e																			
0.05D	0.1D																			
a_p	a_e																			
0.03D	0.1D																			
a_p	a_e																			
0.1D	0.2D																			

Work Material

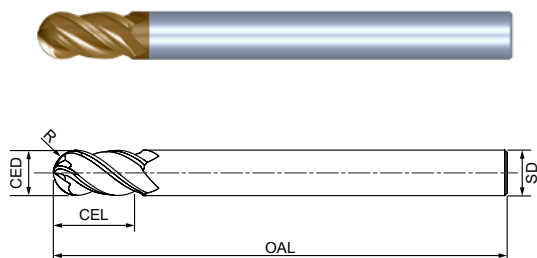
P			H		
G1	G2	G3	G14	G15	G16
•	•	•	•	•	•



1. Please select high rigid tool holder and collet chuck during machining.
2. Please select the suitable coolant fluid.
3. For dry cutting, please use air blow for chip removal and cooling.
4. These cutting data are for reference only. Please adjust the cutting speed according to machine capability and working conditions.
5. If vibrations occur during cutting process, adjust and reduce the cutting speed.

X600⁺ - 83404TO

- ♦ Ball Nose - 4-Flute x 2D / Long Shank
- ♦ Helix 40°



CED Tolerance(mm)	
R	±0.02

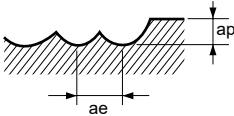
(unit : mm)

Code No.	Radius	CEL	SD	OAL	Flute
X600 ⁺ -83404TO	3R	12	6	75	4
	4R	16	8	100	
	5R	20	10	100	
	6R	24	12	100	
	8R	32	16	150	
	10R	40	20	150	

Code No.	Radius	CEL	SD	OAL	Flute
X600 ⁺ -83404TO	3R	12	6	100	4
	4R	16	8	100	
	5R	20	10	100	
	6R	24	12	150	

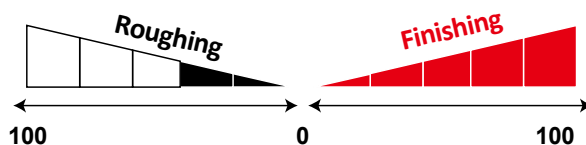
※ Customized Special sizes, Coating type and Inches are available to order.

General Milling

Work Material	Alloyed Steel 25~35HRC		Hardened Steel 35~45HRC		Hardened Steel 45~55HRC		Hardened Steel 55~60HRC													
Cutting Condition	Speed RPM/ min	Feed mm/ min	Speed RPM/ min	Feed mm/ min	Speed RPM/ min	Feed mm/ min	Speed RPM/ min	Feed mm/ min												
R	a _p : 0.1D	a _e : 0.2D	a _p : 0.08D	a _e : 0.2D	a _p : 0.05D	a _e : 0.1D	a _p : 0.03D	a _e : 0.1D												
3R	7,980	1,400	1,780	1,120	6,000	780	4,800	540												
4R	5,900	1,400	5,300	1,120	4,500	780	3,600	540												
5R	4,700	1,400	4,200	1,120	3,360	780	2,600	540												
6R	4,000	1,400	5,900	1,120	3,000	780	2,400	540												
8R	2,900	1,400	2,650	1,120	2,200	780	1,760	540												
10R	2,300	1,200	2,130	960	1,700	670	1,360	470												
Depth of cut			<table><tr><td>a_p</td><td>a_e</td></tr><tr><td>0.08D</td><td>0.2D</td></tr></table>		a _p	a _e	0.08D	0.2D	<table><tr><td>a_p</td><td>a_e</td></tr><tr><td>0.05D</td><td>0.1D</td></tr></table>		a _p	a _e	0.05D	0.1D	<table><tr><td>a_p</td><td>a_e</td></tr><tr><td>0.03D</td><td>0.1D</td></tr></table>		a _p	a _e	0.03D	0.1D
	a _p	a _e																		
	0.08D	0.2D																		
a _p	a _e																			
0.05D	0.1D																			
a _p	a _e																			
0.03D	0.1D																			
	<table><tr><td>a_p</td><td>a_e</td></tr><tr><td>0.1D</td><td>0.2D</td></tr></table>	a _p	a _e	0.1D	0.2D															
a _p	a _e																			
0.1D	0.2D																			

Work Material

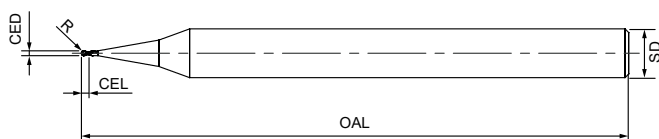
P			H			
G1	G2	G3	G14	G15	G16	G17
●	●	●	●	●	●	○



1. Please select high rigid tool holder and collet chuck during machining.
2. Please select the suitable coolant fluid.
3. For dry cutting, please use air blow for chip removal and cooling.
4. These cutting data are for reference only. Please adjust the cutting speed according to machine capability and working conditions.
5. If vibrations occur during cutting process, adjust and reduce the cutting speed.

X600M⁺ - 84352TO

- ♦ Ball Nose - 2-Flute x 1D / Miniature
- ♦ Helix 35°



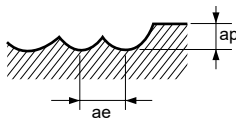
CED Tolerance(mm)	
R	±0.01

(unit : mm)

Code No.	Radius	CEL	SD	OAL	Flute
X600M ⁺ -84352TO	0.1R	0.2	4	45	2
	0.15R	0.3	4	45	
	0.2R	0.4	4	45	
	0.25R	0.5	4	45	
	0.3R	0.6	4	45	
	0.35R	0.7	4	45	
	0.4R	0.8	4	45	
	0.45R	0.9	4	45	

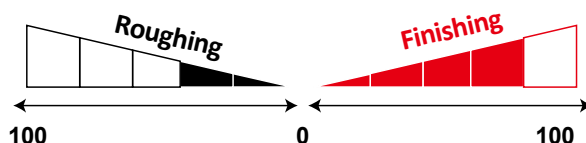
※ Customized Special sizes, Coating type and Inches are available to order.

General Milling

Work Material	Alloyed Steel 25~35HRC		Hardened Steel 35~45HRC		Hardened Steel 45~55HRC		Hardened Steel 55~60HRC													
Cutting Condition	Speed RPM/ min	Feed mm/ min	Speed RPM/ min	Feed mm/ min	Speed RPM/ min	Feed mm/ min	Speed RPM/ min	Feed mm/ min												
R	a _p : 0.05D	a _e : 0.1D	a _p : 0.04D	a _e : 0.05D	a _p : 0.03D	a _e : 0.03D	a _p : 0.02D	a _e : 0.02D												
0.1R	20,000	540	20,000	375	20,000	215	20,000	160												
0.15R	20,000	1,000	20,000	700	20,000	400	20,000	300												
0.2R	20,000	1,400	20,000	980	20,000	560	20,000	420												
0.25R	20,000	1,600	20,000	1,120	20,000	640	20,000	480												
0.3R	20,000	1,800	20,000	1,260	20,000	720	20,000	540												
0.35R	20,000	1,900	20,000	1,330	20,000	760	20,000	570												
0.4R	20,000	2,000	20,000	1,400	20,000	800	20,000	600												
0.45R	20,000	2,200	20,000	1,540	20,000	880	20,000	660												
Depth of cut			<table><tr><td>a_p</td><td>a_e</td></tr><tr><td>0.04D</td><td>0.05D</td></tr></table>		a _p	a _e	0.04D	0.05D	<table><tr><td>a_p</td><td>a_e</td></tr><tr><td>0.03D</td><td>0.03D</td></tr></table>		a _p	a _e	0.03D	0.03D	<table><tr><td>a_p</td><td>a_e</td></tr><tr><td>0.02D</td><td>0.02D</td></tr></table>		a _p	a _e	0.02D	0.02D
	a _p	a _e																		
	0.04D	0.05D																		
	a _p	a _e																		
0.03D	0.03D																			
a _p	a _e																			
0.02D	0.02D																			
<table><tr><td>a_p</td><td>a_e</td></tr><tr><td>0.05D</td><td>0.1D</td></tr></table>		a _p	a _e	0.05D	0.1D															
a _p	a _e																			
0.05D	0.1D																			

Work Material

P			H		
G1	G2	G3	G14	G15	G16
•	•	•	•	•	•

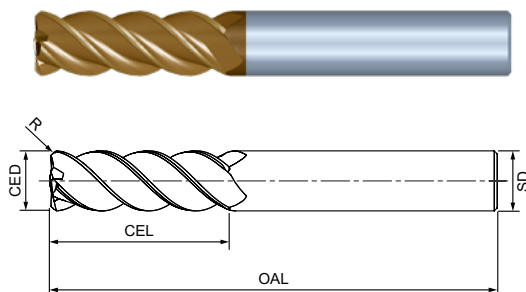


1. Please select high rigid tool holder and collet chuck during machining.
2. Please select the suitable coolant fluid.
3. For dry cutting, please use air blow for chip removal and cooling.
4. These cutting data are for reference only. Please adjust the cutting speed according to machine capability and working conditions.
5. If vibrations occur during cutting process, adjust and reduce the cutting speed.

UMG Carbide - High-Speed Corner Radius End Mill

X600⁺ - 21454TO

- ◆ Corner Radius - 4-Flute x 3D
- ◆ Helix 45°



CED Tolerance(mm)	
1~3	0~-0.014
3~6	0~-0.018
6~10	0~-0.02
10~12	0~-0.025

(unit : mm)

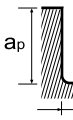
Code No.	CED	CEL	SD	OAL	Radius	Flute
X600 ⁺ -21454TO	1	3	4	50	0.2R	4
	2	6	4	50	0.2R	
	3	9	4	50	0.2R	
	4	12	4	50	0.2R	
	5	15	6	50	0.2R	
	6	18	6	50	0.2R	
	8	24	8	65	0.2R	
					0.5R	
	10	30	10	75	0.2R	
					0.5R	
	12	36	12	80	0.2R	
					0.5R	

Code No.	CED	CEL	SD	OAL	Radius	Flute
X600 ⁺ -21454TO	3	9	6	57	0.2R	4
	4	12	6	65	0.2R	
	5	15	6	65	0.2R	
	6	18	6	65	0.2R	
	8	24	8	75	0.2R	
					0.5R	
	10	30	10	80	0.2R	
					0.5R	
	12	36	12	93	0.2R	
					0.5R	

※ Customized Special sizes, Coating type and Inches are available to order.

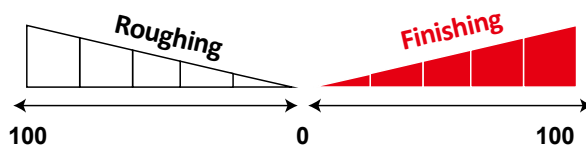
Recommended Cutting Condition

Side Milling

Work Material	Alloyed Steel 25~35HRC		Hardened Steel 35~45HRC		Hardened Steel 45~55HRC		Hardened Steel 55~60HRC													
Cutting Condition	Speed RPM/ min	Feed mm/ min	Speed RPM/ min	Feed mm/ min	Speed RPM/ min	Feed mm/ min	Speed RPM/ min	Feed mm/ min												
CED	a_p : 1.5D	a_e : 0.2D	a_p : 1.5D	a_e : 0.1D	a_p : 1.5D	a_e : 0.05D	a_p : 1.5D	a_e : 0.03D												
1	30,200	470	27,180	360	21,600	250	17,000	170												
2	18,600	580	16,740	440	12,240	210	9,700	150												
3	13,700	690	12,330	520	9,270	240	7,400	230												
4	10,300	740	9,270	560	6,900	360	5,500	250												
5	8,200	790	7,380	600	5,670	400	4,500	280												
6	5,900	990	5,310	750	4,590	480	3,600	340												
8	5,100	990	4,590	750	3,600	470	2,880	330												
10	4,100	880	3,690	670	2,880	450	2,300	320												
12	3,400	820	3,060	620	2,430	340	1,900	230												
Depth of cut			<table><tr><td>a_p</td><td>a_e</td></tr><tr><td>1.5D</td><td>0.1D</td></tr></table>		a_p	a_e	1.5D	0.1D	<table><tr><td>a_p</td><td>a_e</td></tr><tr><td>1.5D</td><td>0.05D</td></tr></table>		a_p	a_e	1.5D	0.05D	<table><tr><td>a_p</td><td>a_e</td></tr><tr><td>1.5D</td><td>0.03D</td></tr></table>		a_p	a_e	1.5D	0.03D
					a_p	a_e														
1.5D	0.1D																			
a_p	a_e																			
1.5D	0.05D																			
a_p	a_e																			
1.5D	0.03D																			

Work Material

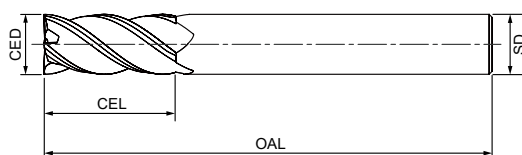
P			H			
G1	G2	G3	G14	G15	G16	G17
●	●	●	●	●	●	○



1. Please select high rigid tool holder and collet chuck during machining.
2. Please select the suitable coolant fluid.
3. For dry cutting, please use air blow for chip removal and cooling.
4. These cutting data are for reference only. Please adjust the cutting speed according to machine capability and working conditions.
5. If vibrations occur during cutting process, adjust and reduce the cutting speed.

X600IE⁺ - 11374TO

- ♦ Square - 4-Flute x 2.5D
- ♦ Uneven Flute / Variable Helix 37° / 40°



CED Tolerance(mm)	
1~3	0~-0.014
3~6	0~-0.018
6~10	0~-0.02
10~16	0~-0.025
16~20	0~-0.03

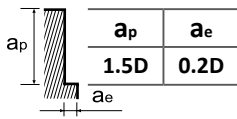
(unit : mm)

Code No.	CED	CEL	SD	OAL	Flute
X600IE ⁺ -11374TO	1	3	4	50	4
	2	5	4	50	
	3	8	4	50	
	4	10	4	50	
	5	13	6	50	
	6	15	6	50	
	8	20	8	65	
	10	25	10	75	
	12	30	12	75	
	16	40	16	100	
	20	50	20	100	

Code No.	CED	CEL	SD	OAL	Flute
X600IE ⁺ -11374TO	3	8	6	57	4
	4	11	6	57	
	5	13	6	57	
	6	13	6	57	
	8	19	8	63	
	10	22	10	72	
	12	26	12	83	

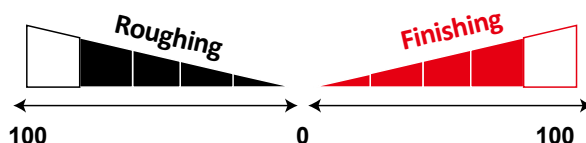
※ Customized Special sizes, Coating type and Inches are available to order.

Side Milling

Work Material	Alloyed Steel 25~35HRC		Hardened Steel 35~45HRC		Hardened Steel 45~55HRC		Hardened Steel 55~60HRC													
Cutting Condition	Speed RPM/ min	Feed mm/ min	Speed RPM/ min	Feed mm/ min	Speed RPM/ min	Feed mm/ min	Speed RPM/ min	Feed mm/ min												
CED	a _p : 1.5D	a _e : 0.2D	a _p : 1.5D	a _e : 0.1D	a _p : 1.5D	a _e : 0.05D	a _p : 1.5D	a _e : 0.03D												
1	38,700	480	32,850	400	29,000	310	26,500	190												
2	19,350	570	16,380	480	14,600	360	13,200	220												
3	12,870	808	10,890	680	9,720	510	8,700	230												
4	9,600	950	8,190	800	7,290	610	6,500	380												
5	7,700	1,280	6,570	1,090	5,850	810	5,200	510												
6	6,400	1,400	5,400	1,200	4,860	900	4,300	580												
8	4,800	1,520	4,050	1,290	3,600	970	3,240	610												
10	3,870	1,400	3,200	1,200	2,880	910	2,600	580												
12	3,240	1,370	2,700	1,140	2,430	880	2,200	550												
16	2,430	1,330	2,070	1,140	1,800	850	1,600	540												
20	1,900	1,280	1,600	1,090	1,440	820	1,300	510												
Depth of cut			<table><tr><td>a_p</td><td>a_e</td></tr><tr><td>1.5D</td><td>0.1D</td></tr></table>		a _p	a _e	1.5D	0.1D	<table><tr><td>a_p</td><td>a_e</td></tr><tr><td>1.5D</td><td>0.05D</td></tr></table>		a _p	a _e	1.5D	0.05D	<table><tr><td>a_p</td><td>a_e</td></tr><tr><td>1.5D</td><td>0.03D</td></tr></table>		a _p	a _e	1.5D	0.03D
					a _p	a _e														
1.5D	0.1D																			
a _p	a _e																			
1.5D	0.05D																			
a _p	a _e																			
1.5D	0.03D																			

Work Material

P			H		
G1	G2	G3	G14	G15	G16
•	•	•	•	•	•

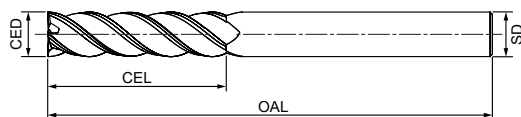


1. Please select high rigid tool holder and collet chuck during machining.
2. Please select the suitable coolant fluid.
3. For dry cutting, please use air blow for chip removal and cooling.
4. These cutting data are for reference only. Please adjust the cutting speed according to machine capability and working conditions.
5. If vibrations occur during cutting process, adjust and reduce the cutting speed.

UMG Carbide - Anti-Vibration Long Flute End Mill

X600IE⁺ - 12394TO

- ♦ Square - 4-Flute x 4D / Long Flute
- ♦ Uneven Flute / Variable Helix 39° / 42°



CED Tolerance(mm)	
4~6	0~-0.018
6~10	0~-0.02
10~16	0~-0.025
16~20	0~-0.03

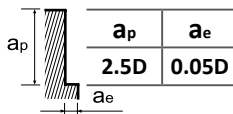
(unit : mm)

Code No.	CED	CEL	SD	OAL	Flute
X600IE ⁺ -12394TO	4	16	4	60	4
	5	20	6	60	
	6	24	6	65	
	8	32	8	90	
	10	40	10	100	
	12	48	12	110	
	16	64	16	140	
	20	80	20	160	

Code No.	CED	CEL	SD	OAL	Flute
X600IE ⁺ -12394TO	4	16	6	65	4
	5	20	6	65	
	6	24	6	65	
	8	32	8	80	
	10	40	10	90	
	12	48	12	100	

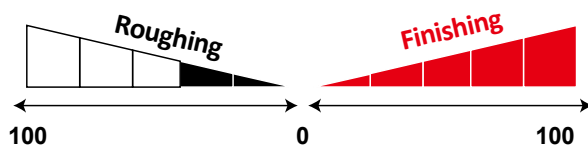
※ Customized Special sizes, Coating type and Inches are available to order.

Side Milling

Work Material	Alloyed Steel 25~35HRC		Hardened Steel 35~45HRC		Hardened Steel 45~55HRC		Hardened Steel 55~60HRC													
Cutting Condition	Speed RPM/ min	Feed mm/ min	Speed RPM/ min	Feed mm/ min	Speed RPM/ min	Feed mm/ min	Speed RPM/ min	Feed mm/ min												
CED	a _p : 2.5D	a _e : 0.05D	a _p : 2.5D	a _e : 0.03D	a _p : 2.5D	a _e : 0.02D	a _p : 2.5D	a _e : 0.01D												
4	8,600	900	7,740	810	6,500	610	6,500	450												
5	7,000	1,100	6,300	990	5,200	810	5,200	450												
6	6,400	1,200	5,760	1,080	4,300	910	4,300	450												
8	4,800	1,400	4,000	1,190	3,200	910	2,900	450												
10	3,400	1,300	2,800	1,170	2,500	910	2,600	450												
12	2,900	1,250	2,750	1,100	2,100	880	2,190	450												
16	2,100	1,150	1,800	1,000	1,620	800	1,600	430												
20	1,900	1,100	1,600	990	1,300	780	1,300	480												
Depth of cut			<table><tr><td>a_p</td><td>a_e</td></tr><tr><td>2.5D</td><td>0.03D</td></tr></table>		a _p	a _e	2.5D	0.03D	<table><tr><td>a_p</td><td>a_e</td></tr><tr><td>2.5D</td><td>0.02D</td></tr></table>		a _p	a _e	2.5D	0.02D	<table><tr><td>a_p</td><td>a_e</td></tr><tr><td>2.5D</td><td>0.01D</td></tr></table>		a _p	a _e	2.5D	0.01D
					a _p	a _e														
					2.5D	0.03D														
a _p	a _e																			
2.5D	0.02D																			
a _p	a _e																			
2.5D	0.01D																			

Work Material

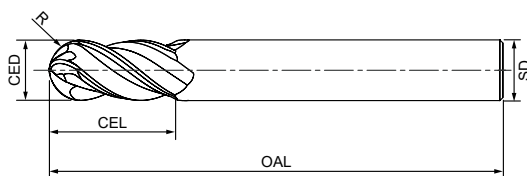
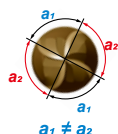
P			H		
G1	G2	G3	G14	G15	G16
•	•	•	•	•	•



1. Please select high rigid tool holder and collet chuck during machining.
2. Please select the suitable coolant fluid.
3. For dry cutting, please use air blow for chip removal and cooling.
4. These cutting data are for reference only. Please adjust the cutting speed according to machine capability and working conditions.
5. If vibrations occur during cutting process, adjust and reduce the cutting speed.

X600IE⁺ - 81374TO

- ♦ Ball Nose - 4-Flute x 2D
- ♦ Uneven Flute / Variable Helix 37° / 40°



CED Tolerance(mm)	
R	±0.02

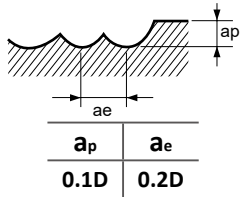
(unit : mm)

Code No.	Radius	CEL	SD	OAL	Flute
X600IE ⁺ -81374TO	3R	12	6	50	4
	4R	16	8	60	
	5R	20	10	75	
	6R	24	12	75	
	8R	32	16	100	
	10R	40	20	100	

Code No.	Radius	CEL	SD	OAL	Flute
X600IE ⁺ -81374TO	3R	12	6	57	4
	4R	16	8	63	
	5R	20	10	72	
	6R	24	12	83	

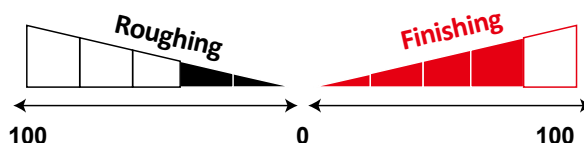
※ Customized Special sizes, Coating type and Inches are available to order.

General Milling

Work Material	Alloyed Steel 25~35HRC		Hardened Steel 35~45HRC		Hardened Steel 45~55HRC		Hardened Steel 55~60HRC	
Cutting Condition	Speed RPM/ min	Feed mm/ min	Speed RPM/ min	Feed mm/ min	Speed RPM/ min	Feed mm/ min	Speed RPM/ min	Feed mm/ min
R	a_p : 0.1D	a_e : 0.2D	a_p : 0.08D	a_e : 0.2D	a_p : 0.05D	a_e : 0.1D	a_p : 0.03D	a_e : 0.1D
3R	10,080	1,820	9,000	1,400	7,200	1,000	5,760	700
4R	7,560	1,820	6,800	1,400	5,400	1,000	4,320	700
5R	6,000	1,820	5,400	1,400	4,320	1,000	3,400	700
6R	5,040	1,820	4,500	1,400	3,600	1,000	2,880	700
8R	3,720	1,820	3,300	1,400	2,640	1,000	2,100	700
10R	3,000	1,560	2,700	1,250	2,160	870	1,700	610
Depth of cut								
	a_p	a_e	a_p	a_e	a_p	a_e	a_p	a_e
	0.1D	0.2D	0.08D	0.2D	0.05D	0.1D	0.03D	0.1D

Work Material

P			H			
G1	G2	G3	G14	G15	G16	G17
●	●	●	●	●	●	○

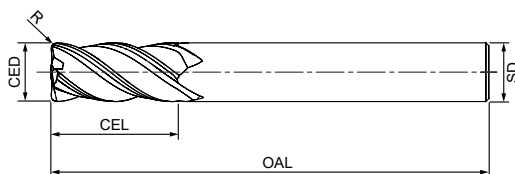


1. Please select high rigid tool holder and collet chuck during machining.
2. Please select the suitable coolant fluid.
3. For dry cutting, please use air blow for chip removal and cooling.
4. These cutting data are for reference only. Please adjust the cutting speed according to machine capability and working conditions.
5. If vibrations occur during cutting process, adjust and reduce the cutting speed.

UMG Carbide - Anti-Vibration Corner Radius End Mill

X600IE⁺ - 21374TO

- ◆ Corner Radius - 4-Flute x 2.5D
- ◆ Uneven Flute / Variable Helix 37° / 40°



CED Tolerance(mm)	
1~3	0~-0.014
3~6	0~-0.018
6~10	0~-0.02
10~12	0~-0.025

(unit : mm)

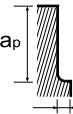
Code No.	CED	CEL	SD	OAL	Radius	Flute
X600IE ⁺ -21374TO	1	3	4	50	0.2R	4
	2	5	4	50	0.2R	
	3	8	4	50	0.2R	
	4	10	4	50	0.2R	
	5	13	6	50	0.2R	
	6	15	6	50	0.2R	
	8	20	8	60	0.2R	
					0.5R	
	10	25	10	75	0.2R	
					0.5R	
	12	30	12	75	0.2R	
					0.5R	

Code No.	CED	CEL	SD	OAL	Radius	Flute
X600IE ⁺ -21374TO	3	8	6	57	0.2R	4
	4	11	6	57	0.2R	
	5	13	6	57	0.2R	
	6	13	6	57	0.2R	
	8	19	8	63	0.2R	
					0.5R	
	10	22	10	72	0.2R	
					0.5R	
	12	26	12	83	0.2R	
					0.5R	

※ Customized Special sizes, Coating type and Inches are available to order.

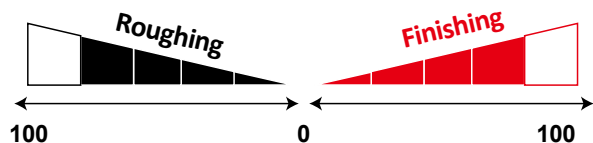
Recommended Cutting Condition

Side Milling

Work Material	Alloyed Steel 25~35HRC		Hardened Steel 35~45HRC		Hardened Steel 45~55HRC		Hardened Steel 55~60HRC													
Cutting Condition	Speed RPM/ min	Feed mm/ min	Speed RPM/ min	Feed mm/ min	Speed RPM/ min	Feed mm/ min	Speed RPM/ min	Feed mm/ min												
CED	a_p : 1.5D	a_e : 0.2D	a_p : 1.5D	a_e : 0.1D	a_p : 1.5D	a_e : 0.05D	a_p : 1.5D	a_e : 0.03D												
1	38,700	480	32,850	400	29,000	310	26,500	190												
2	19,350	570	16,380	480	14,600	360	13,200	220												
3	12,870	808	10,890	680	9,720	510	8,700	230												
4	9,600	950	8,190	800	7,290	610	6,500	380												
5	7,700	1,280	6,570	1,090	5,850	810	5,200	510												
6	6,400	1,400	5,400	1,200	4,860	900	4,300	580												
8	4,800	1,520	4,050	1,290	3,600	970	3,240	610												
10	3,870	1,400	3,200	1,200	2,880	910	2,600	580												
12	3,240	1,370	2,700	1,140	2,430	880	2,200	550												
Depth of cut			<table><tr><td>a_p</td><td>a_e</td></tr><tr><td>1.5D</td><td>0.1D</td></tr></table>		a_p	a_e	1.5D	0.1D	<table><tr><td>a_p</td><td>a_e</td></tr><tr><td>1.5D</td><td>0.05D</td></tr></table>		a_p	a_e	1.5D	0.05D	<table><tr><td>a_p</td><td>a_e</td></tr><tr><td>1.5D</td><td>0.03D</td></tr></table>		a_p	a_e	1.5D	0.03D
					a_p	a_e														
1.5D	0.1D																			
a_p	a_e																			
1.5D	0.05D																			
a_p	a_e																			
1.5D	0.03D																			

Work Material

P			H			
G1	G2	G3	G14	G15	G16	G17
●	●	●	●	●	●	○



1. Please select high rigid tool holder and collet chuck during machining.
2. Please select the suitable coolant fluid.
3. For dry cutting, please use air blow for chip removal and cooling.
4. These cutting data are for reference only. Please adjust the cutting speed according to machine capability and working conditions.
5. If vibrations occur during cutting process, adjust and reduce the cutting speed.