DIA EDGE

TOOL NEWS

2022.6 Update
B200G

Exchangeable Head End Mills

iMX End Mill Series

Series Expansion

"Carbide"+"Carbide"

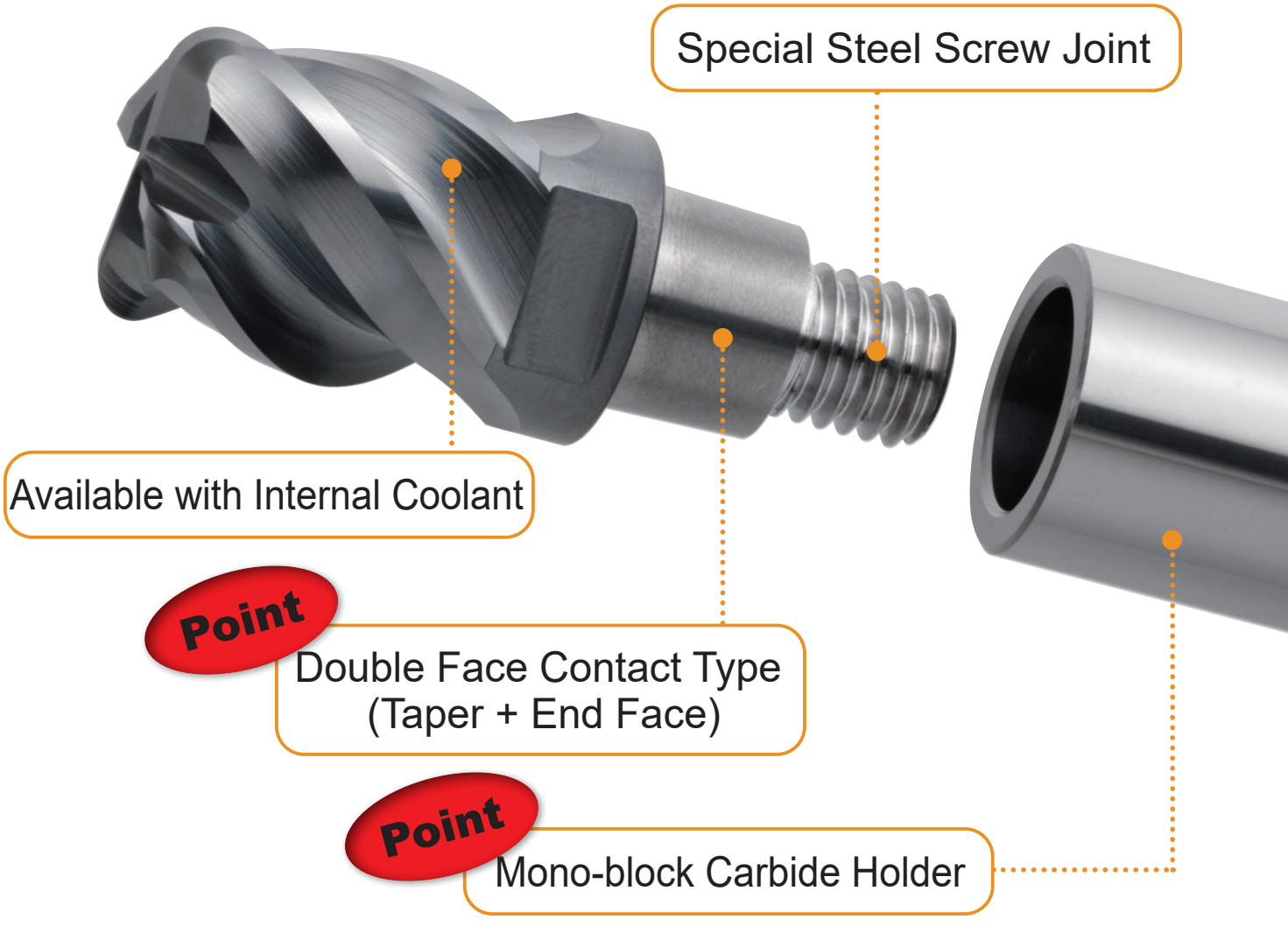
(Head) (Holder)

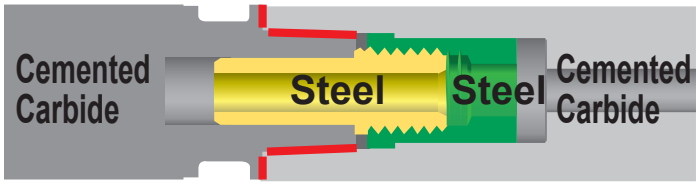
Double Face Contact Type

MITSUBISHI MATERIALS CORPORATION

Exchangeable Head End Mills

iMX End Mill Series



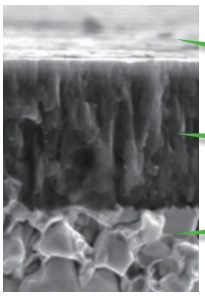


The iMX series is a revolutionary end mill system that enables efficiency, high accuracy and rigidity by combining the advantages of both solid carbide and indexable end mills.
Security and rigidity close to that of a solid type end mill because the contact faces are all carbide.
Excellent for reduced inventory over a variety of applications due to the exchangeable head.

Highly Versatile Grades

EP7020

Suitable for difficult-to-cut materials.



EP8100 Series (EP8110,EP8120)

Suitable for milling of hardened steel.

EP6120

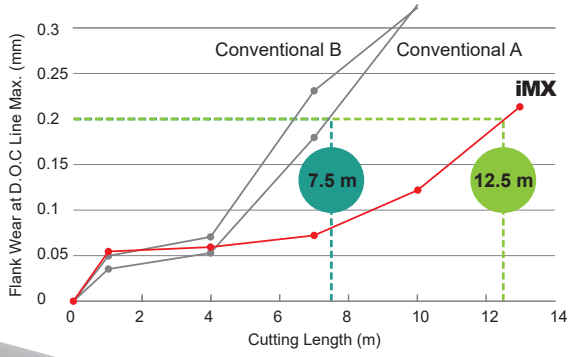
Suitable for high feed milling of steel.

ET2020 (Uncoated)

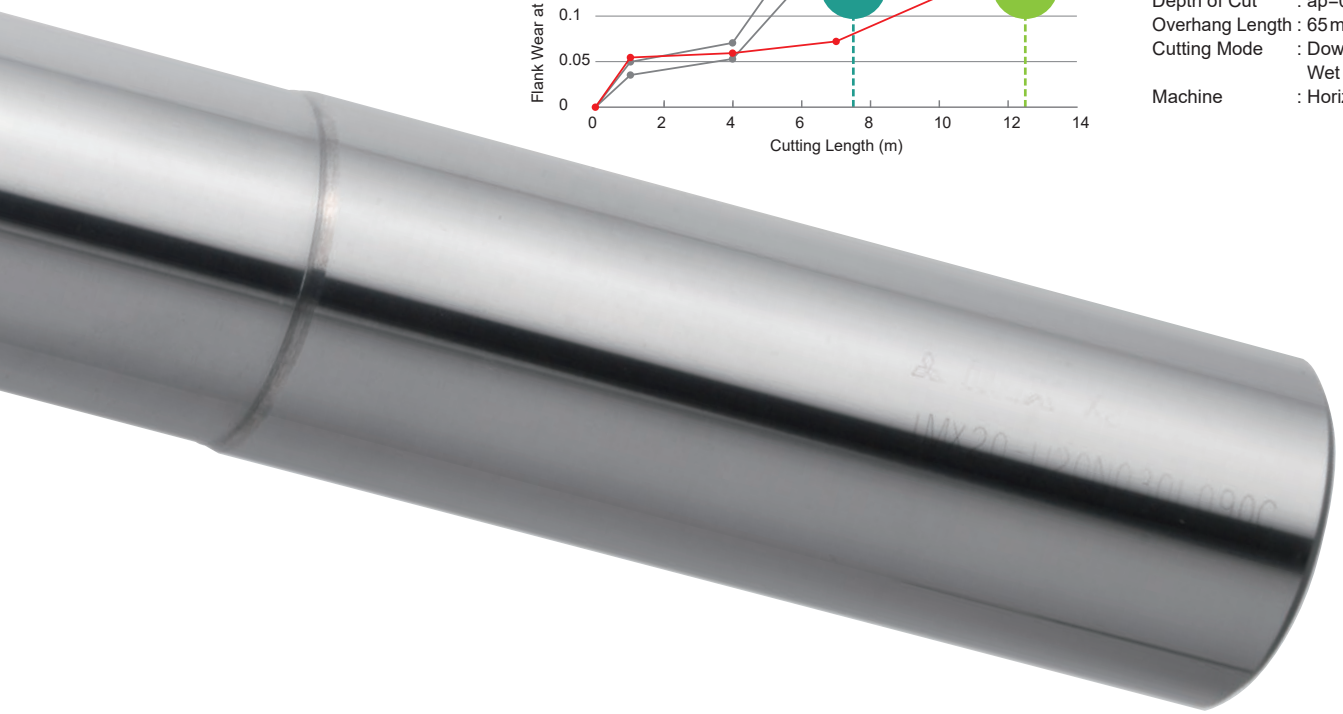
Suitable for milling of aluminium alloys.

Tool Life Comparison when Machining Flat Surfaces in Inconel 718

EP7020 is a grade that enables extended tool life when machining difficult-to-cut materials.

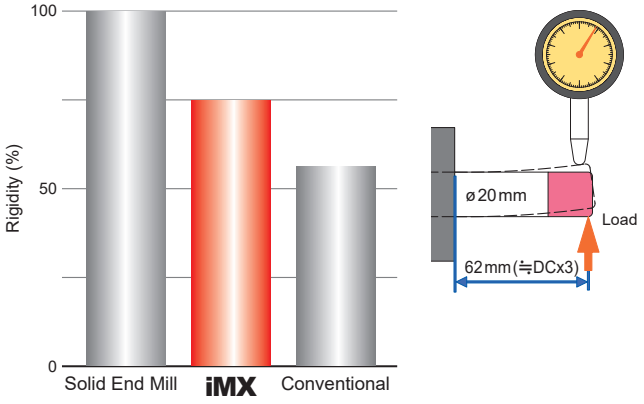


Work Material	: Inconel718 (43HRC)
Holder	: IMX12-U12N041L100C
Head	: IMX12B4HV12012
Revolution	: n=1700min^{-1}
Cutting Speed	: vc=28m/min
Table Feed	: vf=350mm/min
Feed per Tooth	: fz=0.05mm/t.
Depth of Cut	: ap=0.6mm, ae=1.2mm
Overhang Length	: 65mm
Cutting Mode	: Down(Climb) Cut, Wet Cutting (Emulsion)
Machine	: Horizontal MC (BT40)



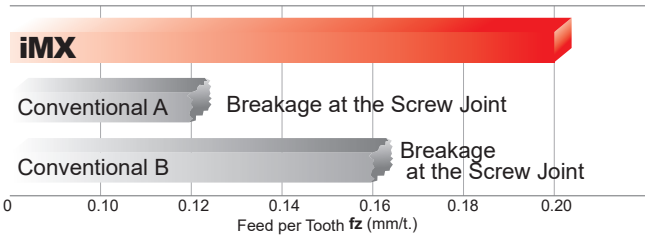
Comparison of Tool Rigidity

The double face contact of the carbide head and carbide holder gives an increase in rigidity of 30%.



Strength Comparison when Slot Milling Titanium Alloys

The reliability of the screw fastening is significantly improved when compared to conventional that employ only steel fastenings. It is also able to cope with high cutting loads.



Work Material	: Ti-6Al-4V (32HRC)	Feed per Tooth	: Above (Expansion)
Holder	: IMX20-U20N030L090C	Depth of Cut	: ap=10mm, ae=20mm
Head	: IMX20C4HV200R10021	Overhang Length	: 72mm
Revolution	: n=1100min^{-1}	Cutting Mode	: Wet Cutting (Emulsion)
Cutting Speed	: vc=69m/min	Machine	: Vertical MC (BT50)

Exchangeable Head End Mills

iMX New Type

NEW

Corner radius head with coolant hole, 6 flute, Irregular helix

iMX-C6HV-C

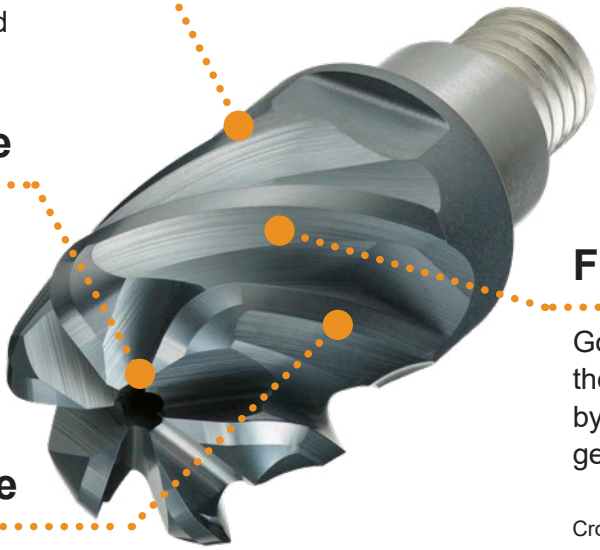
High Efficiency Machining Enables Process Consolidation

Small Relief

Provides a margin effect whilst maintaining edge sharpness. Also achieves less burr creation and enables vibration damping.

Centre Coolant Hole

Effective when machining the corner of a pocket when external coolant isn't sufficient.



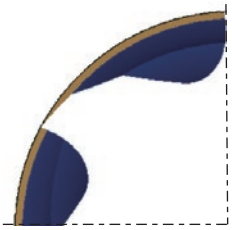
Irregular Helix Angle

Irregularity between each flute provides stability due to reduced vibration.

Flute Geometry

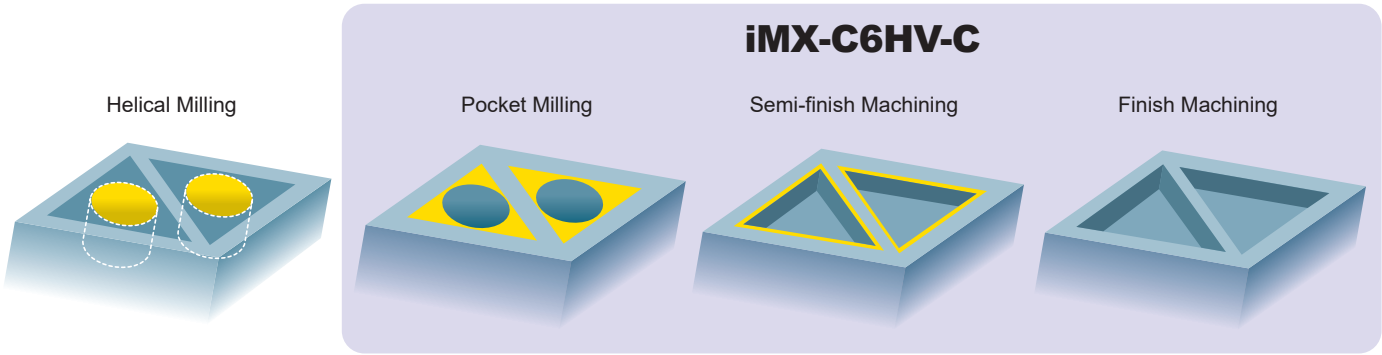
Good chip evacuation in the corners of pockets by adopting an ideal flute geometry.

Cross section of the flute geometry



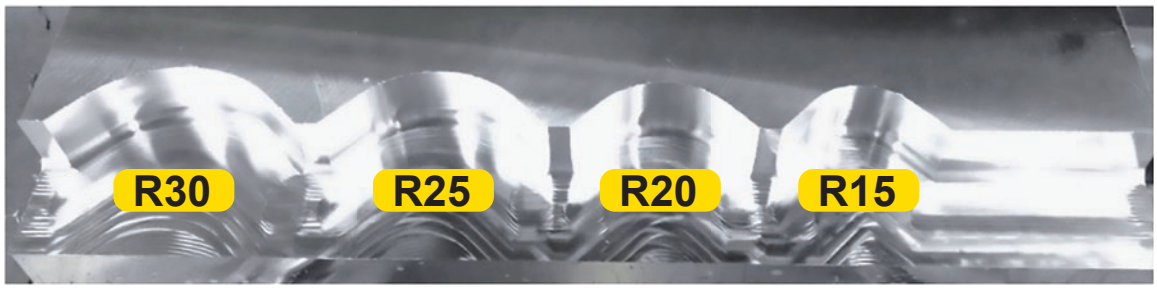
Tool Integration Achieved

Multi functionality brings efficiency to the entire machining process.



Comparison of Anti-Vibration when Machining Corners

Excellent vibration damping that prevents the usual problems even when machining corner radii.

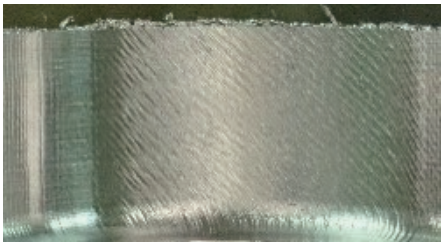


Cutting Speed (m/min)

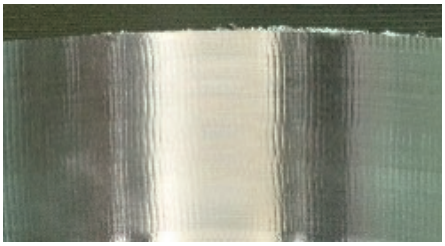
200	No	No	No	No	Yes	Yes	Yes	Yes
150	No	No	No	No	Yes	Yes	Yes	Yes
100	Yes	Yes	No	No	Yes	Yes	Yes	Yes
	R30	R25	R20	R15	R30	R25	R20	R15
	Conventional				**IMX-C6HV-C**			

Yes : Smooth cutting sound and good surface finish.
No : Audible vibrations and poor surface finish. Not the recommended cutting conditions.

vc =200 m/min, R15, Photographed after machining



Conentional



iMX-C6HV-C

<Cutting Conditions>
Work Material : JIS SUS304
Tool : IMX16C6HV160R30016C
DC=16, RE=3
Feed Rate : fz=0.05mm/t.
Depth of Cut : ap=16mm
ae=1mm
Overhang Length : 48mm (DCx3)
Cutting Mode : Internal Coolant
(Emulsion)
Machine : BT50, Vertical MC

SYMBOL DESCRIPTIONS

Tool Material

Ultra Micro Grain Carbide
Ultra micro grain carbide is used as the substrate material.

Angle, Coolant hole, Sharp corner edge and Gash land

Helix Angle
Indicates the helix angle of the end mill.

End Cutting Edge with Coolant Hole

Peripheral Cutting Edge with Coolant Hole

Gash Land
Indicates the end mill cutting edge has a gash land.

Tolerances

Outside Diameter Tolerance
Indicates diameter tolerance of end mill.

R Tolerance
Indicates the radial tolerance of a ball nose end mill.

R Tolerance
Indicates the radial tolerance of an end mill with a corner radius.

Tolerance of Point Angle
Indicates the tolerance of the point angle.

Shank Diameter Tolerance
Indicates the shank diameter tolerance of end mill.

Correction factor by overhang length (Shoulder Milling)

Use by multiplying the recommended cutting condition by the correction factor by overhang length.
Refer to each recommended condition for the Long cutting, offset type and lollipop type.

(mm)

Work Material	Carbon steel, Alloy steel, Mild steel, Copper, Copper alloys AISI 1045, AISI 4140, ASTM A36, AISI 1010				Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT				Austenitic stainless steel, Ferritic and Martensitic stainless steels, Titanium alloy AISI 304, AISI 316, AISI 304LN, AISI 316LN, AISI 410, AISI 430, AISI 431, AISI 420J2, Ti-6Al-4V			
L/D	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Width of Cut ae	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Width of Cut ae	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Width of Cut ae
2	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
3	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
4	80%	80%	90%	70%	80%	80%	90%	70%	80%	80%	90%	70%
5	60%	60%	80%	40%	60%	60%	80%	40%	60%	60%	80%	40%
6	50%	50%	70%	30%	50%	50%	70%	30%	50%	50%	70%	30%
7	40%	40%	70%	20%	40%	40%	70%	20%	30%	30%	60%	20%
8	40%	40%	60%	10%	40%	40%	60%	10%	30%	30%	50%	10%
9	30%	30%	60%	10%	30%	30%	60%	10%	20%	20%	50%	10%

Work Material	Precipitation hardening stainless steel, Cobalt chromium alloy AISI 630, AISI 631				Heat resistant alloys Inconel718			
L/D	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Width of Cut ae	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Width of Cut ae
2	100%	100%	100%	100%	100%	100%	100%	100%
3	100%	100%	100%	100%	100%	100%	100%	100%
4	80%	80%	90%	70%	80%	80%	90%	70%
5	60%	60%	80%	40%	60%	60%	80%	40%
6	50%	50%	70%	30%	50%	50%	70%	30%
7	30%	30%	60%	20%	30%	30%	60%	20%
8	30%	30%	50%	10%	30%	30%	50%	10%
9	20%	20%	50%	10%	20%	20%	50%	10%

CLASSIFICATION

HEAD

(mm)

Figure	Use	No. of Flutes	Head Type	Specifications	Shape	Coolant (Int, Ext)	Dia. DC		APMX		Work Material									Page
											P		H		M	S	N			
							Min.	Max.	Max. DC	APMX / DC	Carbon Steel	Tool Steel	-55HRC	55HRC-	Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy		
SQUARE	For Difficult-to-cut Materials	3	iMX-S3HV	Irregular helix		Ext	10	25	20	0.8	◎	○			◎	◎	○			P.9
SQUARE	For Difficult-to-cut Materials	4	iMX-S4HV	Irregular helix		Ext	10	32	33	1	◎	○			◎	◎	○			P.13
SQUARE	For Difficult-to-cut Materials	4	iMX-S4HV	Irregular helix, Long cutting edge		Ext	16	20	40	2	◎	○			◎	◎	○			P.13
SQUARE	For Difficult-to-cut Materials	4	iMX-S4HV-S	Irregular helix		Int	10	25	25	1	◎	○			◎	◎	○			P.14
SQUARE	For Aluminium Alloys	3	iMX-S3A	Uncoated		Ext	10	28	23.4	0.8								◎		P.20
RADIUS	For Difficult-to-cut Materials	4	iMX-C4HV	Irregular helix		Ext	10	28	29	1	◎	○			◎	◎	○			P.23
RADIUS	For Difficult-to-cut Materials	4	iMX-C4HV	Irregular helix, Long cutting edge		Ext	16	20	40	2	◎	○			◎	◎	○			P.24
RADIUS	For Difficult-to-cut Materials	4	iMX-C4HV-S	Irregular helix		Int	10	25	25	1	◎	○			◎	◎	○			P.25
RADIUS	For Difficult-to-cut Materials	6	iMX-C6HV	Irregular helix, Multi-flute		Ext	10	12	12	1	◎	○			◎	◎				P.33
RADIUS	For Difficult-to-cut Materials	6	NEW iMX-C6HV-C	Irregular helix, Multi-flute		Int	10	25	25	1	◎	○			◎	◎				P.31
RADIUS	For Difficult-to-cut Materials	10	iMX-C10HV	Irregular helix, Multi-flute		Ext	—	16	16	1	◎	○			◎	◎				P.33
RADIUS	For Difficult-to-cut Materials	12	iMX-C12HV	Irregular helix, Multi-flute		Ext	20	25	25	1	◎	○			◎	◎				P.33
RADIUS	For High Feed Machining	4	iMX-C4FD-C	Multi-task corner radius		Int	10	25	1.6	0.07	◎	◎	◎		◎	◎	○			P.35
RADIUS	For High Efficiency Machining	4	iMX-C4FV	Irregular helix		Ext	10	25	26	1	◎	◎	◎							P.37
RADIUS	For Aluminium Alloys	3	iMX-C3A	Uncoated		Ext	10	28	23.4	0.8								◎		P.39
RADIUS	For Blade	8	iMX-C8T-C	Taper head, Long cutting edge		Int	—	8	7.12	0.8					◎	◎				P.42
RADIUS	For Blade	10	iMX-C10T-C	Taper head, Long cutting edge		Int	—	10	7.12	0.7					◎	◎				P.42
RADIUS	For Blade	12	iMX-C12T-C	Taper head, Long cutting edge		Int	15	19	3.56	0.2					◎	◎				P.42
RADIUS	For Blade	15	iMX-C15T-C	Taper head, Long cutting edge		Int	15	19	3.56	0.2					◎	◎				P.42

CLASSIFICATION

HEAD

(mm)

Figure	Use	No. of Flutes	Head Type	Specifications	Shape	Coolant (Int, Ext)	Dia. DC		APMX		Work Material									Page
											P		H		M	S	N			
							Min.	Max.	Max. DC	APMX / DC	Carbon Steel	Tool Steel	-55HRC	55HRC-	Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy		
ROUGHING	For Difficult-to-cut Materials	4	iMX-R4F	Square		Ext	10	25	26	1	◎	○			◎	◎	○			P.43
ROUGHING	For Titanium Alloys	4	iMX-RC4F-C	Radius		Int	10	20	21	1	◎				◎	◎				P.45
BALL	For Hardened Steel	2	iMX-B2S	Finish		Ext	16	20	20	1				◎						P.47
BALL	For Hardened Steel	4	iMX-B4S	Finish		Ext	16	20	20	1				◎						P.48
BALL	For High Efficiency Machining	3	iMX-B3FV	Irregular pitch flute		Ext	10	20	16	0.8		◎	◎							P.49
BALL	For Difficult-to-cut Materials	4	iMX-B4HV	Irregular pitch flute		Ext	10	25	26	1	◎	○			◎	◎	○			P.51
BALL	For Difficult-to-cut Materials	4	iMX-B4HV-E	Irregular pitch flute		Int	10	25	26	1	◎	○			◎	◎	○			P.52
BALL	For Difficult-to-cut Materials	6	iMX-B6HV	Irregular pitch flute		Ext	10	25	26	1	◎	○			◎	◎				P.55
LOLLIPOP	For Difficult-to-cut Materials	4	iMX-B4WH-S	5-axis machining		Int	12	20	15	0.8	◎	○			◎	◎	○			P.57
CHAMFER	For Chamfer Materials	3	iMX-CH3L	Hole and Shape		Ext	10	20	9.2	0.5	◎	○	○		◎	◎				P.59
CHAMFER	For Chamfer Materials	6	iMX-CH6V	Shape, Multi-flute		Ext	12	20	8.5	0.4	◎	○	○		◎	◎				P.61

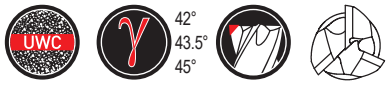
HOLDERS

The undercut type is available in medium, semi-long and long lengths.

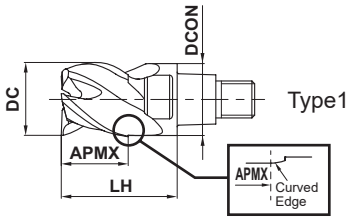
Figure			Length	Taper angle one side	Tool material	Page
Undercut			Medium Semi-long Long	—	Carbide	P.63
					Steel	P.64
Straight	Straight		Semi-long Long	—	Carbide	P.63
	Straight Oversize		Medium	—	Steel	P.64
Taper neck			Long	1°	Carbide	P.63

iMX-S3HV

Square head, 3 flute, Irregular helix



Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			◎	◎	○	



DC≤12	DC>12			
0 - 0.020	0 - 0.030			

●3-flute end mills that cover shoulder milling, slotting and plunging.
●Irregular helix controls vibration and achieves stable machining.

(mm)

Order Number	DC	APMX	LH	DCON	No. of Flutes	Grade EP7020	Type
IMX10S3HV10008	10	8	16	9.7	3	●	1
IMX12S3HV12009	12	9.6	19	11.7	3	●	1
IMX16S3HV16012	16	12.8	24	15.5	3	●	1
IMX20S3HV20016	20	16	30	19.5	3	●	1
IMX25S3HV25020	25	20	37.5	24.5	3	●	1

Note 1) The fastening size of the holder and head should be the same. (Refer to page 67)

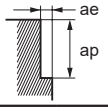
● : Inventory maintained in Japan.

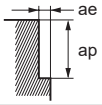
RECOMMENDED CUTTING CONDITIONS

■ Shoulder milling (L/D=3)

Other than the L/D = 3, use following recommended cutting conditions by multiplying the page 5 correction factor by overhang length.

(mm)

Work Material	Carbon steel, Alloy steel, Mild steel, Copper, Copper alloys AISI 1045, AISI 4140, ASTM A36, AISI 1010						Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT						Austenitic stainless steel, Ferritic and Martensitic stainless steels, Titanium alloy AISI 304, AISI 316, AISI 304LN, AISI 316LN, AISI 410, AISI 430, AISI 431, AISI 420J2, Ti-6Al-4V					
Dia. **DC**	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae
10	150	4800	0.09	1300	8	2	120	3800	0.06	680	8	2	100	3200	0.075	720	8	2
12	150	4000	0.09	1100	9.6	2.4	120	3200	0.065	620	9.6	2.4	100	2700	0.08	650	9.6	2.4
16	150	3000	0.1	900	12.8	3.2	120	2400	0.075	540	12.8	3.2	100	2000	0.09	540	12.8	3.2
20	150	2400	0.1	720	16	4	120	1900	0.075	430	16	4	100	1600	0.09	430	16	4
25	150	1900	0.12	680	20	5	120	1500	0.075	340	20	5	100	1300	0.09	350	20	5
Depth of cut																		

Work Material	Precipitation hardening stainless steel, Cobalt chromium alloy AISI 630, AISI 631						Heat resistant alloys Inconel718					
Dia. **DC**	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae
10	75	2400	0.06	430	8	2	40	1300	0.04	160	8	1
12	75	2000	0.065	390	9.6	2.4	40	1100	0.045	150	9.6	1.2
16	75	1500	0.075	340	12.8	3.2	40	800	0.05	120	12.8	1.6
20	75	1200	0.075	270	16	4	40	640	0.05	96	16	2
25	75	950	0.075	210	20	5	40	510	0.05	77	20	2.5
Depth of cut												

Note 1) The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece material installation is poor, vibration or abnormal sounds can occur. In that case, please adjust the revolution, feed rate and depth of cut.
Note 2) The revolution and feed rate can be increased at smaller depth of cut.
Note 3) For stainless steel, titanium alloys and heat resistant alloys, the use of water-soluble coolant is effective.

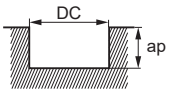
CARBIDE

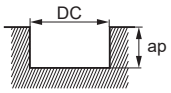
iMX-S3HV

Square head, 3 flute, Irregular helix

■Slot milling

(mm)

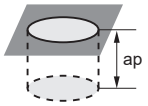
Work Material	Carbon steel, Alloy steel, Mild steel, Copper, Copper alloys AISI 1045, AISI 4140, ASTM A36, AISI 1010					Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT					Austenitic stainless steel, Ferritic and Martensitic stainless steels, Titanium alloy AISI 304, AISI 316, AISI 304LN, AISI 316LN, AISI 410, AISI 430, AISI 431, AISI 420J2, Ti-6Al-4V				
Dia. **DC**	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap
10	100	3200	0.04	380	5	80	2500	0.03	230	5	75	2400	0.03	200	5
12	100	2700	0.05	410	6	80	2100	0.04	250	6	75	2000	0.04	240	6
16	100	2000	0.07	420	8	80	1600	0.05	240	8	75	1500	0.06	270	8
20	100	1600	0.07	340	10	80	1300	0.05	200	10	75	1200	0.06	220	10
25	100	1300	0.08	310	12	80	1000	0.05	150	12	75	950	0.06	170	12
Depth of cut	 DC:Dia.														

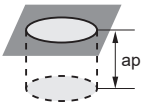
Work Material	Precipitation hardening stainless steel, Cobalt chromium alloy AISI 630, AISI 631					Heat resistant alloys Inconel718				
Dia. **DC**	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap
10	60	1900	0.025	140	5	30	950	0.02	57	2
12	60	1600	0.035	170	6	30	800	0.03	72	2.4
16	60	1200	0.05	180	8	30	600	0.05	90	3.2
20	60	950	0.05	140	10	30	480	0.05	72	4
25	60	760	0.05	110	12	30	380	0.05	57	5
Depth of cut	 DC:Dia.									

Note 1) The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece material installation is poor, vibration or abnormal sounds can occur. In that case, please adjust the revolution, feed rate and depth of cut.
Note 2) The revolution and feed rate can be increased at smaller depth of cut.
Note 3) For stainless steel, titanium alloys and heat resistant alloys, the use of water-soluble coolant is effective.

■Plunging

(mm)

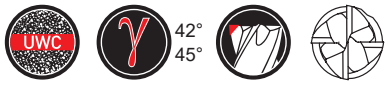
Work Material	Carbon steel, Alloy steel, Mild steel, Copper, Copper alloys AISI 1045, AISI 4140, ASTM A36, AISI 1010						Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT						Austenitic stainless steel, Ferritic and Martensitic stainless steels, Titanium alloy AISI 304, AISI 316, AISI 304LN, AISI 316LN, AISI 410, AISI 430, AISI 431, AISI 420J2, Ti-6Al-4V					
Dia. **DC**	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Rev. (mm/rev)	Feed rate (mm/min)	Drilled Depth ap	Step ap2	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Rev. (mm/rev)	Feed rate (mm/min)	Drilled Depth ap	Step ap2	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Rev. (mm/rev)	Feed rate (mm/min)	Drilled Depth ap	Step ap2
10	100	3200	0.14	450	5	2.5	70	2200	0.09	200	5	2	60	1900	0.03	57	5	0.6
12	100	2700	0.14	380	6	2.5	70	1900	0.09	170	6	2	60	1600	0.03	48	6	0.6
16	100	2000	0.14	280	8	2.5	70	1400	0.09	130	8	2	60	1200	0.03	36	8	0.6
20	100	1600	0.14	220	10	2.5	70	1100	0.09	99	10	2	60	950	0.03	29	10	0.6
25	100	1300	0.14	180	12.5	2.5	70	890	0.09	80	12.5	2	60	760	0.03	23	12.5	0.6
Depth of cut																		

Work Material	Precipitation hardening stainless steel, Cobalt chromium alloy AISI 630, AISI 631					
Dia. **DC**	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Rev. (mm/rev)	Feed rate (mm/min)	Drilled Depth ap	Step ap2
10	40	1300	0.03	39	5	0.6
12	40	1100	0.03	33	6	0.6
16	40	800	0.03	24	8	0.6
20	40	640	0.03	19	10	0.6
25	40	510	0.03	15	12.5	0.6
Depth of cut						

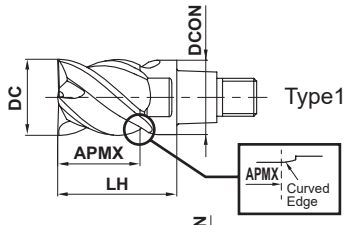
Note 1) The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece material installation is poor, vibration or abnormal sounds can occur.
Note 2) The revolution and feed rate can be increased at smaller depth of cut.
Note 3) For stainless steel, titanium alloys and heat resistant alloys, the use of water-soluble coolant is effective.
Note 4) For the feed rate information, the feed per revolution rate is listed.

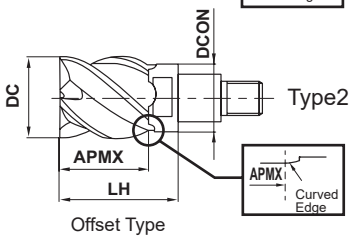
iMX-S4HV

Square head, 4 flute, Irregular helix



Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			◎	◎	○	





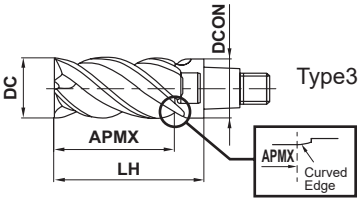
Offset Type

DC≤12	DC>12			
0 - 0.020	0 - 0.030			

● Irregular helix controls vibration and achieves stable machining.

(mm)

Order Number	DC	APMX	LH	DCON	No. of Flutes	Grade EP7020	Type
IMX10S4HV10010	10	10	16	9.7	4	●	1
IMX10S4HV12012	12	12.5	19	9.7	4	●	2
IMX12S4HV12012	12	12	19	11.7	4	●	1
IMX12S4HV14014	14	14.5	22.5	11.7	4	●	2
IMX16S4HV16016	16	16	24	15.5	4	●	1
IMX16S4HV18018	18	18.5	27	15.5	4	●	2
IMX20S4HV20020	20	20	30	19.5	4	●	1
IMX20S4HV22023	22	23	33	19.5	4	●	2
IMX25S4HV25025	25	25	37.5	24.5	4	●	1
IMX25S4HV28029	28	29	41.5	24.5	4	●	2
IMX25S4HV30031	30	31	43.5	24.5	4	●	2
IMX25S4HV32033	32	33	45.5	24.5	4	●	2



■ Long cutting edge type

(mm)

Order Number	DC	APMX	LH	DCON	No. of Flutes	Grade EP7020	Type
IMX16S4HV16032	16	32	40	15.5	4	●	3
IMX20S4HV20040	20	40	50	19.5	4	●	3

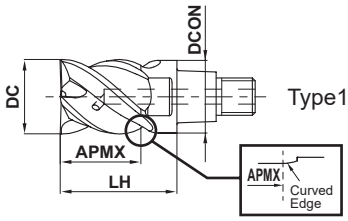
Note 1) The fastening size of the holder and head should be the same. (Refer to page 67)

● : Inventory maintained in Japan.

iMX-S4HV-S

Square head with coolant hole, 4 flute, Irregular helix

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			◎	◎	○	



Type1

DC≤12	DC>12			
0 - 0.020	0 - 0.030			

- Coolant holes for each cutting edge enables a stable coolant supply.
- Irregular helix controls vibration and achieves stable machining.

(mm)

Order Number	DC	APMX	LH	DCON	No. of Flutes	Grade EP7020	Type
IMX10S4HV10010S	10	10	16	9.7	4	●	1
IMX12S4HV12012S	12	12	19	11.7	4	●	1
IMX16S4HV16016S	16	16	24	15.5	4	●	1
IMX20S4HV20020S	20	20	30	19.5	4	●	1
IMX25S4HV25025S	25	25	37.5	24.5	4	●	1

Note 1) The fastening size of the holder and head should be the same. (Refer to page 67)

iMX-S4HV/iMX-S4HV-S

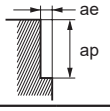
Square head, 4 flute, Irregular helix (With/Without coolant hole)

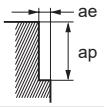
RECOMMENDED CUTTING CONDITIONS

■ Shoulder milling (L/D=3)

Other than the L/D = 3, use following recommended cutting conditions by multiplying the page 5 correction factor by overhang length.

(mm)

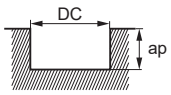
Work Material	Carbon steel, Alloy steel, Mild steel, Copper, Copper alloys AISI 1045, AISI 4140, ASTM A36, AISI 1010						Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT						Austenitic stainless steel, Ferritic and Martensitic stainless steels, Titanium alloy AISI 304, AISI 316, AISI 304LN, AISI 316LN, AISI 410, AISI 430, AISI 431, AISI 420J2, Ti-6Al-4V					
Dia. **DC**	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae
10	150	4800	0.09	1700	10	2	120	3800	0.06	910	10	2	100	3200	0.075	960	10	2
12	150	4000	0.09	1400	12	2.4	120	3200	0.065	830	12	2.4	100	2700	0.08	860	12	2.4
16	150	3000	0.1	1200	16	3.2	120	2400	0.075	720	16	3.2	100	2000	0.09	720	16	3.2
20	150	2400	0.1	960	20	4	120	1900	0.075	570	20	4	100	1600	0.09	580	20	4
25	150	1900	0.12	910	25	5	120	1500	0.075	450	25	5	100	1300	0.09	470	25	5
Depth of cut																		

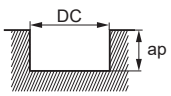
Work Material	Precipitation hardening stainless steel, Cobalt chromium alloy AISI 630, AISI 631						Heat resistant alloys Inconel718					
Dia. **DC**	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae
10	75	2400	0.06	580	10	2	40	1300	0.04	210	10	1
12	75	2000	0.065	520	12	2.4	40	1100	0.045	200	12	1.2
16	75	1500	0.075	450	16	3.2	40	800	0.05	160	16	1.6
20	75	1200	0.075	360	20	4	40	640	0.05	130	20	2
25	75	950	0.075	290	25	5	40	510	0.05	100	25	2.5
Depth of cut												

Note 1) The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece material installation is poor, vibration or abnormal sounds can occur. In that case, please adjust the revolution, feed rate and depth of cut.
Note 2) The revolution and feed rate can be increased at smaller depth of cut.
Note 3) For stainless steel, titanium alloys and heat resistant alloys, the use of water-soluble coolant is effective.

■ Slot milling

(mm)

Work Material	Carbon steel, Alloy steel, Mild steel, Copper, Copper alloys AISI 1045, AISI 4140, ASTM A36, AISI 1010					Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT					Austenitic stainless steel, Ferritic and Martensitic stainless steels, Titanium alloy AISI 304, AISI 316, AISI 304LN, AISI 316LN, AISI 410, AISI 430, AISI 431, AISI 420J2, Ti-6Al-4V				
Dia. **DC**	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap
10	100	3200	0.04	510	5	80	2500	0.03	300	5	75	2400	0.03	290	5
12	100	2700	0.05	540	6	80	2100	0.04	340	6	75	2000	0.04	320	6
16	100	2000	0.07	560	8	80	1600	0.05	320	8	75	1500	0.06	360	8
20	100	1600	0.07	450	10	80	1300	0.05	260	10	75	1200	0.06	290	10
25	100	1300	0.08	420	12	80	1000	0.05	200	12	75	950	0.06	230	12
Depth of cut	 DC:Dia.														

Work Material	Precipitation hardening stainless steel, Cobalt chromium alloy AISI 630, AISI 631					Heat resistant alloys Inconel718				
Dia. **DC**	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap
10	60	1900	0.025	190	5	30	950	0.02	76	2
12	60	1600	0.035	220	6	30	800	0.03	96	2.4
16	60	1200	0.05	240	8	30	600	0.05	120	3.2
20	60	950	0.05	190	10	30	480	0.05	96	4
25	60	760	0.05	150	12	30	380	0.05	76	5
Depth of cut	 DC:Dia.									

Note 1) The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece material installation is poor, vibration or abnormal sounds can occur. In that case, please adjust the revolution, feed rate and depth of cut.
Note 2) The revolution and feed rate can be increased at smaller depth of cut.
Note 3) For stainless steel, titanium alloys and heat resistant alloys, the use of water-soluble coolant is effective.

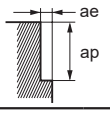
iMX-S4HV

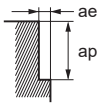
Square head, 4 flute, Irregular helix, Long cutting edge type

RECOMMENDED CUTTING CONDITIONS

■ Shoulder milling

(mm)

Work Material		Carbon steel, Alloy steel, Mild steel, Copper, Copper alloys AISI 1045, AISI 4140, ASTM A36, AISI 1010						Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT						Austenitic stainless steel, Ferritic and Martensitic stainless steels, Titanium alloy AISI 304, AISI 316, AISI 304LN, AISI 316LN, AISI 410, AISI 430, AISI 431, AISI 420J2, Ti-6Al-4V					
L/D	Dia. DC	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae
4	**16**	100	2000	0.09	720	32	0.8	80	1600	0.07	450	32	0.8	60	1200	0.08	380	32	0.8
	20	100	1600	0.09	580	40	1	80	1300	0.07	360	40	1	60	950	0.08	300	40	1
6	**16**	60	1200	0.07	340	32	0.8	50	990	0.05	200	32	0.8	40	800	0.06	190	32	0.8
	20	60	950	0.07	270	40	1	50	800	0.05	160	40	1	40	640	0.06	150	40	1
Depth of cut																			

Work Material		Precipitation hardening stainless steel, Cobalt chromium alloy AISI 630, AISI 631						Heat resistant alloys Inconel718					
L/D	Dia. DC	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae
4	**16**	50	990	0.07	280	32	0.8	30	600	0.05	120	32	0.4
	20	50	800	0.07	220	40	1	30	480	0.05	96	40	0.5
6	**16**	30	600	0.05	120	32	0.8	20	400	0.04	64	32	0.4
	20	30	480	0.05	96	40	1	20	320	0.04	51	40	0.5
Depth of cut													

Note 1) The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece material installation is poor, vibration or abnormal sounds can occur. In that case, please adjust the revolution, feed rate and depth of cut.
Note 2) The revolution and feed rate can be increased at smaller depth of cut.
Note 3) The length of the long cutting type is 2 times that of the standard head. L/D demonstrates +1 when installed to a holder of the same size.
Note 4) For stainless steel, titanium alloys and heat resistant alloys, the use of water-soluble coolant is effective.

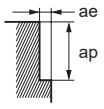
iMX-S4HV

Square head, 4 flute, Irregular helix, Offset type

RECOMMENDED CUTTING CONDITIONS

■ Shoulder milling

(mm)

Work Material		Carbon steel, Alloy steel, Mild steel, Copper, Copper alloys AISI 1045, AISI 4140, ASTM A36, AISI 1010						Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT						Austenitic stainless steel, Ferritic and Martensitic stainless steels, Titanium alloy AISI 304, AISI 316, AISI 304LN, AISI 316LN, AISI 410, AISI 430, AISI 431, AISI 420J2, Ti-6Al-4V					
L/D	Dia. DC	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae
3	**12**	150	4000	0.09	1400	12	1.2	120	3200	0.06	770	12	1.2	100	2700	0.075	810	12	1.2
	14	150	3400	0.09	1200	14	1.4	120	2700	0.065	700	14	1.4	100	2300	0.08	740	14	1.4
	18	150	2700	0.1	1100	18	1.8	120	2100	0.075	630	18	1.8	100	1800	0.09	650	18	1.8
	22	150	2200	0.1	880	22	2.2	120	1700	0.075	510	22	2.2	100	1400	0.09	500	22	2.2
	28	150	1700	0.12	820	28	2.8	120	1400	0.075	420	28	2.8	100	1100	0.09	400	28	2.8
	30	150	1600	0.12	770	30	3	120	1300	0.075	390	30	3	100	1100	0.09	400	30	3
	32	150	1500	0.12	720	32	3.2	120	1200	0.075	360	32	3.2	100	990	0.09	360	32	3.2
5	**12**	90	2400	0.07	670	12	0.5	70	1900	0.05	380	12	0.5	60	1600	0.06	380	12	0.5
	14	90	2000	0.07	560	14	0.6	70	1600	0.05	320	14	0.6	60	1400	0.06	340	14	0.6
	18	90	1600	0.08	510	18	0.7	70	1200	0.06	290	18	0.7	60	1100	0.07	310	18	0.7
	22	90	1300	0.08	420	22	0.9	70	1000	0.06	240	22	0.9	60	870	0.07	240	22	0.9
	28	90	1000	0.1	400	28	1.1	70	800	0.06	190	28	1.1	60	680	0.07	190	28	1.1
	30	90	950	0.1	380	30	1.2	70	740	0.06	180	30	1.2	60	640	0.07	180	30	1.2
	32	90	900	0.1	360	32	1.3	70	700	0.06	170	32	1.3	60	600	0.07	170	32	1.3
7	**12**	60	1600	0.06	380	12	0.2	50	1300	0.04	210	12	0.2	32	850	0.05	170	12	0.2
	14	60	1400	0.06	340	14	0.3	50	1100	0.05	220	14	0.3	32	730	0.06	180	14	0.3
	18	60	1100	0.07	310	18	0.4	50	880	0.05	180	18	0.4	32	570	0.06	140	18	0.4
	22	60	870	0.07	240	22	0.4	50	720	0.05	140	22	0.4	32	460	0.06	110	22	0.4
	28	60	680	0.08	220	28	0.6	50	570	0.05	110	28	0.6	32	360	0.06	86	28	0.6
	30	60	640	0.08	200	30	0.6	50	530	0.05	110	30	0.6	32	340	0.06	82	30	0.6
	32	60	600	0.08	190	32	0.6	50	500	0.05	100	32	0.6	32	320	0.06	77	32	0.6
Depth of cut																			

Note 1) The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece material installation is poor, vibration or abnormal sounds can occur. In that case, please adjust the revolution, feed rate and depth of cut.

Note 2) The revolution and feed rate can be increased at smaller depth of cut.

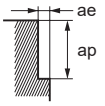
Note 3) For stainless steel, titanium alloys and heat resistant alloys, the use of water-soluble coolant is effective.

iMX-S4HV

Square head, 4 flute, Irregular helix, Offset type

■ Shoulder milling

(mm)

Work Material		Precipitation hardening stainless steel, Cobalt chromium alloy AISI 630, AISI 631						Heat resistant alloys Inconel718					
L/D	Dia. DC	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae
3	12	75	2000	0.06	480	12	1.2	30	800	0.04	130	12	0.9
	14	75	1700	0.065	440	14	1.4	30	680	0.045	120	14	1.1
	18	75	1300	0.075	390	18	1.8	40	710	0.05	140	18	1.4
	22	75	1100	0.075	330	22	2.2	40	580	0.05	120	22	1.7
	28	75	850	0.075	260	28	2.8	40	450	0.05	90	28	2.1
	30	75	800	0.075	240	30	3	40	420	0.05	84	30	2.3
	32	75	750	0.075	230	32	3.2	40	400	0.05	80	32	2.4
5	12	50	1300	0.05	260	12	0.5	10	270	0.03	32	12	0.4
	14	50	1100	0.05	220	14	0.6	10	230	0.04	37	14	0.4
	18	50	880	0.06	210	18	0.7	19	340	0.04	54	18	0.6
	22	50	720	0.06	170	22	0.9	19	270	0.04	43	22	0.7
	28	50	570	0.06	140	28	1.1	19	220	0.04	35	28	0.8
	30	50	530	0.06	130	30	1.2	19	200	0.04	32	30	0.9
	32	50	500	0.06	120	32	1.3	19	190	0.04	30	32	1
7	12	24	640	0.04	100	12	0.2	–	–	–	–	–	–
	14	24	550	0.05	110	14	0.3	–	–	–	–	–	–
	18	24	420	0.05	84	18	0.4	–	–	–	–	–	–
	22	24	350	0.05	70	22	0.4	–	–	–	–	–	–
	28	24	270	0.05	54	28	0.6	–	–	–	–	–	–
	30	24	250	0.05	50	30	0.6	–	–	–	–	–	–
	32	24	240	0.05	48	32	0.6	–	–	–	–	–	–
Depth of cut													

Note 1) The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece material installation is poor, vibration or abnormal sounds can occur. In that case, please adjust the revolution, feed rate and depth of cut.

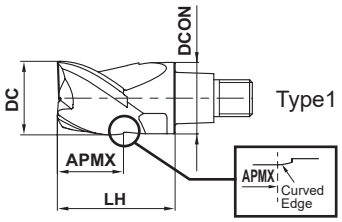
Note 2) The revolution and feed rate can be increased at smaller depth of cut.

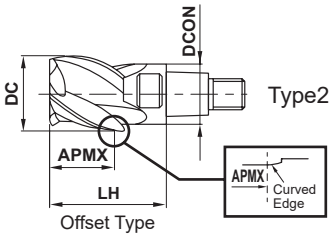
Note 3) For stainless steel, titanium alloys and heat resistant alloys, the use of water-soluble coolant is effective.

iMX-S3A

Square head, 3 flute, For aluminium alloy

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
							◎





Offset Type

DC≤12	DC>12			
0 - 0.020	0 - 0.030			

●High efficiency machining due to the sharp cutting edge suitable for aluminium alloy machining and polished rake face.

(mm)

Order Number	DC	APMX	LH	DCON	No. of Flutes	Grade ET2020	Type
IMX10S3A10008	10	8	16	9.7	3	●	1
IMX10S3A12010	12	10.1	19	9.7	3	●	2
IMX12S3A12009	12	9.6	19	11.7	3	●	1
IMX12S3A14011	14	11.7	22.5	11.7	3	●	2
IMX16S3A16012	16	12.8	24	15.5	3	●	1
IMX16S3A18014	18	14.9	27	15.5	3	●	2
IMX20S3A20016	20	16	30	19.5	3	●	1
IMX20S3A22018	22	18.6	33	19.5	3	●	2
IMX25S3A25020	25	20	37.5	24.5	3	●	1
IMX25S3A28023	28	23.4	41.5	24.5	3	●	2

Note 1) The fastening size of the holder and head should be the same. (Refer to page 67)

● : **Inventory maintained in Japan.**

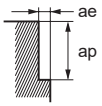
iMX-S3A

Square head, 3 flute, For aluminium alloy

RECOMMENDED CUTTING CONDITIONS

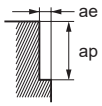
■Shoulder milling (L/D=3)

(mm)

Work Material	Aluminium alloy A6061, A7075					
Dia. DC	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae
10	500	16000	0.117	5600	8	3
12	500	13000	0.118	4600	9.6	3.6
16	500	9900	0.153	4500	12.8	4.8
20	500	8000	0.175	4200	16	6
25	500	6400	0.211	4100	20	7.5
Depth of Cut						

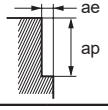
■Shoulder milling (L/D=5)

(mm)

Work Material	Aluminium alloy A6061, A7075					
Dia. DC	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae
10	300	9500	0.09	2600	8	1.2
12	300	8000	0.09	2200	9.6	1.44
16	300	6000	0.12	2200	12.8	1.92
20	300	4800	0.14	2000	16	2.4
25	300	3800	0.17	1900	20	3
Depth of Cut						

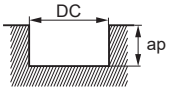
■Shoulder milling (L/D=7)

(mm)

Work Material	Aluminium alloy A6061, A7075					
Dia. DC	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae
10	200	6400	0.08	1500	8	0.6
12	200	5300	0.08	1300	9.6	0.72
16	200	4000	0.11	1300	12.8	0.96
20	200	3200	0.12	1200	16	1.2
25	200	2500	0.15	1100	20	1.5
Depth of Cut						

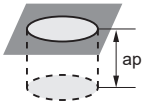
■Slot milling (L/D=3)

(mm)

Work Material	Aluminium alloy A6061, A7075				
DC	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap
10	500	16000	0.068	3300	5
12	500	13000	0.072	2800	6
16	500	9900	0.093	2800	8
20	500	8000	0.108	2600	10
25	500	6400	0.127	2400	12.5
Depth of Cut	 DC:Dia.				

■Plunging (L/D=3)

(mm)

Work Material	Aluminium alloy A6061, A7075					
DC	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Rev. (mm/rev)	Feed rate (mm/min)	Drilled Depth ap	Step ap_2
10	300	9500	0.1	950	5	2.5
12	300	8000	0.1	800	6	2.5
16	300	6000	0.1	600	8	2.5
20	300	4800	0.1	480	10	2.5
25	300	3800	0.1	380	12.5	2.5
Depth of Cut						

Note 1) Vibration may occur if there is poor rigidity of the machine or workpiece material. In that case, please adjust the revolution, feed rate and depth of cut.
Note 2) The use of water-soluble coolant is effective.
Note 3) For the feed rate information, the feed per revolution rate is listed.

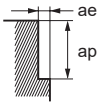
iMX-S3A

Square head, 3 flute, For aluminium alloy, Offset type

RECOMMENDED CUTTING CONDITIONS

■ Side milling

(mm)

Work Material		Aluminium alloy A6061, A7075					
L/D	Dia. **DC**	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae
3	**12**	500	13000	0.117	4600	9.6	2.4
	14	500	11000	0.118	3900	11.2	2.8
	18	500	8800	0.153	4000	14.4	3.6
	22	500	7200	0.175	3800	17.6	4.4
	28	500	5700	0.211	3600	22.4	5.6
5	**12**	300	8000	0.09	2200	9.6	1.0
	14	300	6800	0.09	1800	11.2	1.1
	18	300	5300	0.12	1900	14.4	1.4
	22	300	4300	0.14	1800	17.6	1.8
	28	300	3400	0.17	1700	22.4	2.2
Depth of cut							

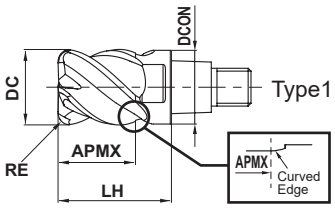
Note 1) Vibration may occur if there is poor rigidity of the machine or workpiece material. In that case, please adjust the revolution, feed rate and depth of cut.

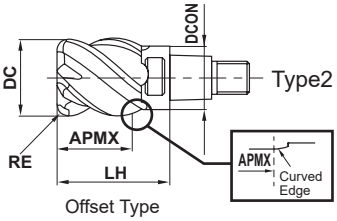
Note 2) The use of water-soluble coolant is effective.

iMX-C4HV

Corner radius head, 4 flute, Irregular helix

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			◎	◎	○	





Offset Type

RE≤6.35				
±0.020				

DC≤12	DC>12			
0 - 0.020	0 - 0.030			

● Irregular helix controls vibration and achieves stable machining.

(mm)

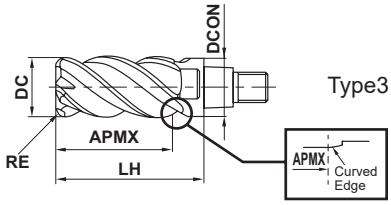
Order Number	DC	RE	APMX	LH	DCON	No. of Flutes	Grade EP7020	Type
IMX10C4HV100R03010	10	0.3	10	16	9.7	4	●	1
IMX10C4HV100R05010	10	0.5	10	16	9.7	4	●	1
IMX10C4HV100R10010	10	1	10	16	9.7	4	●	1
IMX10C4HV100R15010	10	1.5	10	16	9.7	4	●	1
IMX10C4HV100R20010	10	2	10	16	9.7	4	●	1
IMX10C4HV100R25010	10	2.5	10	16	9.7	4	●	1
IMX10C4HV100R30010	10	3	10	16	9.7	4	●	1
IMX10C4HV110R05011	11	0.5	11.5	18	9.7	4	●	2
IMX10C4HV110R10011	11	1	11.5	18	9.7	4	●	2
IMX10C4HV120R03012	12	0.3	12.5	19	9.7	4	●	2
IMX10C4HV120R05012	12	0.5	12.5	19	9.7	4	●	2
IMX10C4HV120R10012	12	1	12.5	19	9.7	4	●	2
IMX10C4HV120R20012	12	2	12.5	19	9.7	4	●	2
IMX12C4HV120R03012	12	0.3	12	19	11.7	4	●	1
IMX12C4HV120R05012	12	0.5	12	19	11.7	4	●	1
IMX12C4HV120R10012	12	1	12	19	11.7	4	●	1
IMX12C4HV120R15012	12	1.5	12	19	11.7	4	●	1
IMX12C4HV120R20012	12	2	12	19	11.7	4	●	1
IMX12C4HV120R25012	12	2.5	12	19	11.7	4	●	1
IMX12C4HV120R30012	12	3	12	19	11.7	4	●	1
IMX12C4HV120R40012	12	4	12	19	11.7	4	●	1
IMX12C4HV130R05013	13	0.5	13.5	21.5	11.7	4	●	2
IMX12C4HV130R10013	13	1	13.5	21.5	11.7	4	●	2
IMX12C4HV140R03014	14	0.3	14.5	22.5	11.7	4	●	2
IMX12C4HV140R05014	14	0.5	14.5	22.5	11.7	4	●	2
IMX12C4HV140R10014	14	1	14.5	22.5	11.7	4	●	2
IMX12C4HV140R20014	14	2	14.5	22.5	11.7	4	●	2
IMX16C4HV160R03016	16	0.3	16	24	15.5	4	●	1
IMX16C4HV160R05016	16	0.5	16	24	15.5	4	●	1
IMX16C4HV160R10016	16	1	16	24	15.5	4	●	1
IMX16C4HV160R15016	16	1.5	16	24	15.5	4	●	1
IMX16C4HV160R20016	16	2	16	24	15.5	4	●	1
IMX16C4HV160R25016	16	2.5	16	24	15.5	4	●	1
IMX16C4HV160R30016	16	3	16	24	15.5	4	●	1

● : Inventory maintained in Japan.

(mm)

Order Number	DC	RE	APMX	LH	DCON	No. of Flutes	Grade EP7020	Type
IMX16C4HV160R40016	16	4	16	24	15.5	4	●	1
IMX16C4HV160R50016	16	5	16	24	15.5	4	●	1
IMX16C4HV170R05017	17	0.5	17	26	15.5	4	●	2
IMX16C4HV170R10017	17	1	17	26	15.5	4	●	2
IMX16C4HV180R03018	18	0.3	18	27	15.5	4	●	2
IMX16C4HV180R05018	18	0.5	18.5	27	15.5	4	●	2
IMX16C4HV180R10018	18	1	18.5	27	15.5	4	●	2
IMX16C4HV180R20018	18	2	18.5	27	15.5	4	●	2
IMX16C4HV180R30018	18	3	18.5	27	15.5	4	●	2
IMX20C4HV200R03020	20	0.3	20	30	19.5	4	●	1
IMX20C4HV200R05020	20	0.5	20	30	19.5	4	●	1
IMX20C4HV200R10020	20	1	20	30	19.5	4	●	1
IMX20C4HV200R15020	20	1.5	20	30	19.5	4	●	1
IMX20C4HV200R20020	20	2	20	30	19.5	4	●	1
IMX20C4HV200R25020	20	2.5	20	30	19.5	4	●	1
IMX20C4HV200R30020	20	3	20	30	19.5	4	●	1
IMX20C4HV200R40020	20	4	20	30	19.5	4	●	1
IMX20C4HV200R50020	20	5	20	30	19.5	4	●	1
IMX20C4HV200R60020	20	6	20	30	19.5	4	●	1
IMX20C4HV200R63520	20	6.35	20	30	19.5	4	●	1
IMX20C4HV220R05023	22	0.5	23	33	19.5	4	●	2
IMX20C4HV220R10023	22	1	23	33	19.5	4	●	2
IMX20C4HV220R20023	22	2	23	33	19.5	4	●	2
IMX20C4HV220R30023	22	3	23	33	19.5	4	●	2
IMX25C4HV250R10025	25	1	25	37.5	24.5	4	●	1
IMX25C4HV250R20025	25	2	25	37.5	24.5	4	●	1
IMX25C4HV250R30025	25	3	25	37.5	24.5	4	●	1
IMX25C4HV250R40025	25	4	25	37.5	24.5	4	●	1
IMX25C4HV250R50025	25	5	25	37.5	24.5	4	●	1
IMX25C4HV250R60025	25	6	25	37.5	24.5	4	●	1
IMX25C4HV250R63525	25	6.35	25	37.5	24.5	4	●	1
IMX25C4HV280R10029	28	1	29	41.5	24.5	4	●	2
IMX25C4HV280R30029	28	3	29	41.5	24.5	4	●	2

Note 1) The fastening size of the holder and head should be the same. (Refer to page 67)



■ Long cutting edge type

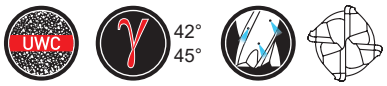
(mm)

Order Number	DC	RE	APMX	LH	DCON	No. of Flutes	Grade EP7020	Type
IMX16C4HV160R10032	16	1	32	40	15.5	4	●	3
IMX16C4HV160R30032	16	3	32	40	15.5	4	●	3
IMX20C4HV200R10040	20	1	40	50	19.5	4	●	3
IMX20C4HV200R30040	20	3	40	50	19.5	4	●	3

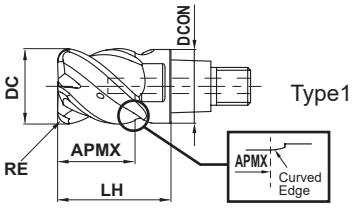
Note 1) The fastening size of the holder and head should be the same. (Refer to page 67)

iMX-C4HV-S

Corner radius head, 4 flute, Irregular helix, with coolant hole



Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			◎	◎	○	



RE≤6.35				
±0.020				
DC≤12	DC>12			
0 - 0.020	0 - 0.030			

● Coolant holes for each cutting edge enable stable coolant supply.

● Irregular helix controls vibration and achieves stable machining even on difficult-to-cut materials and long overhang applications.

(mm)

Order Number	DC	RE	APMX	LH	DCON	No. of Flutes	Grade EP7020	Type
IMX10C4HV100R03010S	10	0.3	10	16	9.7	4	●	1
IMX10C4HV100R05010S	10	0.5	10	16	9.7	4	●	1
IMX10C4HV100R10010S	10	1	10	16	9.7	4	●	1
IMX10C4HV100R15010S	10	1.5	10	16	9.7	4	●	1
IMX10C4HV100R20010S	10	2	10	16	9.7	4	●	1
IMX10C4HV100R30010S	10	3	10	16	9.7	4	●	1
IMX12C4HV120R03012S	12	0.3	12	19	11.7	4	●	1
IMX12C4HV120R05012S	12	0.5	12	19	11.7	4	●	1
IMX12C4HV120R10012S	12	1	12	19	11.7	4	●	1
IMX12C4HV120R15012S	12	1.5	12	19	11.7	4	●	1
IMX12C4HV120R20012S	12	2	12	19	11.7	4	●	1
IMX12C4HV120R30012S	12	3	12	19	11.7	4	●	1
IMX12C4HV120R40012S	12	4	12	19	11.7	4	●	1
IMX16C4HV160R05016S	16	0.5	16	24	15.5	4	●	1
IMX16C4HV160R10016S	16	1	16	24	15.5	4	●	1
IMX16C4HV160R15016S	16	1.5	16	24	15.5	4	●	1
IMX16C4HV160R20016S	16	2	16	24	15.5	4	●	1
IMX16C4HV160R30016S	16	3	16	24	15.5	4	●	1
IMX16C4HV160R40016S	16	4	16	24	15.5	4	●	1
IMX20C4HV200R05020S	20	0.5	20	30	19.5	4	●	1
IMX20C4HV200R10020S	20	1	20	30	19.5	4	●	1
IMX20C4HV200R15020S	20	1.5	20	30	19.5	4	●	1
IMX20C4HV200R20020S	20	2	20	30	19.5	4	●	1
IMX20C4HV200R30020S	20	3	20	30	19.5	4	●	1
IMX20C4HV200R40020S	20	4	20	30	19.5	4	●	1
IMX20C4HV200R60020S	20	6	20	30	19.5	4	●	1
IMX20C4HV200R63520S	20	6.35	20	30	19.5	4	●	1
IMX25C4HV250R10025S	25	1	25	37.5	24.5	4	●	1
IMX25C4HV250R15025S	25	1.5	25	37.5	24.5	4	●	1
IMX25C4HV250R20025S	25	2	25	37.5	24.5	4	●	1
IMX25C4HV250R30025S	25	3	25	37.5	24.5	4	●	1
IMX25C4HV250R40025S	25	4	25	37.5	24.5	4	●	1
IMX25C4HV250R60025S	25	6	25	37.5	24.5	4	●	1
IMX25C4HV250R63525S	25	6.35	25	37.5	24.5	4	●	1

Note 1) The fastening size of the holder and head should be the same. (Refer to page 67)

● : **Inventory maintained in Japan.**

iMX-C4HV/iMX-C4HV-S

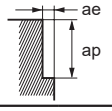
Corner radius head, 4 flute, Irregular helix (With/Without coolant hole)

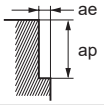
RECOMMENDED CUTTING CONDITIONS

■ Shoulder milling (L/D=3)

Other than the L/D = 3, use following recommended cutting conditions by multiplying the page 5 correction factor by overhang length.

(mm)

Work Material	Carbon steel, Alloy steel, Mild steel, Copper, Copper alloys AISI 1045, AISI 4140, ASTM A36, AISI 1010						Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT						Austenitic stainless steel, Ferritic and Martensitic stainless steels, Titanium alloy AISI 304, AISI 316, AISI 304LN, AISI 316LN, AISI 410, AISI 430, AISI 431, AISI 420J2, Ti-6Al-4V					
Dia. **DC**	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae
10	150	4800	0.09	1700	10	2	120	3800	0.06	910	10	2	100	3200	0.075	960	10	2
12	150	4000	0.09	1400	12	2.4	120	3200	0.065	830	12	2.4	100	2700	0.08	860	12	2.4
16	150	3000	0.1	1200	16	3.2	120	2400	0.075	720	16	3.2	100	2000	0.09	720	16	3.2
20	150	2400	0.1	960	20	4	120	1900	0.075	570	20	4	100	1600	0.09	580	20	4
25	150	1900	0.12	910	25	5	120	1500	0.075	450	25	5	100	1300	0.09	470	25	5
Depth of cut																		

Work Material	Precipitation hardening stainless steel, Cobalt chromium alloy AISI 630, AISI 631						Heat resistant alloys Inconel718					
Dia. **DC**	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae
10	75	2400	0.06	580	10	2	40	1300	0.04	210	10	1
12	75	2000	0.065	520	12	2.4	40	1100	0.045	200	12	1.2
16	75	1500	0.075	450	16	3.2	40	800	0.05	160	16	1.6
20	75	1200	0.075	360	20	4	40	640	0.05	130	20	2
25	75	950	0.075	290	25	5	40	510	0.05	100	25	2.5
Depth of cut												

Note 1) The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece material installation is poor, vibration or abnormal sounds can occur. In that case, please adjust the revolution, feed rate and depth of cut.

Note 2) The revolution and feed rate can be increased at smaller depth of cut.

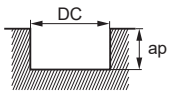
Note 3) For stainless steel, titanium alloys and heat resistant alloys, the use of water-soluble coolant is effective.

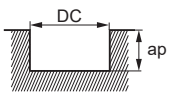
iMX-C4HV/iMX-C4HV-S

Corner radius head, 4 flute, Irregular helix (With/Without coolant hole)

■ Slot milling

(mm)

Work Material	Carbon steel, Alloy steel, Mild steel, Copper, Copper alloys AISI 1045, AISI 4140, ASTM A36, AISI 1010					Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT					Austenitic stainless steel, Ferritic and Martensitic stainless steels, Titanium alloy AISI 304, AISI 316, AISI 304LN, AISI 316LN, AISI 410, AISI 430, AISI 431, AISI 420J2, Ti-6Al-4V				
Dia. **DC**	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap
10	100	3200	0.04	510	5	80	2500	0.03	300	5	75	2400	0.03	290	5
12	100	2700	0.05	540	6	80	2100	0.04	340	6	75	2000	0.04	320	6
16	100	2000	0.07	560	8	80	1600	0.05	320	8	75	1500	0.06	360	8
20	100	1600	0.07	450	10	80	1300	0.05	260	10	75	1200	0.06	290	10
25	100	1300	0.08	420	12	80	1000	0.05	200	12	75	950	0.06	230	12
Depth of cut	 DC:Dia.														

Work Material	Precipitation hardening stainless steel, Cobalt chromium alloy AISI 630, AISI 631					Heat resistant alloys Inconel718				
Dia. **DC**	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap
10	60	1900	0.025	190	5	30	950	0.02	76	2
12	60	1600	0.035	220	6	30	800	0.03	96	2.4
16	60	1200	0.05	240	8	30	600	0.05	120	3.2
20	60	950	0.05	190	10	30	480	0.05	96	4
25	60	760	0.05	150	12	30	380	0.05	76	5
Depth of cut	 DC:Dia.									

Note 1) The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece material installation is poor, vibration or abnormal sounds can occur. In that case, please adjust the revolution, feed rate and depth of cut.
Note 2) The revolution and feed rate can be increased at smaller depth of cut.
Note 3) For stainless steel, titanium alloys and heat resistant alloys, the use of water-soluble coolant is effective.

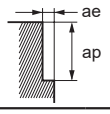
iMX-C4HV

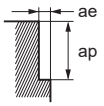
Corner radius head, 4 flute, Irregular helix, Long cutting edge type

RECOMMENDED CUTTING CONDITIONS

■ Shoulder milling

(mm)

Work Material		Carbon steel, Alloy steel, Mild steel, Copper, Copper alloys AISI 1045, AISI 4140, ASTM A36, AISI 1010						Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT						Austenitic stainless steel, Ferritic and Martensitic stainless steels, Titanium alloy AISI 304, AISI 316, AISI 304LN, AISI 316LN, AISI 410, AISI 430, AISI 431, AISI 420J2, Ti-6Al-4V					
L/D	Dia. DC	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae
4	**16**	100	2000	0.09	720	32	0.8	80	1600	0.07	450	32	0.8	60	1200	0.08	380	32	0.8
	20	100	1600	0.09	580	40	1	80	1300	0.07	360	40	1	60	950	0.08	300	40	1
6	**16**	60	1200	0.07	340	32	0.8	50	990	0.05	200	32	0.8	40	800	0.06	190	32	0.8
	20	60	950	0.07	270	40	1	50	800	0.05	160	40	1	40	640	0.06	150	40	1
Depth of cut																			

Work Material		Precipitation hardening stainless steel, Cobalt chromium alloy AISI 630, AISI 631						Heat resistant alloys Inconel718					
L/D	Dia. DC	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae
4	**16**	50	990	0.07	280	32	0.8	30	600	0.05	120	32	0.4
	20	50	800	0.07	220	40	1	30	480	0.05	96	40	0.5
6	**16**	30	600	0.05	120	32	0.8	20	400	0.04	64	32	0.4
	20	30	480	0.05	96	40	1	20	320	0.04	51	40	0.5
Depth of cut													

Note 1) The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece material installation is poor, vibration or abnormal sounds can occur. In that case, please adjust the revolution, feed rate and depth of cut.
Note 2) The revolution and feed rate can be increased at smaller depth of cut.
Note 3) The length of the long cutting type is 2 times that of the standard head. L/D demonstrates +1 when installed to a holder of the same size.
Note 4) For stainless steel, titanium alloys and heat resistant alloys, the use of water-soluble coolant is effective.

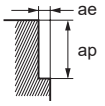
iMX-C4HV

Corner radius head, 4 flute, Irregular helix, Offset type

RECOMMENDED CUTTING CONDITIONS

■ Shoulder milling

(mm)

Work Material		Carbon steel, Alloy steel, Mild steel, Copper, Copper alloys AISI 1045, AISI 4140, ASTM A36, AISI 1010						Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT						Austenitic stainless steel, Ferritic and Martensitic stainless steels, Titanium alloy AISI 304, AISI 316, AISI 304LN, AISI 316LN, AISI 410, AISI 430, AISI 431, AISI 420J2, Ti-6Al-4V					
L/D	Dia. DC	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae
3	**11**	150	4300	0.09	1500	11	1.1	120	3500	0.06	840	11	1.1	100	2900	0.075	870	11	1.1
	12	150	4000	0.09	1400	12	1.2	120	3200	0.06	770	12	1.2	100	2700	0.075	810	12	1.2
	13	150	3700	0.09	1300	13	1.3	120	2900	0.065	750	13	1.3	100	2400	0.08	770	13	1.3
	14	150	3400	0.09	1200	14	1.4	120	2700	0.065	700	14	1.4	100	2300	0.08	740	14	1.4
	17	150	2800	0.1	1100	17	1.7	120	2200	0.075	660	17	1.7	100	1900	0.08	610	17	1.7
	18	150	2700	0.1	1100	18	1.8	120	2100	0.075	630	18	1.8	100	1800	0.09	650	18	1.8
	22	150	2200	0.1	880	22	2.2	120	1700	0.075	510	22	2.2	100	1400	0.09	500	22	2.2
	28	150	1700	0.12	820	28	2.8	120	1400	0.075	420	28	2.8	100	1100	0.09	400	28	2.8
	30	150	1600	0.12	770	30	3	120	1300	0.075	390	30	3	100	1100	0.09	400	30	3
	32	150	1500	0.12	720	32	3.2	120	1200	0.075	360	32	3.2	100	990	0.09	360	32	3.2
5	**11**	90	2600	0.07	730	11	0.4	70	2000	0.05	400	11	0.4	60	1700	0.06	410	11	0.4
	12	90	2400	0.07	670	12	0.5	70	1900	0.05	380	12	0.5	60	1600	0.06	380	12	0.5
	13	90	2200	0.07	620	13	0.5	70	1700	0.05	340	13	0.5	60	1500	0.06	360	13	0.5
	14	90	2000	0.07	560	14	0.6	70	1600	0.05	320	14	0.6	60	1400	0.06	340	14	0.6
	17	90	1700	0.08	540	17	0.7	70	1300	0.06	310	17	0.7	60	1100	0.07	310	17	0.7
	18	90	1600	0.08	510	18	0.7	70	1200	0.06	290	18	0.7	60	1100	0.07	310	18	0.7
	22	90	1300	0.08	420	22	0.9	70	1000	0.06	240	22	0.9	60	870	0.07	240	22	0.9
	28	90	1000	0.1	400	28	1.1	70	800	0.06	190	28	1.1	60	680	0.07	190	28	1.1
	30	90	950	0.1	380	30	1.2	70	740	0.06	180	30	1.2	60	640	0.07	180	30	1.2
	32	90	900	0.1	360	32	1.3	70	700	0.06	170	32	1.3	60	600	0.07	170	32	1.3
7	**11**	60	1700	0.06	410	11	0.2	50	1400	0.04	220	11	0.2	32	930	0.05	190	11	0.2
	12	60	1600	0.06	380	12	0.2	50	1300	0.04	210	12	0.2	32	850	0.05	170	12	0.2
	13	60	1500	0.06	360	13	0.3	50	1200	0.05	240	13	0.3	32	780	0.06	190	13	0.3
	14	60	1400	0.06	340	14	0.3	50	1100	0.05	220	14	0.3	32	730	0.06	180	14	0.3
	17	60	1100	0.07	310	17	0.3	50	940	0.05	190	17	0.3	32	600	0.06	140	17	0.3
	18	60	1100	0.07	310	18	0.4	50	880	0.05	180	18	0.4	32	570	0.06	140	18	0.4
	22	60	870	0.07	240	22	0.4	50	720	0.05	140	22	0.4	32	460	0.06	110	22	0.4
	28	60	680	0.08	220	28	0.6	50	570	0.05	110	28	0.6	32	360	0.06	86	28	0.6
	30	60	640	0.08	200	30	0.6	50	530	0.05	110	30	0.6	32	340	0.06	82	30	0.6
	32	60	600	0.08	190	32	0.6	50	500	0.05	100	32	0.6	32	320	0.06	77	32	0.6
Depth of cut																			

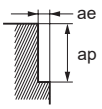
Note 1) The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece material installation is poor, vibration or abnormal sounds can occur. In that case, please adjust the revolution, feed rate and depth of cut.

Note 2) The revolution and feed rate can be increased at smaller depth of cut.

Note 3) For stainless steel, titanium alloys and heat resistant alloys, the use of water-soluble coolant is effective.

■ Shoulder milling

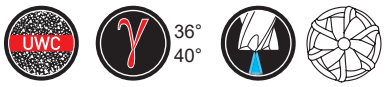
(mm)

Work Material		Precipitation hardening stainless steel, Cobalt chromium alloy AISI 630, AISI 631						Heat resistant alloys Inconel718					
L/D	Dia. DC	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae
3	**11**	75	2200	0.06	530	11	1.1	30	870	0.04	140	11	0.8
	12	75	2000	0.06	480	12	1.2	30	800	0.04	130	12	0.9
	13	75	1800	0.065	470	13	1.3	30	730	0.045	130	13	1
	14	75	1700	0.065	440	14	1.4	30	680	0.045	120	14	1.1
	17	75	1400	0.065	360	17	1.7	40	750	0.045	140	17	1.3
	18	75	1300	0.075	390	18	1.8	40	710	0.05	140	18	1.4
	22	75	1100	0.075	330	22	2.2	40	580	0.05	120	22	1.7
	28	75	850	0.075	260	28	2.8	40	450	0.05	90	28	2.1
	30	75	800	0.075	240	30	3	40	420	0.05	84	30	2.3
	32	75	750	0.075	230	32	3.2	40	400	0.05	80	32	2.4
5	**11**	50	1400	0.05	280	11	0.4	10	290	0.03	35	11	0.3
	12	50	1300	0.05	260	12	0.5	10	270	0.03	32	12	0.4
	13	50	1200	0.05	240	13	0.5	10	240	0.04	38	13	0.4
	14	50	1100	0.05	220	14	0.6	10	230	0.04	37	14	0.4
	17	50	940	0.06	230	17	0.7	19	360	0.04	58	17	0.5
	18	50	880	0.06	210	18	0.7	19	340	0.04	54	18	0.6
	22	50	720	0.06	170	22	0.9	19	270	0.04	43	22	0.7
	28	50	570	0.06	140	28	1.1	19	220	0.04	35	28	0.8
	30	50	530	0.06	130	30	1.2	19	200	0.04	32	30	0.9
	32	50	500	0.06	120	32	1.3	19	190	0.04	30	32	1
7	**11**	24	690	0.04	110	11	0.2	–	–	–	–	–	–
	12	24	640	0.04	100	12	0.2	–	–	–	–	–	–
	13	24	590	0.05	120	13	0.3	–	–	–	–	–	–
	14	24	550	0.05	110	14	0.3	–	–	–	–	–	–
	17	24	450	0.05	90	17	0.3	–	–	–	–	–	–
	18	24	420	0.05	84	18	0.4	–	–	–	–	–	–
	22	24	350	0.05	70	22	0.4	–	–	–	–	–	–
	28	24	270	0.05	54	28	0.6	–	–	–	–	–	–
	30	24	250	0.05	50	30	0.6	–	–	–	–	–	–
	32	24	240	0.05	48	32	0.6	–	–	–	–	–	–
Depth of cut													

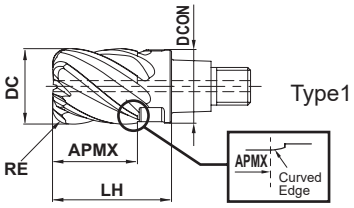
Note 1) The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece material installation is poor, vibration or abnormal sounds can occur. In that case, please adjust the revolution, feed rate and depth of cut.
Note 2) The revolution and feed rate can be increased at smaller depth of cut.
Note 3) For stainless steel, titanium alloys and heat resistant alloys, the use of water-soluble coolant is effective.

iMX-C6HV-C NEW

Corner radius head with coolant hole, 6 flute, Irregular helix



Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			◎	◎		



RE≤3				
±0.020				
DC=10	12≤DC<16	20≤DC≤25		
0 - 0.030	0 - 0.040	0 - 0.050		

- Chatter and vibration are suppressed and stable machining is enabled by using irregular helix flutes.
- Equipped with centre through coolant hole to improve chip evacuation.

(mm)

Order Number	DC	RE	APMX	LH	DCON	No. of Flutes	Grade EP7020	Type
IMX10C6HV100R05010C	10	0.5	10	16	9.7	6	●	1
IMX10C6HV100R10010C	10	1	10	16	9.7	6	●	1
IMX12C6HV120R05012C	12	0.5	12	19	11.7	6	●	1
IMX12C6HV120R10012C	12	1	12	19	11.7	6	●	1
IMX16C6HV160R10016C	16	1	16	24	15.5	6	●	1
IMX16C6HV160R30016C	16	3	16	24	15.5	6	●	1
IMX20C6HV200R10020C	20	1	20	30	19.5	6	●	1
IMX20C6HV200R30020C	20	3	20	30	19.5	6	●	1
IMX25C6HV250R10025C	25	1	25	37.5	24.5	6	●	1
IMX25C6HV250R30025C	25	3	25	37.5	24.5	6	●	1

Note 1) The fastening size of the holder and head should be the same. (Refer to page 67)

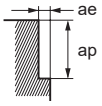
● : Inventory maintained in Japan.

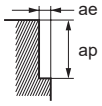
RECOMMENDED CUTTING CONDITIONS

■ Shoulder milling (L/D=3)

Other than the L/D = 3, use following recommended cutting conditions by multiplying the page 5 correction factor by overhang length.

(mm)

Work Material	Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT						Austenitic stainless steel, Ferritic and Martensitic stainless steels AISI 304, AISI 316, AISI 304LN, AISI 316LN, AISI 410, AISI 430, AISI 431, AISI 420J2						Precipitation hardening stainless steel, Cobalt chromium alloy, Titanium alloy AISI 630, AISI 631, Ti-6Al-4V					
Dia. **DC**	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae
10	200	6400	0.07	2700	10	1.0	150	4800	0.07	2000	10	1.0	100	3200	0.07	1300	10	1.0
12	200	5300	0.085	2700	12	1.2	150	4000	0.085	2000	12	1.2	100	2700	0.085	1400	12	1.2
16	200	4000	0.088	2100	16	1.6	150	3000	0.088	1600	16	1.6	100	2000	0.088	1100	16	1.6
20	200	3200	0.1	1900	20	2.0	150	2400	0.1	1400	20	2.0	100	1600	0.1	1000	20	2.0
25	200	2500	0.1	1500	25	2.5	150	1900	0.1	1100	25	2.5	100	1300	0.1	800	25	2.5
Depth of cut																		

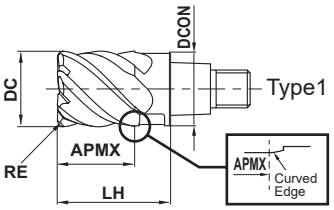
Work Material	Heat resistant alloys Inconel718					
Dia. **DC**	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae
10	40	1300	0.033	260	10	0.5
12	40	1100	0.035	230	12	0.6
16	40	800	0.038	180	16	0.8
20	40	640	0.04	150	20	1.0
25	40	510	0.04	120	25	1.3
Depth of cut						

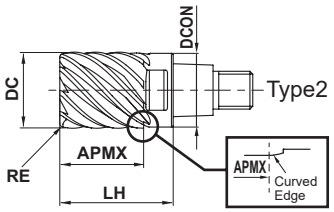
Note 1) The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece material installation is poor, vibration or abnormal sounds can occur. In that case, please adjust the revolution, feed rate and depth of cut.
Note 2) The revolution and feed rate can be increased at smaller depth of cut.
Note 3) For stainless steel, titanium alloys and heat resistant alloys, the use of water-soluble coolant is effective.

iMX-C6HV/C10HV/C12HV

Corner radius head, Multi-flute, Irregular helix

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			◎	◎		





RE≤1				
±0.020				
DC≤12	DC>12			
0 - 0.020	0 - 0.030			

- High machining efficiency due to the multi-flute design.
- Irregular helix controls vibration and achieves stable machining.

(mm)

Order Number	DC	RE	APMX	LH	DCON	No. of Flutes	Grade EP7020	Type
IMX10C6HV100R05010	10	0.5	10	16	9.7	6	●	1
IMX10C6HV100R10010	10	1	10	16	9.7	6	●	1
IMX12C6HV120R10012	12	1	12	19	11.7	6	●	1
IMX16C10HV160R10016	16	1	16	24	15.5	10	●	2
IMX20C12HV200R10020	20	1	20	30	19.5	12	●	2
IMX25C12HV250R10025	25	1	25	37.5	24.5	12	●	2

Note 1) The fastening size of the holder and head should be the same. (Refer to page 67)

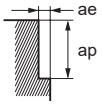
● : Inventory maintained in Japan.

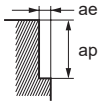
RECOMMENDED CUTTING CONDITIONS

■ Shoulder milling (L/D=3)

Other than the L/D = 3, use following recommended cutting conditions by multiplying the page 5 correction factor by overhang length.

(mm)

Work Material	Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT						Austenitic stainless steel, Ferritic and Martensitic stainless steels AISI 304, AISI 316, AISI 304LN, AISI 316LN, AISI 410, AISI 430, AISI 431, AISI 420J2						Precipitation hardening stainless steel, Cobalt chromium alloy, Titanium alloy AISI 630, AISI 631, Ti-6Al-4V					
Dia. **DC**	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae
10	200	6400	0.07	2700	10	1	150	4800	0.07	2000	10	1	100	3200	0.07	1300	10	1
12	200	5300	0.085	2700	12	1.2	150	4000	0.085	2000	12	1.2	100	2700	0.085	1400	12	1.2
16	200	4000	0.088	3500	16	0.6	150	3000	0.088	2600	16	0.64	100	2000	0.088	1800	16	0.6
20	200	3200	0.1	3800	20	0.8	150	2400	0.1	2900	20	0.8	100	1600	0.1	1900	20	0.8
25	200	2500	0.1	3000	25	1	150	1900	0.1	2300	25	1	100	1300	0.1	1600	25	1
Depth of cut																		

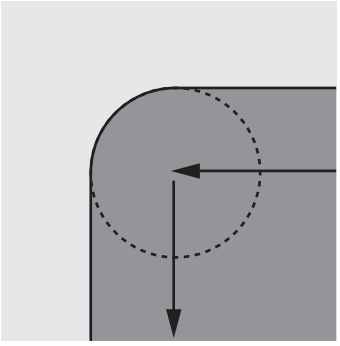
Work Material	Heat resistant alloys Inconel718					
Dia. **DC**	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae
10	40	1300	0.033	260	10	0.5
12	40	1100	0.035	230	12	0.6
16	40	800	0.038	300	16	0.6
20	40	640	0.04	310	20	0.8
25	40	510	0.04	240	25	1
Depth of cut						

Note 1) The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece material installation is poor, vibration or abnormal sounds can occur. In that case, please adjust the revolution, feed rate and depth of cut.

Note 2) The revolution and feed rate can be increased at smaller depth of cut.

Note 3) If the machining radius at the corner is the same as the tool radius when using the head with more than 10 flutes, please set the depth of cut and feed rate to half of the above.

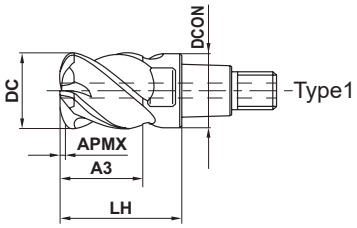
Note 4) For stainless steel, titanium alloys and heat resistant alloys, the use of water-soluble coolant is effective.



iMX-C4FD-C

With coolant hole Multi-task corner radius end mill for high feed cutting

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	◎		◎	◎	○	



DC≤12	DC>12			
0 - 0.020	0 - 0.030			

- Multi-task corner radius type and 4 flutes offer high feed and high efficiency.
- Centre coolant hole provides effective cooling and stable coolant supply.

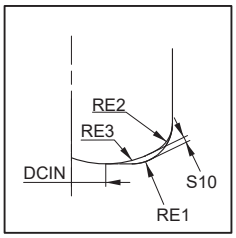
(mm)

Order Number	DC	RE1 *1	APMX	A3	LH	DCON	No. of Flutes	RMPX *2	Grade EP7020	Type
IMX10C4FD10010C	10	1.99	0.7	10.5	16	9.7	4	2.1°	●	1
IMX12C4FD12012C	12	2.1	0.8	12.5	19	11.7	4	2.8°	●	1
IMX16C4FD16016C	16	2.75	1	16.5	24	15.5	4	3°	●	1
IMX20C4FD20021C	20	3.07	1.3	21	30	19.5	4	3.3°	●	1
IMX25C4FD25026C	25	4.21	1.6	26	37.5	24.5	4	4.5°	●	1

Note 1) The fastening size of the holder and head should be the same. (Refer to page 67)
Note 2) Multi-task corner radius is not suitable for corner radius milling that transfers an R-shape because cutting at R is incomplete.
*1 RE1 : Approx. R
*2 RMPX : Max. Ramping Angle

(mm)

Order Number	RE1 *1	Multi-task Radius Part			
		S10	DCIN	RE2	RE3
IMX10C4FD10010C	1.99	0.27	3.4	1.5	5
IMX12C4FD12012C	2.1	0.33	4.5	1.5	6
IMX16C4FD16016C	2.75	0.42	6.2	2	8
IMX20C4FD20021C	3.07	0.59	8	2	10
IMX25C4FD25026C	4.21	0.67	10	3	12



Please programme CAM as an R2 cutter radius, when using the **iMX**.
The approximate uncut portions for the programme are as follows.

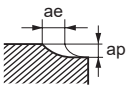
● : Inventory maintained in Japan.

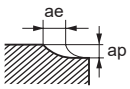
RECOMMENDED CUTTING CONDITIONS

■ Shoulder milling (L/D=3)

Other than the L/D = 3, use following recommended cutting conditions by multiplying the page 5 correction factor by overhang length.

(mm)

Work Material	Carbon steel, Alloy steel, Mild steel, Copper, Copper alloys AISI 1045, AISI 4140, ASTM A36, AISI 1010						Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT						Hardened steel, Precipitation hardening stainless steel, Ferritic and Martensitic stainless steels, AISI H13, AISI L6, AISI 431, AISI 420J2, AISI 630, AISI 631					
Dia. **DC**	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae
10	150	4800	0.4	7700	0.5	6	135	4300	0.4	6900	0.5	6	120	3800	0.3	4600	0.5	6
12	150	4000	0.45	7200	0.6	7.2	135	3600	0.45	6500	0.6	7.2	120	3200	0.3	3800	0.6	7.2
16	150	3000	0.5	6000	0.8	9.6	135	2700	0.5	5400	0.8	9.6	120	2400	0.4	3800	0.8	9.6
20	150	2400	0.5	4800	1	12	135	2100	0.5	4200	1	12	120	1900	0.4	3000	1	12
25	150	1900	0.5	3800	1.25	15	135	1700	0.5	3400	1.25	15	120	1500	0.4	2400	1.25	15
Depth of cut																		

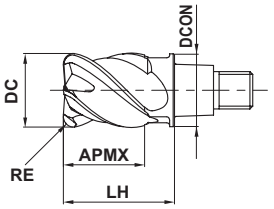
Work Material	Austenitic stainless steel, Titanium alloy, Cobalt chromium alloy AISI 304, AISI 316, AISI 304LN, AISI 316LN, Ti-6Al-4V						Heat resistant alloys Inconel718					
Dia. **DC**	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae
10	40	1300	0.2	1000	0.5	6	25	800	0.1	320	0.5	6
12	40	1100	0.2	880	0.6	7.2	25	660	0.1	260	0.6	7.2
16	40	800	0.3	960	0.8	9.6	25	500	0.15	300	0.8	9.6
20	40	640	0.3	770	1	12	25	400	0.15	240	1	12
25	40	510	0.3	610	1.25	15	25	320	0.15	190	1.25	15
Depth of cut												

Note 1) Vibration may occur if there is poor rigidity of the machine or workpiece material. In that case, please adjust the revolution, feed rate and depth of cut.
Note 2) The revolution and feed rate can be increased at smaller depth of cut.
Note 3) Reduce the feed by 1/2 for ramping process.
Note 4) For stainless steel, titanium alloys and heat resistant alloys, the use of water-soluble coolant is effective.

iMX-C4FV

Corner radius head for high efficiency machining, 4 flute, Irregular helix

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	◎					



Type1

RE≤3	RE=4			
±0.010	±0.020			
DC≤12	DC>12			
0 - 0.020	0 - 0.030			

- Corner radius end mill for high efficiency machining
- Irregular helix controls vibration and achieves stable machining.

(mm)

Order Number	DC	RE	APMX	LH	DCON	No. of Flutes	Grade EP6120	Type
IMX10C4FV100R20010	10	2	10.5	16	9.7	4	●	1
IMX12C4FV120R20012	12	2	12.5	19	11.7	4	●	1
IMX16C4FV160R30016	16	3	16.5	24	15.5	4	●	1
IMX20C4FV200R30021	20	3	21	30	19.5	4	●	1
IMX25C4FV250R40026	25	4	26	37.5	24.5	4	●	1

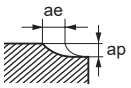
Note 1) The fastening size of the holder and head should be the same. (Refer to page 67)

● : Inventory maintained in Japan.

RECOMMENDED CUTTING CONDITIONS

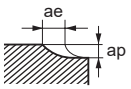
■High depth of cut conditions

(mm)

Work Material		Carbon steel, Alloy steel, Gray cast iron AISI 1045, AISI 4140, AISI No 45 B						Pre-hardened steel, Alloy tool steel AISI P21, AISI P20, SKD, SKT						Hardened steel (45－55HRC) AISI H13, AISI L6					
Dia. **DC**	Corner R **RE**	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae
10	**2**	90	2900	0.25	2900	1.2	4.5	75	2400	0.23	2200	1	4.5	60	1900	0.22	1700	0.7	4.5
12	**2**	90	2400	0.25	2400	1.8	6	75	2000	0.23	1800	1.4	6	60	1600	0.22	1400	0.9	6
16	**3**	90	1800	0.25	1800	1.8	7.5	75	1500	0.23	1400	1.4	7.5	60	1200	0.22	1100	0.9	7.5
20	**3**	90	1400	0.25	1400	1.8	9	75	1200	0.23	1100	1.4	9	60	950	0.22	840	0.9	9
25	**4**	90	1100	0.25	1100	2.4	11.5	75	950	0.23	870	1.8	11.5	60	760	0.22	670	1.2	11.5
Depth of cut																			

■High speed milling

(mm)

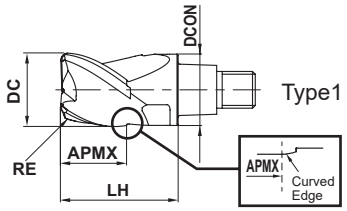
Work Material		Carbon steel, Alloy steel, Gray cast iron AISI 1045, AISI 4140, AISI No 45 B						Pre-hardened steel, Alloy tool steel AISI P21, AISI P20, SKD, SKT						Hardened steel (45－55HRC) AISI H13, AISI L6					
Dia. **DC**	Corner R **RE**	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae
10	**2**	150	4800	0.4	7700	0.6	4.5	125	4000	0.35	5600	0.46	4.5	100	3200	0.3	3800	0.36	4.5
12	**2**	150	4000	0.45	7200	0.9	6	125	3300	0.4	5300	0.7	6	100	2700	0.3	3200	0.45	6
16	**3**	150	3000	0.5	6000	0.9	7.5	125	2500	0.45	4500	0.7	7.5	100	2000	0.3	2400	0.45	7.5
20	**3**	150	2400	0.5	4800	0.9	9	125	2000	0.45	3600	0.7	9	100	1600	0.35	2200	0.45	9
25	**4**	150	1900	0.5	3800	1.2	11.5	125	1600	0.45	2900	0.9	11.5	100	1300	0.35	1800	0.6	11.5
Depth of cut																			

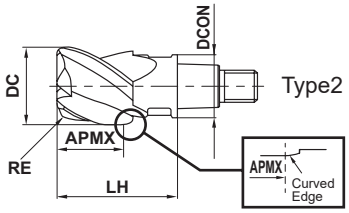
Note 1) The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece material installation is poor, vibration or abnormal sounds can occur. In that case, please adjust the revolution, feed rate and depth of cut.
Note 2) The revolution and feed rate can be increased at smaller depth of cut.
Note 3) For profile machining such as mould machining conditions may differ considerably depending on the workpiece material geometry, machining methods, and depth of cut. Reduce the feed rate especially when machining the corner sections of a workpiece material.
Note 4) Air blower or oil mist is recommended for good chip evacuation.

iMX-C3A

Corner radius head, 3 flute, For aluminium alloy

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
							◎





Offset Type

RE≤5				
±0.020				

DC≤12	DC>12			
0 - 0.020	0 - 0.030			

●High efficiency machining due to the sharp cutting edge and polished rake face.

(mm)

Order Number	DC	RE	APMX	LH	DCON	No. of Flutes	Grade ET2020	Type
IMX10C3A100R10008	10	1	8	16	9.7	3	●	1
IMX10C3A100R25008	10	2.5	8	16	9.7	3	●	1
IMX10C3A120R10010	12	1	10.1	19	9.7	3	●	2
IMX12C3A120R10009	12	1	9.6	19	11.7	3	●	1
IMX12C3A120R32009	12	3.2	9.6	19	11.7	3	●	1
IMX12C3A140R10011	14	1	11.7	22.5	11.7	3	●	2
IMX16C3A160R10012	16	1	12.8	24	15.5	3	●	1
IMX16C3A160R32012	16	3.2	12.8	24	15.5	3	●	1
IMX16C3A180R32014	18	3.2	14.9	27	15.5	3	●	2
IMX20C3A200R10016	20	1	16	30	19.5	3	●	1
IMX20C3A200R32016	20	3.2	16	30	19.5	3	●	1
IMX20C3A220R32018	22	3.2	18.6	33	19.5	3	●	2
IMX25C3A250R10020	25	1	20	37.5	24.5	3	●	1
IMX25C3A250R32020	25	3.2	20	37.5	24.5	3	●	1
IMX25C3A250R50020	25	5	20	37.5	24.5	3	●	1
IMX25C3A280R32023	28	3.2	23.4	41.5	24.5	3	●	2

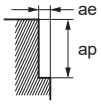
Note 1) The fastening size of the holder and head should be the same. (Refer to page 67)

● : Inventory maintained in Japan.

RECOMMENDED CUTTING CONDITIONS

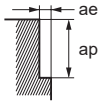
■Shoulder milling (L/D=3)

(mm)

Work Material	Aluminium alloy A6061, A7075					
Dia. **DC**	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae
10	500	16000	0.117	5600	8	3
12	500	13000	0.118	4600	9.6	3.6
16	500	9900	0.153	4500	12.8	4.8
20	500	8000	0.175	4200	16	6
25	500	6400	0.211	4100	20	7.5
Depth of Cut						

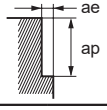
■Shoulder milling (L/D=5)

(mm)

Work Material	Aluminium alloy A6061, A7075					
Dia. **DC**	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae
10	300	9500	0.09	2600	8	1.2
12	300	8000	0.09	2200	9.6	1.44
16	300	6000	0.12	2200	12.8	1.92
20	300	4800	0.14	2000	16	2.4
25	300	3800	0.17	1900	20	3
Depth of Cut						

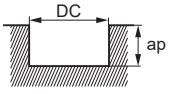
■Shoulder milling (L/D=7)

(mm)

Work Material	Aluminium alloy A6061, A7075					
Dia. **DC**	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae
10	200	6400	0.08	1500	8	0.6
12	200	5300	0.08	1300	9.6	0.72
16	200	4000	0.11	1300	12.8	0.96
20	200	3200	0.12	1200	16	1.2
25	200	2500	0.15	1100	20	1.5
Depth of Cut						

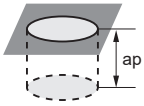
■Slot milling (L/D=3)

(mm)

Work Material	Aluminium alloy A6061, A7075				
DC	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap
10	500	16000	0.068	3300	5
12	500	13000	0.072	2800	6
16	500	9900	0.093	2800	8
20	500	8000	0.108	2600	10
25	500	6400	0.127	2400	12.5
Depth of Cut	 DC:Dia.				

■Plunging (L/D=3)

(mm)

Work Material	Aluminium alloy A6061, A7075					
DC	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Rev. (mm/rev)	Feed rate (mm/min)	Drilled Depth ap	Step ap_2
10	300	9500	0.1	950	5	2.5
12	300	8000	0.1	800	6	2.5
16	300	6000	0.1	600	8	2.5
20	300	4800	0.1	480	10	2.5
25	300	3800	0.1	380	12.5	2.5
Depth of Cut						

Note 1) Vibration may occur if there is poor rigidity of the machine or workpiece material. In that case, please adjust the revolution, feed rate and depth of cut.
Note 2) The use of water-soluble coolant is effective.
Note 3) For the feed rate information, the feed per revolution rate is listed.

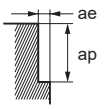
iMX-C3A

Corner radius head, 3 flute, For aluminium alloy, Offset type

RECOMMENDED CUTTING CONDITIONS

■ Side milling

(mm)

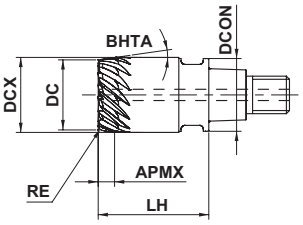
Work Material		Aluminium alloy A6061, A7075					
L/D	Dia. DC	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae
3	12	500	13000	0.117	4600	9.6	2.4
	14	500	11000	0.118	3900	11.2	2.8
	18	500	8800	0.153	4000	14.4	3.6
	22	500	7200	0.175	3800	17.6	4.4
	28	500	5700	0.211	3600	22.4	5.6
5	12	300	8000	0.09	2200	9.6	1.0
	14	300	6800	0.09	1800	11.2	1.1
	18	300	5300	0.12	1900	14.4	1.4
	22	300	4300	0.14	1800	17.6	1.8
	28	300	3400	0.17	1700	22.4	2.2
Depth of cut							

Note 1) Vibration may occur if there is poor rigidity of the machine or workpiece material. In that case, please adjust the revolution, feed rate and depth of cut.
Note 2) The use of water-soluble coolant is effective.

iMX-C8T/C10T/C12T/C15T-C

Corner radius, Taper head, Multi-flute, With coolant hole

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
				◎	◎		



Type1

RE ≤2				
±0.015				
DC ≤12	DC>12			
0 - 0.020	0 - 0.030			

- Suitable for 3-dimensional free-form surface machining such as blades.
- High feed cutting is possible due to multiple cutting edges.

(mm)

Order Number	DC	RE	APMX	DCX	LH	DCON	BHTA	No. of Flutes	Grade EP7020	Type
IMX10C8T080R05T080C	8	0.5	7.12	10	16	9.7	8°	8	●	1
IMX10C8T080R10T080C	8	1	7.12	10	16	9.7	8°	8	●	1
IMX12C10T100R05T080C	10	0.5	7.12	12	19	11.7	8°	10	●	1
IMX12C10T100R10T080C	10	1	7.12	12	19	11.7	8°	10	●	1
IMX16C15T150R05T080C	15	0.5	3.56	16	24	15.5	8°	15	●	1
IMX16C15T150R10T080C	15	1	3.56	16	24	15.5	8°	15	●	1
IMX16C12T150R20T080C	15	2	3.56	16	24	15.5	8°	12	●	1
IMX20C15T190R05T080C	19	0.5	3.56	20	30	19.5	8°	15	●	1
IMX20C15T190R10T080C	19	1	3.56	20	30	19.5	8°	15	●	1
IMX20C12T190R20T080C	19	2	3.56	20	30	19.5	8°	12	●	1

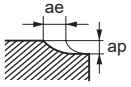
Note 1) The fastening size of the holder and head should be the same. (Refer to page 67)

Recommended Cutting Conditions

■ Shoulder milling (L/D=3)

Other than the L/D = 3, use following recommended cutting conditions by multiplying the page 5 correction factor by overhang length.

(mm)

Work Material		Austenitic stainless steels, Ferritic and Martensitic stainless steels AISI 304, AISI 316, AISI 304LN, AISI 316LN, AISI 410, AISI 430, AISI 431, AISI 420J2						Precipitation hardening stainless steels, Titanium alloys AISI 630, AISI 631, Ti-6Al-4V						Heat resistant alloys Inconel718					
Dia. DC	No. of Flutes	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae
8	**8**	300	12000	0.1	9600	0.3	1.2	200	8000	0.1	6400	0.3	1.2	60	2400	0.08	1500	0.3	0.8
10	**10**	300	9500	0.1	9500	0.3	1.5	200	6400	0.1	6400	0.3	1.5	60	1900	0.08	1500	0.3	1
15	**12**	300	6400	0.12	9200	0.3	2.2	200	4200	0.12	6000	0.3	2.2	60	1300	0.1	1600	0.3	1.5
15	**15**	300	6400	0.1	9600	0.3	2.2	200	4200	0.1	6300	0.3	2.2	60	1300	0.08	1600	0.3	1.5
19	**12**	300	5000	0.12	7200	0.3	2.8	200	3400	0.12	4900	0.3	2.8	60	1000	0.1	1200	0.3	1.9
19	**15**	300	5000	0.1	7500	0.3	2.8	200	3400	0.1	5100	0.3	2.8	60	1000	0.08	1200	0.3	1.9
Depth of Cut																			

Note 1) Vibration may occur if there is poor rigidity of the machine or workpiece material. In that case, please adjust the revolution, feed rate and depth of cut.

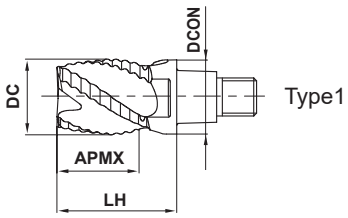
Note 2) The use of water-soluble coolant is effective.

● : **Inventory maintained in Japan.**

iMX-R4F

Roughing head, 4 flute

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			◎	◎	○	



Type1

● The roughing edge geometry reduces cutting resistance.
Effective when rigidity of the machine or work material is low.

(mm)

Order Number	DC	APMX	LH	DCON	No. of Flutes	Grade EP7020	Type
IMX10R4F10010	10	10.5	16	9.7	4	●	1
IMX12R4F12012	12	12.5	19	11.7	4	●	1
IMX16R4F16016	16	16.5	24	15.5	4	●	1
IMX20R4F20021	20	21	30	19.5	4	●	1
IMX25R4F25026	25	26	37.5	24.5	4	●	1

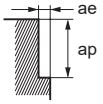
Note 1) The fastening size of the holder and head should be the same. (Refer to page 67)

RECOMMENDED CUTTING CONDITIONS

■ Shoulder milling (L/D=3)

Other than the L/D = 3, use following recommended cutting conditions by multiplying the page 5 correction factor by overhang length.

(mm)

Work Material	Carbon steel, Alloy steel, Mild steel, Copper, Copper alloys AISI 1045, AISI 4140, ASTM A36, AISI 1010						Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT						Austenitic stainless steel, Ferritic and Martensitic stainless steels, Titanium alloy AISI 304, AISI 316, AISI 304LN, AISI 316LN, AISI 410, AISI 430, AISI 431, AISI 420J2, Ti-6Al-4V					
Dia. DC	Cutting Speed (m/min)	Revolution (min-1)	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae	Cutting Speed (m/min)	Revolution (min-1)	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae	Cutting Speed (m/min)	Revolution (min-1)	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae
10	150	4800	0.045	860	8	4	120	3800	0.03	460	8	4	100	3200	0.038	490	8	4
12	150	4000	0.045	720	9.6	4.8	120	3200	0.033	420	9.6	4.8	100	2700	0.04	430	9.6	4.8
16	150	3000	0.05	600	12.8	6.4	120	2400	0.038	360	12.8	6.4	100	2000	0.045	360	12.8	6.4
20	150	2400	0.05	480	16	8	120	1900	0.038	290	16	8	100	1600	0.045	290	16	8
25	150	1900	0.06	460	20	10	120	1500	0.038	230	20	10	100	1300	0.045	230	20	10
Depth of cut																		

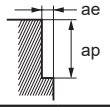
Note 1) Vibration may occur if there is poor rigidity of the machine or workpiece material. In that case, please adjust the revolution, feed rate and depth of cut.
Note 2) The revolution and feed rate can be increased at smaller depth of cut.
Note 3) For stainless steel, titanium alloys and heat resistant alloys, the use of water-soluble coolant is effective.

● : **Inventory maintained in Japan.**

■ Shoulder milling (L/D=3)

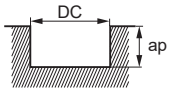
Other than the L/D = 3, use following recommended cutting conditions by multiplying the page 5 correction factor by overhang length.

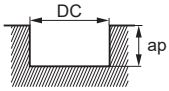
(mm)

Work Material	Precipitation hardening stainless steel, Cobalt chromium alloy AISI 630, AISI 631						Heat resistant alloys Inconel718					
Dia. **DC**	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae
10	75	2400	0.03	290	8	4	40	1300	0.04	210	8	1
12	75	2000	0.033	260	9.6	4.8	40	1100	0.045	200	9.6	1.2
16	75	1500	0.038	230	12.8	6.4	40	800	0.05	160	12.8	1.6
20	75	1200	0.038	180	16	8	40	640	0.05	130	16	2
25	75	950	0.038	140	20	10	40	510	0.05	100	20	2.5
Depth of cut												

■ Slot milling

(mm)

Work Material	Carbon steel, Alloy steel, Mild steel, Copper, Copper alloys AISI 1045, AISI 4140, ASTM A36, AISI 1010					Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT					Austenitic stainless steel, Ferritic and Martensitic stainless steels, Titanium alloy AISI 304, AISI 316, AISI 304LN, AISI 316LN, AISI 410, AISI 430, AISI 431, AISI 420J2, Ti-6Al-4V				
Dia. **DC**	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap
10	100	3200	0.04	510	5	80	2500	0.03	300	5	60	1900	0.02	150	4
12	100	2700	0.045	490	6	80	2100	0.032	270	6	60	1600	0.025	160	4.8
16	100	2000	0.05	400	8	80	1600	0.038	240	8	60	1200	0.03	140	6.4
20	100	1600	0.05	320	10	80	1300	0.038	200	10	60	950	0.034	130	8
25	100	1300	0.06	310	12	80	1000	0.038	150	12	60	760	0.034	100	10
Depth of cut	 DC:Dia.														

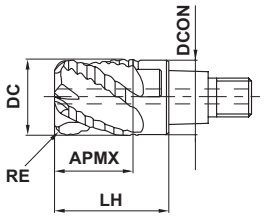
Work Material	Precipitation hardening stainless steel, Cobalt chromium alloy AISI 630, AISI 631				
Dia. **DC**	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap
10	40	1300	0.016	83	4
12	40	1100	0.02	88	4.8
16	40	800	0.024	77	6.4
20	40	640	0.027	70	8
25	40	510	0.027	55	10
Depth of cut	 DC:Dia.				

Note 1) Vibration may occur if there is poor rigidity of the machine or workpiece material. In that case, please adjust the revolution, feed rate and depth of cut.
Note 2) The revolution and feed rate can be increased at smaller depth of cut.
Note 3) For stainless steel, titanium alloys and heat resistant alloys, the use of water-soluble coolant is effective.

iMX-RC4F-C

Roughing head with coolant hole, 4 flute

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy	Copper Alloy	Aluminium Alloy
◎				◎	◎		



Type1

● The roughing edge geometry reduces cutting resistance. Effective when the rigidity of the machine or work material is low.
● Centre through coolant hole provides excellent chip evacuation.

(mm)

Order Number	DC	RE	APMX	LH	DCON	No. of Flutes	Grade EP7020	Type
IMX10RC4F100R05010C	10	0.5	10.5	16	9.7	4	●	1
IMX10RC4F100R10010C	10	1	10.5	16	9.7	4	●	1
IMX12RC4F120R05012C	12	0.5	12.5	19	11.7	4	●	1
IMX12RC4F120R10012C	12	1	12.5	19	11.7	4	●	1
IMX12RC4F120R15012C	12	1.5	12.5	19	11.7	4	●	1
IMX12RC4F120R20012C	12	2	12.5	19	11.7	4	●	1
IMX16RC4F160R05016C	16	0.5	16.5	24	15.5	4	●	1
IMX16RC4F160R10016C	16	1	16.5	24	15.5	4	●	1
IMX16RC4F160R15016C	16	1.5	16.5	24	15.5	4	●	1
IMX16RC4F160R20016C	16	2	16.5	24	15.5	4	●	1
IMX16RC4F160R30016C	16	3	16.5	24	15.5	4	●	1
IMX20RC4F200R05021C	20	0.5	21	30	19.5	4	●	1
IMX20RC4F200R10021C	20	1	21	30	19.5	4	●	1
IMX20RC4F200R20021C	20	2	21	30	19.5	4	●	1
IMX20RC4F200R30021C	20	3	21	30	19.5	4	●	1

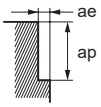
Note 1) The fastening size of the holder and head should be the same. (Refer to page 67)

● : Inventory maintained in Japan.

RECOMMENDED CUTTING CONDITIONS

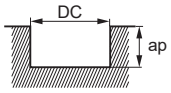
■ Shoulder milling

(mm)

Work Material	Carbon steel, Alloy steel, Mild steel AISI 1045, AISI 4140					Titanium Alloy, Austenitic stainless steel, Ferritic and Martensitic stainless steels Ti-6Al-4V, AISI 304, AISI 316LN, AISI 410, AISI 420J2					Precipitation hardening stainless steel AISI 630, AISI 631				
Dia. **DC**	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae
10	150	4800	860	8	4	70	2000	320	8	4	60	1900	230	8	4
12	150	4000	800	9.6	4.8	70	1900	340	9.6	4.8	60	1600	230	9.6	4.8
16	150	3000	600	12.8	6.4	70	1400	280	12.8	6.4	60	1200	200	12.8	6.4
20	150	2400	530	16	8	70	1100	220	16	8	60	950	180	16	8
Depth of cut															

■ Slot milling

(mm)

Work Material	Carbon steel, Alloy steel, Mild steel AISI 1045, AISI 4140				Titanium Alloy, Austenitic stainless steel, Ferritic and Martensitic stainless steels Ti-6Al-4V, AISI 304, AISI 316LN, AISI 410, AISI 420J2				Precipitation hardening stainless steel AISI 630, AISI 631			
Dia. **DC**	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap
10	100	3200	510	5	60	1900	230	5	40	1300	100	5
12	100	2700	490	6	60	1600	260	6	40	1100	110	6
16	100	2000	400	8	60	1200	220	8	40	800	96	8
20	100	1600	350	10	60	950	170	10	40	640	90	10
Depth of cut	 DC:Dia.											

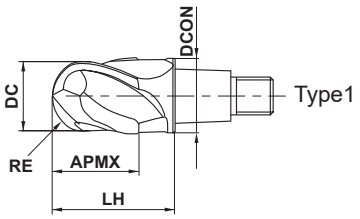
Note 1) Vibration may occur if there is poor rigidity of the machine or workpiece material. In that case, please adjust the revolution, feed rate and depth of cut.
Note 2) The revolution and feed rate can be increased at smaller depth of cut.
Note 3) For stainless steel and titanium alloys, the use of water-soluble coolant is effective.

iMX-B2S

Ball nose head, 2 flute, For hardened steel

UWC 30°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
			◎				



RE≥8				
±0.020				

● Ideal for machining with long overhangs.

(mm)

Order Number	RE	DC	APMX	LH	DCON	No. of Flutes	Grade EP8110	Type
IMX16B2S16016	8	16	16	24	15.5	2	●	1
IMX20B2S20020	10	20	20	30	19.5	2	●	1

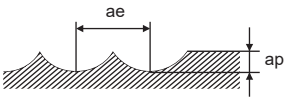
Note 1) The fastening size of the holder and head should be the same. (Refer to page 67)

Recommended Cutting Conditions

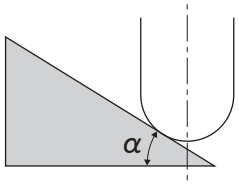
■ Shoulder milling (L/D=3)

Other than the L/D = 3, use following recommended cutting conditions by multiplying the page 5 correction factor by overhang length.

(mm)

Work Material	Hardened steel (55–65HRC) AISI D2									
Inclination angle	α≤15°				α>15°				Depth of Cut ap	Width of Cut ae
Dia DC	Radius of Ball Nose RE	Cutting Speed (m/min)	Revolution (min⁻¹)	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Cutting Speed (m/min)	Revolution (min⁻¹)	Feed per Tooth (mm/t.)	Feed rate (mm/min)		
16	**8**	300	6000	0.14	1700	150	3000	0.08	480	0.3	1.6
20	**10**	300	4800	0.14	1300	150	2400	0.08	380	0.3	2
Depth of cut											

Note 1) The revolution and feed rate can be increased at smaller depth of cut.
Note 2) α is the inclination angle of the machined surface.

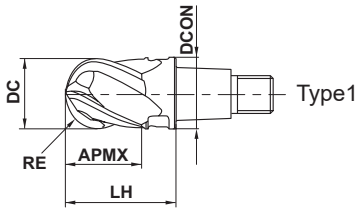


● : **Inventory maintained in Japan.**

iMX-B4S

Ball nose head, 4 flute, For hardened steel

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
			◎				



RE≥8				
±0.020				

●High efficiency machining is realized even when only using the very end of the ball nose.

(mm)

Order Number	RE	DC	APMX	LH	DCON	No. of Flutes	Grade EP8110	Type
IMX16B4S16016	8	16	16	24	15.5	4	●	1
IMX20B4S20020	10	20	20	30	19.5	4	●	1

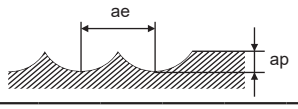
Note 1) The fastening size of the holder and head should be the same. (Refer to page 67)

Recommended Cutting Conditions

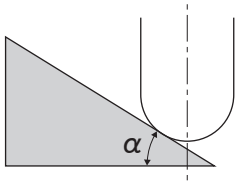
■Shoulder milling (L/D=3)

Other than the L/D = 3, use following recommended cutting conditions by multiplying the page 5 correction factor by overhang length.

(mm)

Work Material	Hardened steel (55–65HRC) AISI D2									
Inclination angle	α≤15°				α>15°				Depth of Cut ap	Width of Cut ae
Dia DC	Radius of Ball Nose RE	Cutting Speed (m/min)	Revolution (min⁻¹)	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Cutting Speed (m/min)	Revolution (min⁻¹)	Feed per Tooth (mm/t.)	Feed rate (mm/min)		
16	**8**	300	6000	0.07	1700	150	3000	0.06	720	0.3	1.6
20	**10**	300	4800	0.07	1300	150	2400	0.06	580	0.3	2
Depth of cut										

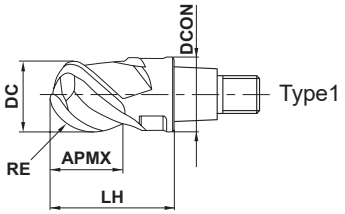
Note 1) The revolution and feed rate can be increased at smaller depth of cut.
Note 2) α is the inclination angle of the machined surface.



iMX-B3FV

Ball nose head, 3 flute, Irregular pitch flutes, For high efficiency machining

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
	◎	◎					



RE≤6	RE>6			
±0.010	±0.020			

- High efficiency machining is possible in deep applications. (DCx5)
- High wear resistance and good chip evacuation is achieved in when rough machining.
- Effective vibration control enables high efficiency machining.

(mm)

Order Number	RE	DC	APMX	LH	DCON	No. of Flutes	Grade EP8120	Type
IMX10B3FV10008	5	10	8	16	9.7	3	●	1
IMX12B3FV12009	6	12	9.6	19	11.7	3	●	1
IMX16B3FV16012	8	16	12.8	24	15.5	3	●	1
IMX20B3FV20016	10	20	16	30	19.5	3	●	1

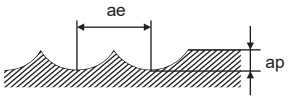
Note 1) The fastening size of the holder and head should be the same. (Refer to page 67)

● : Inventory maintained in Japan.

Recommended Cutting Conditions

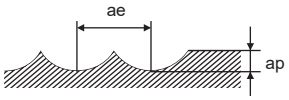
■Shoulder milling (L/D=5)

(mm)

Work Material		Pre-hardened steel, Alloy tool steel										Hardened steel (40−55HRC)									
Inclination angle		α≤15°				α>15°				Depth of Cut ap	Width of Cut ae	α≤15°				α>15°				Depth of Cut ap	Width of Cut ae
Dia DC	Radius of Ball Nose RE	Cutting Speed (m/min)	Revolution (min-1)	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Cutting Speed (m/min)	Revolution (min-1)	Feed per Tooth (mm/t.)	Feed rate (mm/min)			Cutting Speed (m/min)	Revolution (min-1)	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Cutting Speed (m/min)	Revolution (min-1)	Feed per Tooth (mm/t.)	Feed rate (mm/min)		
10	**5**	175	5600	0.22	3700	115	3700	0.15	1700	0.7	2.6	150	4800	0.18	2600	100	3200	0.12	1200	0.5	2
12	**6**	175	4600	0.22	3000	115	3100	0.15	1400	1	3.2	150	4000	0.18	2200	100	2700	0.12	970	0.7	2.5
16	**8**	175	3500	0.22	2300	115	2300	0.15	1000	1.1	3.8	150	3000	0.18	1600	100	2000	0.12	720	0.9	3.5
20	**10**	175	2800	0.22	1800	115	1800	0.15	810	1.2	4.8	150	2400	0.18	1300	100	1600	0.12	580	1.1	4.2
Depth of Cut																					

■Shoulder milling (L/D=7)

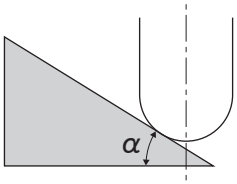
(mm)

Work Material		Pre-hardened steel, Alloy tool steel AISI P21, AISI P20、AISI D2、AISI H13、AISI L6										Hardened steel (40−55HRC) AISI H13, AISI L6									
Inclination angle		α≤15°				α>15°				Depth of Cut ap	Width of Cut ae	α≤15°				α>15°				Depth of Cut ap	Width of Cut ae
Dia DC	Radius of Ball Nose RE	Cutting Speed (m/min)	Revolution (min-1)	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Cutting Speed (m/min)	Revolution (min-1)	Feed per Tooth (mm/t.)	Feed rate (mm/min)			Cutting Speed (m/min)	Revolution (min-1)	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Cutting Speed (m/min)	Revolution (min-1)	Feed per Tooth (mm/t.)	Feed rate (mm/min)		
10	**5**	120	3800	0.2	2300	80	2500	0.13	980	0.5	1.3	100	3200	0.13	1200	65	2100	0.085	540	0.4	1
12	**6**	120	3200	0.2	1900	80	2100	0.13	820	0.7	1.6	100	2700	0.13	1100	65	1700	0.085	430	0.6	1.3
16	**8**	120	2400	0.2	1400	80	1600	0.13	620	0.8	1.9	100	2000	0.13	780	65	1300	0.085	330	0.7	1.8
20	**10**	120	1900	0.2	1100	80	1300	0.13	510	0.9	2.4	100	1600	0.13	620	65	1000	0.085	260	0.8	2.1
Depth of Cut																					

Note 1) The irregular pitch flutes end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece material installation is poor, vibration or abnormal sounds can occur. In that case, please adjust the revolution, feed rate and depth of cut.

Note 2) The revolution and feed rate can be increased at smaller depth of cut.

Note 3) α is the inclination angle of the machined surface.

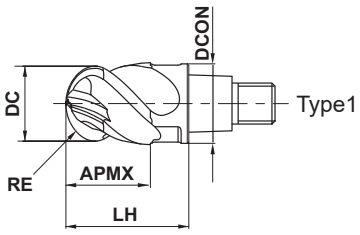


iMX-B4HV

Ball nose head, 4 flute, Irregular pitch flutes

UWC γ 45°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			◎	◎	○	



DC≤12	RE>6			
±0.010	±0.020			
DC≤12	DC>12			
0 - 0.020	0 - 0.030			

● Irregular pitch flutes cutting edge controls vibration and achieves stable machining.

(mm)

Order Number	RE	DC	APMX	LH	DCON	No. of Flutes	Grade EP7020	Type
IMX10B4HV10010	5	10	10.5	16	9.7	4	●	1
IMX12B4HV12012	6	12	12.5	19	11.7	4	●	1
IMX16B4HV16016	8	16	16.5	24	15.5	4	●	1
IMX20B4HV20021	10	20	21	30	19.5	4	●	1
IMX25B4HV25026	12.5	25	26	37.5	24.5	4	●	1

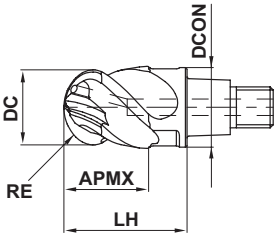
Note 1) The fastening size of the holder and head should be the same. (Refer to page 67)

● : Inventory maintained in Japan.

iMX-B4HV-E

Ball nose head with coolant hole, 4 flute, Irregular pitch flutes

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			◎	◎	○	



Type1

DC≤12	RE>6			
±0.010	±0.020			

DC≤12	DC>12			
0 - 0.020	0 - 0.030			

- Coolant holes for each cutting edge provide a stable coolant supply.
- The variable pitch flutes cutting edge controls vibration and achieves stable machining of difficult-to-cut materials and for long overhang applications.

(mm)

Order Number	RE	DC	APMX	LH	DCON	No. of Flutes	Grade EP7020	Type
IMX10B4HV10010E	5	10	10.5	16	9.7	4	●	1
IMX12B4HV12012E	6	12	12.5	19	11.7	4	●	1
IMX16B4HV16016E	8	16	16.5	24	15.5	4	●	1
IMX20B4HV20021E	10	20	21	30	19.5	4	●	1
IMX25B4HV25026E	12.5	25	26	37.5	24.5	4	●	1

Note 1) The fastening size of the holder and head should be the same. (Refer to page 67)

iMX-B4HV/iMX-B4HV-E

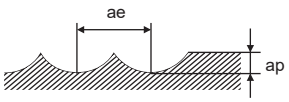
Ball nose head, 4 flute, Irregular pitch flutes (With/Without coolant hole)

RECOMMENDED CUTTING CONDITIONS

■ Shoulder milling (L/D=3)

Other than the L/D = 3, use following recommended cutting conditions by multiplying the page 5 correction factor by overhang length.

(mm)

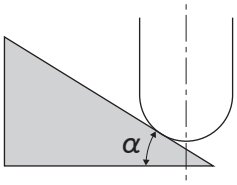
Work Material		Carbon steel, Alloy steel, Mild steel, Pre-hardened steel AISI 1045, AISI 4140, AISI 4340, ASTM A36, AISI 1010, AISI P21, AISI P20										Austenitic stainless steel, Ferritic and Martensitic stainless steels, Cobalt chromium alloy, Titanium alloy AISI 304, AISI 316, AISI 431, AISI 420J2, AISI 630, AISI 631, Ti-6Al-4V									
Inclination angle		α≤15°				α>15°				Depth of Cut	Width of Cut	α≤15°				α>15°				Depth of Cut	Width of Cut
Dia DC	Radius of Ball Nose RE	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	ap	ae	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	ap	ae
10	**5**	300	9500	0.106	4000	200	6400	0.07	1800	1	2.5	225	7200	0.105	3000	150	4800	0.067	1300	1	2.5
12	**6**	300	8000	0.125	4000	200	5300	0.085	1800	1.2	3	225	6000	0.125	3000	150	4000	0.08	1300	1.2	3
16	**8**	300	6000	0.134	3200	200	4000	0.088	1400	1.6	4	225	4500	0.14	2500	150	3000	0.09	1100	1.6	4
20	**10**	300	4800	0.156	3000	200	3200	0.1	1300	2	5	225	3600	0.16	2300	150	2400	0.105	1000	2	5
25	**12.5**	300	3800	0.16	2400	200	2500	0.1	1000	2.5	6	225	2900	0.16	1900	150	1900	0.105	800	2.5	6
Depth of cut																					

Note 1) The irregular pitch flutes end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece material installation is poor, vibration or abnormal sounds can occur. In that case, please adjust the revolution, feed rate and depth of cut.

Note 2) The revolution and feed rate can be increased at smaller depth of cut.

Note 3) For stainless steel, titanium alloys and heat resistant alloys, the use of water-soluble coolant is effective.

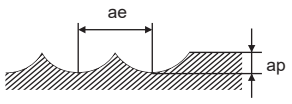
Note 4) α is the inclination angle of the machined surface.



■Shoulder milling (L/D=3)

Other than the L/D = 3, use following recommended cutting conditions by multiplying the page 5 correction factor by overhang length.

(mm)

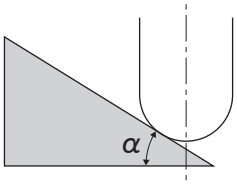
Work Material		Heat resistant alloys Inconel718									
Inclination angle		α≤15°				α>15°				Depth of Cut	Width of Cut
Dia **DC**	Radius of Ball Nose **RE**	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	ap	ae
10	**5**	60	1900	0.055	420	40	1300	0.035	180	0.5	1
12	**6**	60	1600	0.055	350	40	1100	0.035	150	0.6	1.2
16	**8**	60	1200	0.062	300	40	800	0.04	130	0.8	1.6
20	**10**	60	950	0.062	240	40	640	0.04	100	1	2
25	**12.5**	60	760	0.062	190	40	510	0.04	82	1.2	2.5
Depth of cut											

Note 1) The irregular pitch flutes end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece material installation is poor, vibration or abnormal sounds can occur. In that case, please adjust the revolution, feed rate and depth of cut.

Note 2) The revolution and feed rate can be increased at smaller depth of cut.

Note 3) For stainless steel, titanium alloys and heat resistant alloys, the use of water-soluble coolant is effective.

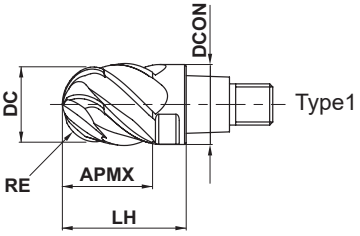
Note 4) α is the inclination angle of the machined surface.



iMX-B6HV

Ball nose head, 6 flute, Irregular pitch flutes

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			◎	◎		



RE≤6	RE>6			
±0.010	±0.020			
DC≤12	DC>12			
0 - 0.020	0 - 0.030			

● The irregular pitch flutes controls vibration and achieves stable machining of difficult-to-cut materials and for long overhang applications.

● 6 flutes enable high machining efficiency.

(mm)

Order Number	RE	DC	APMX	LH	DCON	No. of Flutes	Grade EP7020	Type
IMX10B6HV10010	5	10	10.5	16	9.7	6	●	1
IMX12B6HV12012	6	12	12.5	19	11.7	6	●	1
IMX16B6HV16016	8	16	16.5	24	15.5	6	●	1
IMX20B6HV20021	10	20	21	30	19.5	6	●	1
IMX25B6HV25026	12.5	25	26	37.5	24.5	6	●	1

Note 1) The fastening size of the holder and head should be the same. (Refer to page 67)

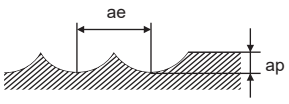
● : Inventory maintained in Japan.

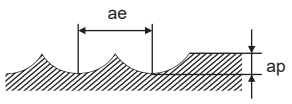
RECOMMENDED CUTTING CONDITIONS

■ Shoulder milling (L/D=3)

Other than the L/D = 3, use following recommended cutting conditions by multiplying the page 5 correction factor by overhang length.

(mm)

Work Material		Carbon steel, Alloy steel, Mild steel, Pre-hardened steel AISI 1045, AISI 4140, AISI 4340, ASTM A36, AISI 1010, AISI P21, AISI P20										Austenitic stainless steel, Ferritic and Martensitic stainless steels, Cobalt chromium alloy, Titanium alloy AISI 304, AISI 316, AISI 431, AISI 420J2, AISI 630, AISI 631, Ti-6Al-4V									
Inclination angle		α≤15°				α>15°				Depth of Cut ap	Width of Cut ae	α≤15°				α>15°				Depth of Cut ap	Width of Cut ae
Dia DC	Radius of Ball Nose RE	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)			Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)		
10	**5**	300	9500	0.106	6000	200	6400	0.07	2700	0.5	2	225	7200	0.105	4500	150	4800	0.067	1900	0.5	2
12	**6**	300	8000	0.125	6000	200	5300	0.085	2700	0.6	2.4	225	6000	0.125	4500	150	4000	0.08	1900	0.6	2.4
16	**8**	300	6000	0.134	4800	200	4000	0.088	2100	0.8	3.2	225	4500	0.14	3800	150	3000	0.09	1600	0.8	3.2
20	**10**	300	4800	0.156	4500	200	3200	0.1	1900	1	4	225	3600	0.16	3500	150	2400	0.105	1500	1	4
25	**12.5**	300	3800	0.16	3600	200	2500	0.1	1500	1.2	5	225	2900	0.16	2800	150	1900	0.105	1200	1.2	5
Depth of cut																					

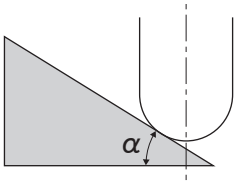
Work Material		Heat resistant alloys Inconel718									
Inclination angle		α≤15°				α>15°				Depth of Cut ap	Width of Cut ae
Dia DC	Radius of Ball Nose RE	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)		
10	**5**	60	1900	0.055	630	40	1300	0.035	270	0.5	1
12	**6**	60	1600	0.055	530	40	1100	0.035	230	0.6	1.2
16	**8**	60	1200	0.062	450	40	800	0.04	190	0.8	1.6
20	**10**	60	950	0.062	350	40	640	0.04	150	1	2
25	**12.5**	60	760	0.062	280	40	510	0.04	120	1.2	2.5
Depth of cut											

Note 1) The irregular pitch flutes end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece material installation is poor, vibration or abnormal sounds can occur. In that case, please adjust the revolution, feed rate and depth of cut.

Note 2) The revolution and feed rate can be increased at smaller depth of cut.

Note 3) For stainless steel, titanium alloys and heat resistant alloys, the use of water-soluble coolant is effective.

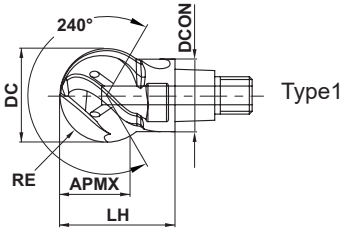
Note 4) α is the inclination angle of the machined surface.



iMX-B4WH-S

Lollipop head with coolant hole, 4 flute

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			◎	◎	○	



Type1

RE≥6				
±0.015				

●Optimal choice for machining undercut and complex shapes when using a 5-axis machine.
●A stable supply of coolant is maintained even when machining complex component geometries.

(mm)

Order Number	RE	DC	APMX	LH	DCON	No. of Flutes	Grade EP7020	Type
IMX10B4WH12008S	6	12	9	16.5	9.7	4	●	1
IMX12B4WH16008S	8	16	12	20.9	11.7	4	●	1
IMX16B4WH20008S	10	20	15	24.7	15.5	4	●	1

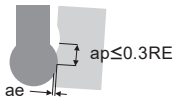
Note 1) The fastening size of the holder and head should be the same. (Refer to page 67)

● : Inventory maintained in Japan.

RECOMMENDED CUTTING CONDITIONS

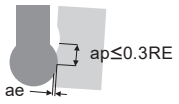
■ Internal Profile Milling, Undercut Machining (L/D=3)

(mm)

Work Material		Mild steel, Carbon steel, Alloy steel, Pre-hardened steel, Copper steel AISI 1045, AISI 4140, AISI 4340, ASTM A36, AISI 1010, AISI P21, AISI P20					Austenitic stainless steel, Ferritic and Martensitic stainless steels, Cobalt chromium alloy, Titanium alloy AISI 304, AISI 316, AISI 431, AISI 420J2, AISI 630, AISI 631, Ti-6Al-4V					Heat resistant alloys Inconel718				
Dia. **DC**	Radius of Ball Nose **RE**	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Width of cut ae	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Width of cut ae	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Width of cut ae
12	**6**	100	2700	0.090	970	0.45	80	2100	0.075	630	0.45	30	800	0.040	130	0.36
16	**8**	100	2000	0.100	800	0.60	80	1600	0.080	510	0.60	30	600	0.045	110	0.48
20	**10**	100	1600	0.100	640	0.75	80	1300	0.090	470	0.75	30	480	0.050	96	0.60
Depth of Cut																

■ Internal Profile Milling, Undercut Machining (L/D=5)

(mm)

Work Material		Mild steel, Carbon steel, Alloy steel, Pre-hardened steel, Copper steel AISI 1045, AISI 4140, AISI 4340, ASTM A36, AISI 1010, AISI P21, AISI P20					Austenitic stainless steel, Ferritic and Martensitic stainless steels, Cobalt chromium alloy, Titanium alloy AISI 304, AISI 316, AISI 431, AISI 420J2, AISI 630, AISI 631, Ti-6Al-4V					Heat resistant alloys Inconel718				
Dia. **DC**	Radius of Ball Nose **RE**	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Width of cut ae	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Width of cut ae	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Width of cut ae
12	**6**	70	1900	0.070	530	0.30	50	1300	0.050	260	0.30	20	530	0.030	64	0.24
16	**8**	70	1400	0.080	450	0.40	50	990	0.060	240	0.40	20	400	0.040	64	0.32
20	**10**	70	1100	0.080	350	0.50	50	800	0.070	220	0.50	20	320	0.040	51	0.40
Depth of Cut																

■ Internal Profile Milling, Undercut Machining (L/D=7)

(mm)

Work Material		Mild steel, Carbon steel, Alloy steel, Pre-hardened steel, Copper steel AISI 1045, AISI 4140, AISI 4340, ASTM A36, AISI 1010, AISI P21, AISI P20					Austenitic stainless steel, Ferritic and Martensitic stainless steels, Cobalt chromium alloy, Titanium alloy AISI 304, AISI 316, AISI 431, AISI 420J2, AISI 630, AISI 631, Ti-6Al-4V				
Dia. **DC**	Radius of Ball Nose **RE**	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Width of cut ae	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Width of cut ae
12	**6**	50	1300	0.030	160	0.15	30	800	0.025	80	0.15
16	**8**	50	990	0.035	140	0.20	30	600	0.030	72	0.20
20	**10**	50	800	0.040	130	0.25	30	480	0.035	67	0.25
Depth of Cut											

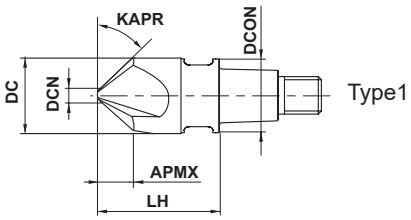
Note 1) Vibration may occur if there is poor rigidity of the machine or workpiece material. In that case, please adjust the revolution, feed rate and depth of cut.
Note 2) The revolution and feed rate can be increased at smaller depth of cut.
Note 3) In case of L/D >5, it is recommended to use a taper neck type holder.
Note 4) For stainless steel, titanium alloys and heat resistant alloys, the use of water-soluble coolant is effective.

iMX-CH3L

Chamfer head, 3 flute

UWC γ 5°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○	○		◎	◎		



Type1

DCN=1.5				
±0.020				

- Chamfer cutting head geometry suitable for inner and outer circumferences.
- Anti-vibration design.

(mm)

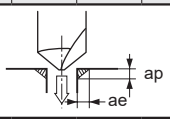
Order Number	DC	APMX	KAPR	DCN	LH	DCON	No. of Flutes	Grade EP7020	Type
IMX10CH3L100A45	10	4.2	45°	1.5	16	9.7	3	●	1
IMX12CH3L120A45	12	5.2	45°	1.5	19	11.7	3	●	1
IMX16CH3L160A45	16	7.2	45°	1.5	24	15.5	3	●	1
IMX20CH3L200A45	20	9.2	45°	1.5	30	19.5	3	●	1

Note 1) The fastening size of the holder and head should be the same. (Refer to page 67)

RECOMMENDED CUTTING CONDITIONS

■Chamfer milling (Hole circumference)

(mm)

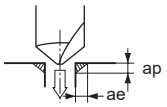
Work Material		Carbon steel, Alloy steel, Gray cast irons AISI 1045, AISI 4140, AISI No 45 B						Alloy tool steel, Carbon steel, Alloy steel, Pre-hardened steel SKD, SKT, AISI 4340, AISI P21, AISI P20						Austenitic stainless steels, Titanium alloys AISI 304, AISI 316, Ti-6Al-4V					
Dia. DC	No. of Flutes	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae
10	**3**	40	1300	0.04	160	1.8	1.8	40	1300	0.03	120	1.8	1.8	30	950	0.03	86	1.8	1.8
12	**3**	40	1100	0.04	130	2.2	2.2	40	1100	0.03	99	2.2	2.2	30	800	0.03	72	2.2	2.2
16	**3**	40	800	0.04	96	2.4	2.4	40	800	0.03	72	2.4	2.4	30	600	0.03	54	2.4	2.4
20	**3**	40	640	0.04	77	2.6	2.6	40	640	0.03	58	2.6	2.6	30	480	0.03	43	2.6	2.6
Depth of Cut																			

Note 1) Vibration may occur if there is poor rigidity of the machine or workpiece material. In that case, please adjust the revolution and feed rate.
Note 2) For stainless steel, titanium alloys and heat resistant alloys, the use of water-soluble coolant is effective.

● : **Inventory maintained in Japan.**

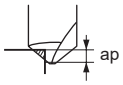
■ Chamfer milling (Hole circumference)

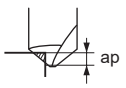
(mm)

Work Material		Hardenned steel (40-55HRC) AISI H13, AISI L6						Heat resistant alloys Inconel718					
Dia. DC	No. of Flutes	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Width of Cut ae
10	**3**	30	950	0.02	57	1.8	1.8	30	950	0.04	110	1.8	1.8
12	**3**	30	800	0.02	48	2.2	2.2	30	800	0.04	96	2.2	2.2
16	**3**	30	600	0.02	36	2.4	2.4	30	600	0.04	72	2.4	2.4
20	**3**	30	480	0.02	29	2.6	2.6	30	480	0.04	58	2.6	2.6
Depth of Cut													

■ Chamfer milling (Shape circumference)

(mm)

Work Material		Carbon steel, Alloy steel, Gray cast irons AISI 1045, AISI 4140, AISI No 45 B					Alloy tool steel, Carbon steel, Alloy steel, Pre-hardened steel SKD, SKT, AISI 4340, AISI P21, AISI P20					Austenitic stainless steels, Titanium alloys AISI 304, AISI 316, Ti-6Al-4V				
Dia. DC	No. of Flutes	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap
10	**3**	100	3200	0.05	480	2	70	2200	0.05	300	2	60	1900	0.04	230	2
12	**3**	100	2700	0.05	410	2.4	70	1900	0.05	260	2.4	60	1600	0.04	190	2.4
16	**3**	100	2000	0.05	300	2.7	70	1400	0.05	190	2.7	60	1200	0.04	140	2.7
20	**3**	100	1600	0.05	240	3.2	70	1100	0.05	150	3.2	60	950	0.04	110	3.2
Depth of Cut																

Work Material		Hardenned steel (40-55HRC) AISI H13, AISI L6					Heat resistant alloys Inconel718				
Dia. DC	No. of Flutes	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap
10	**3**	50	1600	0.03	140	2	30	950	0.04	110	2
12	**3**	50	1300	0.03	120	2.4	30	800	0.04	96	2.4
16	**3**	50	990	0.03	89	2.7	30	600	0.04	72	2.7
20	**3**	50	800	0.03	72	3.2	30	480	0.04	58	3.2
Depth of Cut											

Note 1) Vibration may occur if there is poor rigidity of the machine or workpiece material. In that case, please adjust the revolution and feed rate.
Note 2) For stainless steel, titanium alloys and heat resistant alloys, the use of water-soluble coolant is effective.

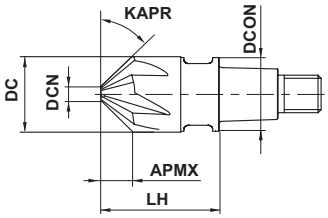
iMX-CH6V

Chamfer head, 6 flute

UWC

1°
3°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○	○		◎	◎		



Type1

DCN=3					
±0.020					

- Suitable for outer circumference.
- Multi-functional design for extended tool life.

(mm)

Order Number	DC	APMX	KAPR	DCN	LH	DCON	No. of Flutes	Grade EP7020	Type
IMX12CH6V120A45	12	4.5	45°	3	19	11.7	6	●	1
IMX16CH6V160A45	16	6.5	45°	3	24	15.5	6	●	1
IMX20CH6V200A45	20	8.5	45°	3	30	19.5	6	●	1

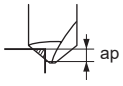
Note 1) The fastening size of the holder and head should be the same. (Refer to page 67)

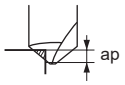
● : Inventory maintained in Japan.

RECOMMENDED CUTTING CONDITIONS

■ Chamfer milling (Shape circumference)

(mm)

Work Material		Carbon steel, Alloy steel, Gray cast irons AISI 1045, AISI 4140, AISI No 45 B					Alloy tool steel, Carbon steel, Alloy steel, Pre-hardened steel SKD, SKT, AISI 4340, AISI P21, AISI P20					Austenitic stainless steels, Titanium alloys AISI 304, AISI 316, Ti-6Al-4V				
Dia. DC	No. of Flutes	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap
12	**6**	100	2700	0.05	810	2.4	70	1900	0.045	510	2.4	60	1600	0.04	380	2.4
16	**6**	100	2000	0.05	600	2.7	70	1400	0.045	380	2.7	60	1200	0.04	290	2.7
20	**6**	100	1600	0.05	480	3.2	70	1100	0.045	300	3.2	60	950	0.04	230	3.2
Depth of Cut																

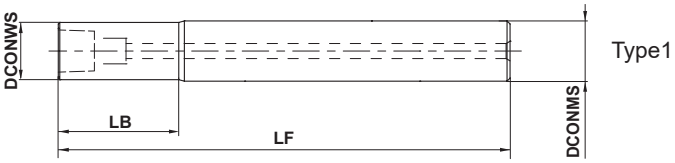
Work Material		Hardenned steel (40-55HRC) AISI H13, AISI L6					Heat resistant alloys Inconel718				
Dia. DC	No. of Flutes	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap	Cutting Speed (m/min)	Revolution (min^{-1})	Feed per Tooth (mm/t.)	Feed rate (mm/min)	Depth of cut ap
12	**6**	50	1300	0.03	230	2.4	30	800	0.04	190	2.4
16	**6**	50	990	0.03	180	2.7	30	600	0.04	140	2.7
20	**6**	50	800	0.03	140	3.2	30	480	0.04	120	3.2
Depth of Cut											

Note 1) Vibration may occur if there is poor rigidity of the machine or workpiece material. In that case, please adjust the revolution and feed rate.
Note 2) For stainless steel, titanium alloys and heat resistant alloys, the use of water-soluble coolant is effective.

iMX

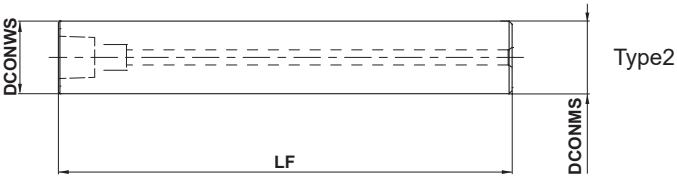
Carbide Holder

■Undercut



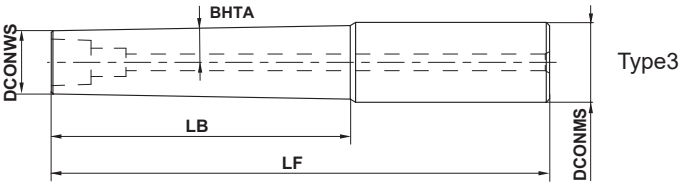
Type1

■Straight



Type2

■Taper Neck Type



Type3

DCONMS=10	12 ≤DCONMS ≤16	20 ≤DCONMS ≤25		
0 - 0.009	0 - 0.011	0 - 0.013		

■Carbide Holder

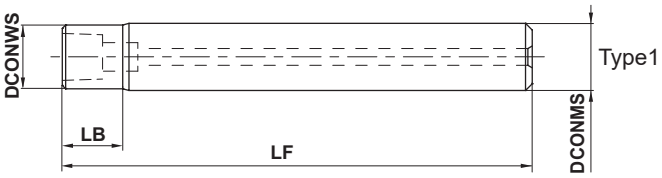
(mm)

Order Number	BHTA	LB	DCONWS	LF	DCONMS	Stock	Type	Suitable Head	Wrench
IMX10-U10N014L070C	—	14	9.7	70	10	●	1	IMX10	IMX10-WR
IMX10-S10L090C	—	—	10	90	10	●	2	IMX10	IMX10-WR
IMX10-U10N034L090C	—	34	9.7	90	10	●	1	IMX10	IMX10-WR
IMX10-S10L110C	—	—	10	110	10	●	2	IMX10	IMX10-WR
IMX10-U10N054L110C	—	54	9.7	110	10	●	1	IMX10	IMX10-WR
IMX10-A12N054L110C	1°	54	9.7	110	12	●	3	IMX10	IMX10-WR
IMX12-U12N017L080C	—	17	11.7	80	12	●	1	IMX12	IMX12-WR
IMX12-S12L100C	—	—	12	100	12	●	2	IMX12	IMX12-WR
IMX12-U12N041L100C	—	41	11.7	100	12	●	1	IMX12	IMX12-WR
IMX12-S12L130C	—	—	12	130	12	●	2	IMX12	IMX12-WR
IMX12-U12N065L130C	—	65	11.7	130	12	●	1	IMX12	IMX12-WR
IMX12-A16N065L130C	1°	65	11.7	130	16	●	3	IMX12	IMX12-WR
IMX16-U16N024L080C	—	24	15.5	80	16	●	1	IMX16	IMX16-WR
IMX16-S16L110C	—	—	16	110	16	●	2	IMX16	IMX16-WR
IMX16-U16N056L110C	—	56	15.5	110	16	●	1	IMX16	IMX16-WR
IMX16-S16L150C	—	—	16	150	16	●	2	IMX16	IMX16-WR
IMX16-U16N088L150C	—	88	15.5	150	16	●	1	IMX16	IMX16-WR
IMX16-A20N088L150C	1°	88	15.5	150	20	●	3	IMX16	IMX16-WR
IMX20-U20N030L090C	—	30	19.5	90	20	●	1	IMX20	IMX20-WR
IMX20-S20L130C	—	—	20	130	20	●	2	IMX20	IMX20-WR
IMX20-U20N070L130C	—	70	19.5	130	20	●	1	IMX20	IMX20-WR
IMX20-S20L180C	—	—	20	180	20	●	2	IMX20	IMX20-WR
IMX20-U20N110L180C	—	110	19.5	180	20	●	1	IMX20	IMX20-WR
IMX20-A25N110L180C	1°	110	19.5	180	25	●	3	IMX20	IMX20-WR
IMX25-U25N037L110C	—	37.5	24.5	110	25	●	1	IMX25	IMX25-WR
IMX25-S25L160C	—	—	25	160	25	●	2	IMX25	IMX25-WR
IMX25-U25N087L160C	—	87.5	24.5	160	25	●	1	IMX25	IMX25-WR
IMX25-S25L210C	—	—	25	210	25	●	2	IMX25	IMX25-WR

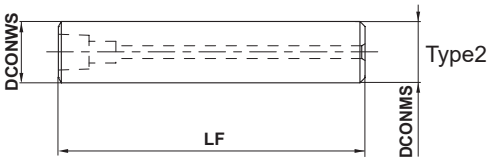
Note 1) The fastening size of the holder and head should be the same. (Refer to page 67)

● : Inventory maintained in Japan.

■Undercut



■High Rigidity - Straight



DCONMS=10	12 ≤DCONMS ≤16	20 ≤DCONMS ≤25	DCONMS=32	
0 - 0.009	0 - 0.011	0 - 0.013	0 - 0.016	

■Steel Holder

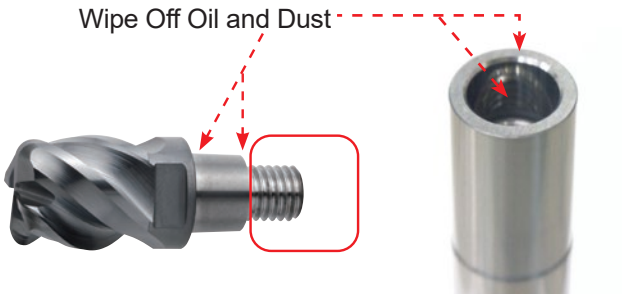
(mm)

Order Number	LB	DCONWS	LF	DCONMS	Stock	Type	Suitable Head	Wrench
IMX10-U10N009L070S	9	9.7	70	10	●	1	IMX10	IMX10-WR
IMX10-G12L060S	—	12	60	12	●	2	IMX10	IMX10-WR
IMX12-U12N011L080S	11	11.7	80	12	●	1	IMX12	IMX12-WR
IMX12-G16L070S	—	16	70	16	●	2	IMX12	IMX12-WR
IMX16-U16N016L080S	16	15.5	80	16	●	1	IMX16	IMX16-WR
IMX16-G20L070S	—	20	70	20	●	2	IMX16	IMX16-WR
IMX20-U20N020L090S	20	19.5	90	20	●	1	IMX20	IMX20-WR
IMX20-G25L080S	—	25	80	25	●	2	IMX20	IMX20-WR
IMX25-U25N025L110S	25	24.5	110	25	●	1	IMX25	IMX25-WR
IMX25-G32L100S	—	32	100	32	●	2	IMX25	IMX25-WR

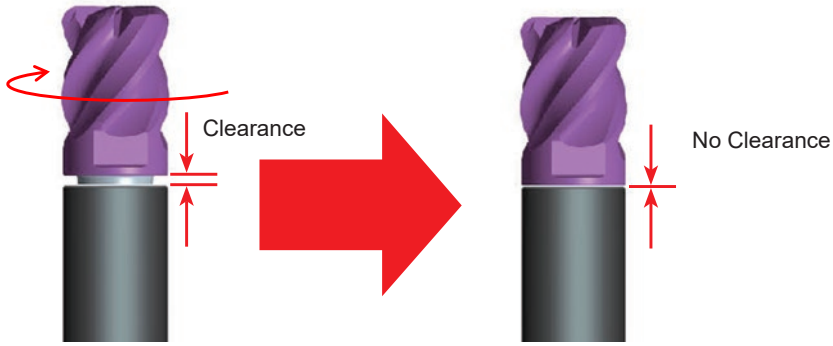
Note 1) The fastening size of the holder and head should be the same. (Refer to page 67)

How to Install the Head

1 Using a clean cloth, wipe away oil and dust from the taper and end surfaces of the head and holder.

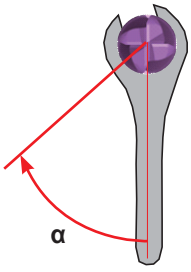


2 Use gloves to protect hands when fastening. Securely fasten the head and holder end surfaces using the enclosed wrench to close off any remaining gap.



3 Refer to the table below for the amount to rotate after the gap is closed, or refer to the clamping torque.

Suitable Head	Reference Tightening Angle α	Recommended Clamping Torque (N·m)
IMX10	50°	10
IMX12	50°	15
IMX16	50°	30
IMX20	40°	50
IMX25	35°	75

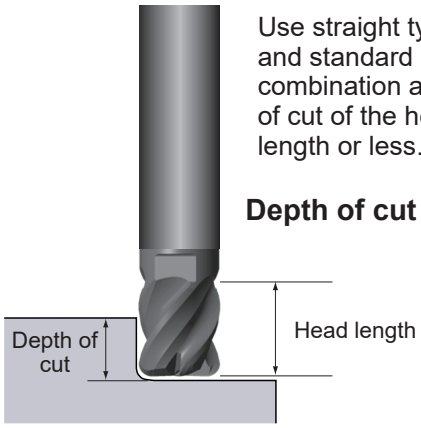


Note 1) Use the special reduced thickness wrench.

iMX holder application

- Straight type holder and head causes workpiece interference when the depth of cut is longer than the head.
- To avoid interference in longer reach applications, use an offset head and holder.

Straight + Standard head

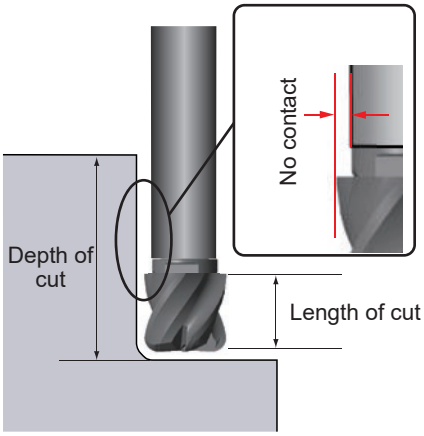


Use straight type and standard head combination at a depth of cut of the head length or less.

Depth of cut < Head length

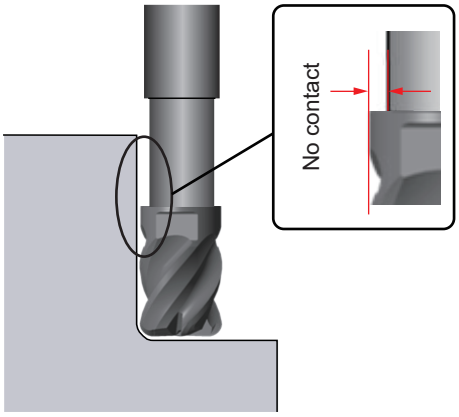
Installation at an overhang of DC×3 or less is also possible, if the depth of cut < head length is assumed.

Straight + Offset head

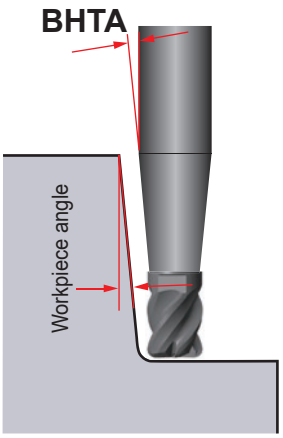


- It is suitable for vertical wall machining, because the undercut type has a relieved neck.
- A taper neck has high rigidity and is especially stable for deeper applications.
- Additional grinding according to customer specifications is also possible.

Undercut + Standard head



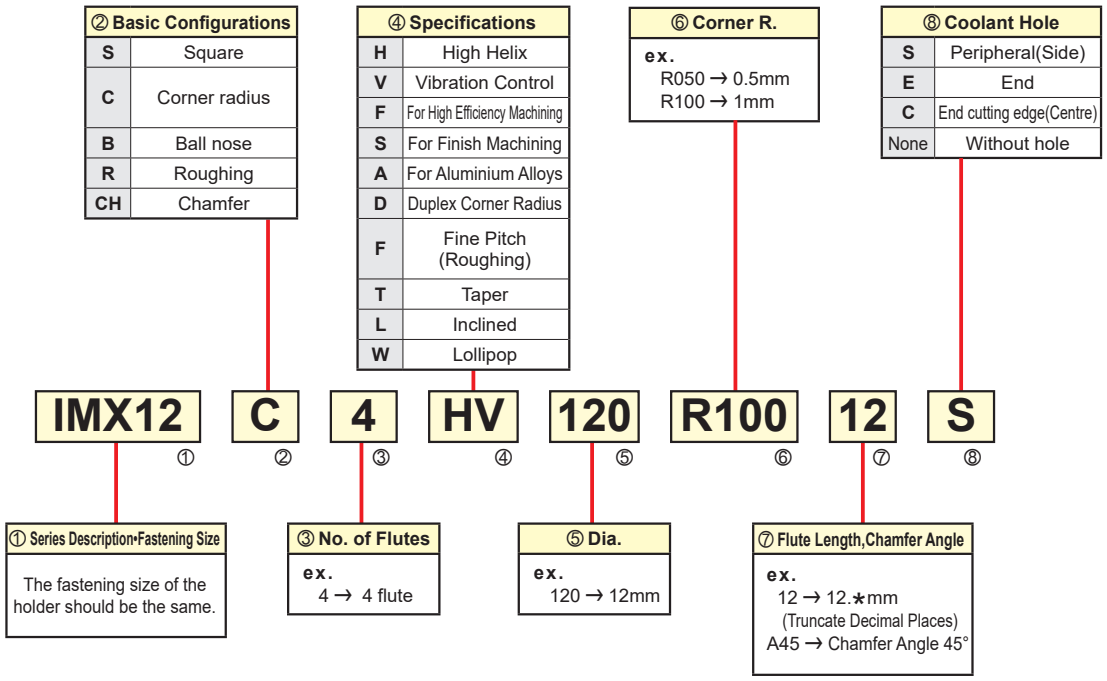
Taper neck + Standard head



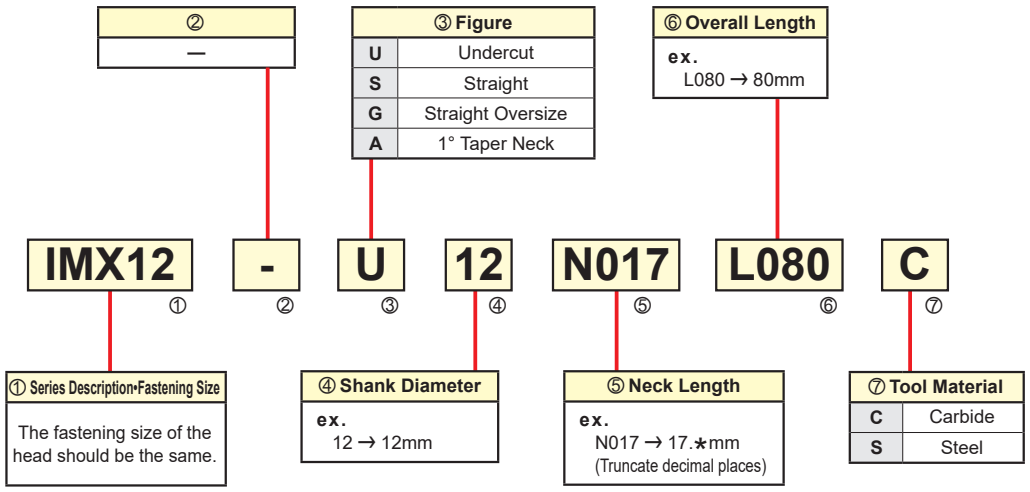
IDENTIFICATION

iMX End Mill Series

■HEAD



■HOLDER



■RUN-OUT ACCURACY AND HEAD EXCHANGE ACCURACY

(mm)

Dia. DC	Run-out accuracy for the peripheral cutting edge *	Head exchange accuracy (Axial)
<ϕ25	0.015	±0.05
≥ϕ25	0.020	

∗ Use the carbide holder. (Except iMX-RC4F-C, iMX-R4F roughing head)

Exchangeable Head End Mills

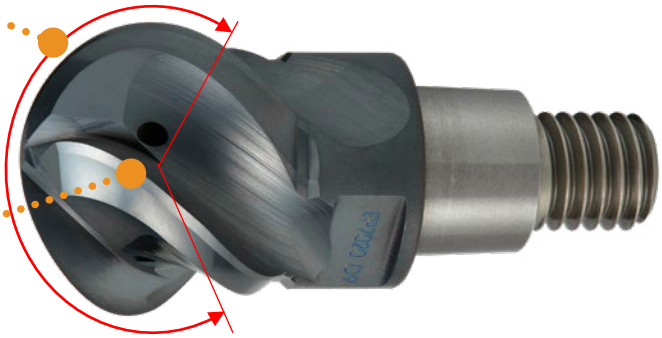
iMX

Lollipop head with coolant hole, 4 flute

iMX-B4WH-S

Lollipop Shape

With a true round ball cutting edge that extends 240º, making it ideal for finishing undercut surfaces.

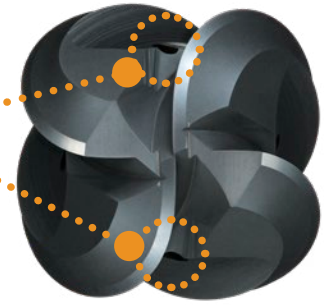


High Helix Cutting Edge

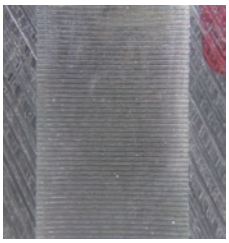
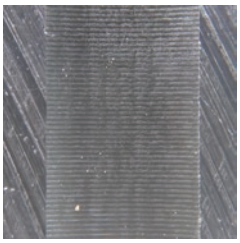
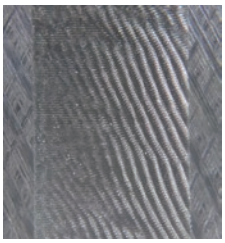
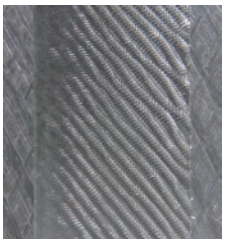
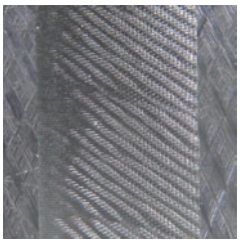
The high helix edge geometry reduces cutting resistance. This results in reduced chatter and vibration even when machining with a long tool overhang.

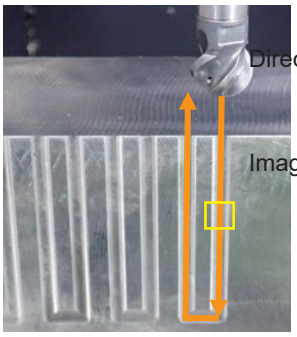
With Coolant Hole

A stable supply of coolant is maintained even when machining components with complex geometries.



SUS630 Comparison of Vertical Machining

Cutting Speed	40 m/min	60 m/min	80 m/min
iMX-B4WH-S	 Surface machined without chatter	 Surface machined without chatter	 Surface machined without chatter
Conventional	 Machined surface displaying chatter	 Machined surface displaying chatter	 Machined surface displaying chatter



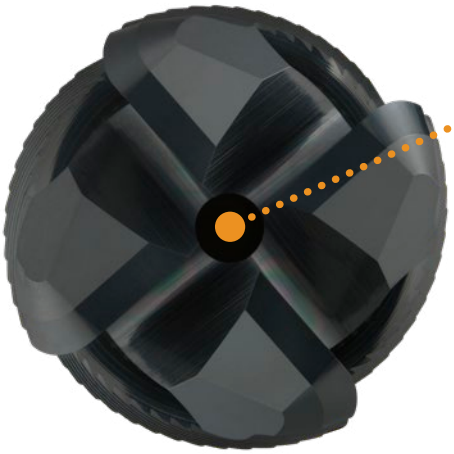
<Cutting Conditions>
Work Material : JIS SUS630
Tool : IMX10B4WH12008S
Feed Rate : fz=0.03mm/t.
Depth of Cut : ae=0.3mm
Overhang Length : 60mm, L/D=5
Cutting Mode : Internal Coolant (Emulsion)

Roughing head with coolant hole, 4 flute

iMX-RC4F-C

For Titanium Alloys and Stainless Steels

A corner radius roughing type with a centre through coolant hole. The roughing edge geometry reduces cutting resistance and is effective for low rigidity and long tool overhang applications.



Centre Through Coolant Hole

For improved chip disposal.

Adopting a New Roughing Edge Geometry

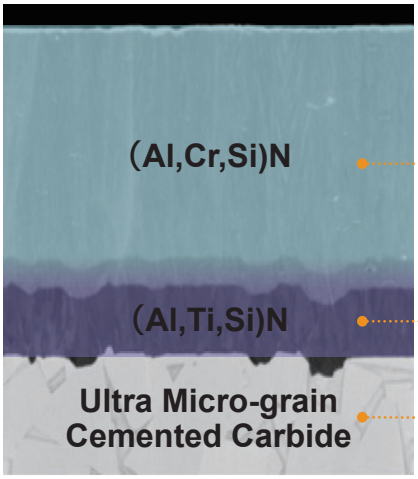
The new optimised edge geometry has improved fracture resistance.

New Corner Radius Type

The new corner radius geometry is resistant to cutting edge damage.

EP8100 Series (EP8110/EP8120)

The combination of the (Al,Cr,Si)N coating (newly-developed), which has a high oxidation temperature and high lubricity, together with the (Al,Ti,Si)N coating, which has better wear resistance and high adhesion, allows high strength hardened steel to be machined.



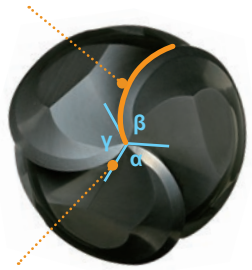
★High Oxidation Temperature
★High Lubricity

★Better Wear Resistance
★High Adhesion

Ball nose head, 3 flute, Irregular pitch flutes, For high efficiency machining

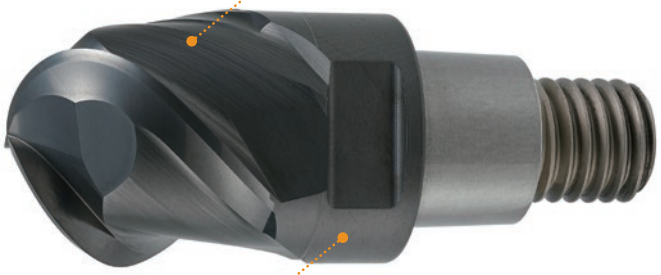
iMX-B3FV

High helical tooth improves fracture resistance.



Reduced vibration by optimised irregular pitch flutes.
α ≠ β ≠ γ

Stable wall machining is possible with a strong back taper angle.



EP8120 is ideal for processing hot forging dies.

Ball nose head, 2 and 4 flute, For hardened steel

iMX-B2S/iMX-B4S

(Picture is **iMX-B2S**)

Low helix tooth is suitable for finishing.

EP8110 is ideal for processing high hardned steel. (≤ 65HRC)

Corner radius, Taper head, Multi-flute, With coolant hole

Taper radius end mills, (corner radius) were conventionally used for turbine blade finishing. iMX taper radius end mills offer equivalent performance to solid end mills but achieve lower process costs.

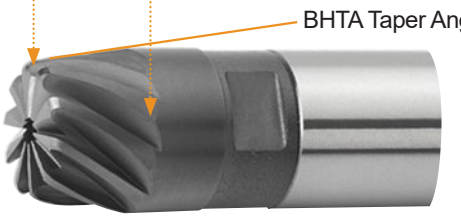
Features

Extensive Range of Corner Radii

For a wide range of applications.

Multi-flute

Higher efficiency milling by multi-flute design more than conventional.

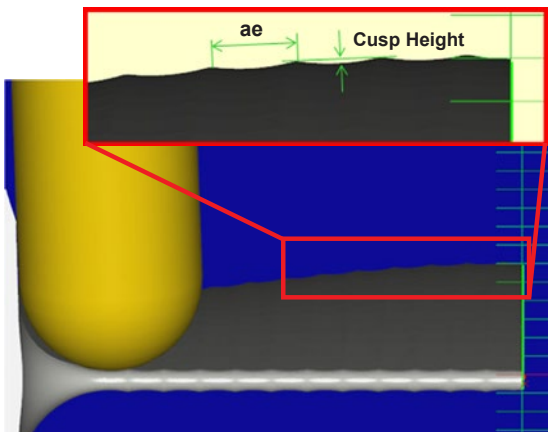


Through Coolant Hole

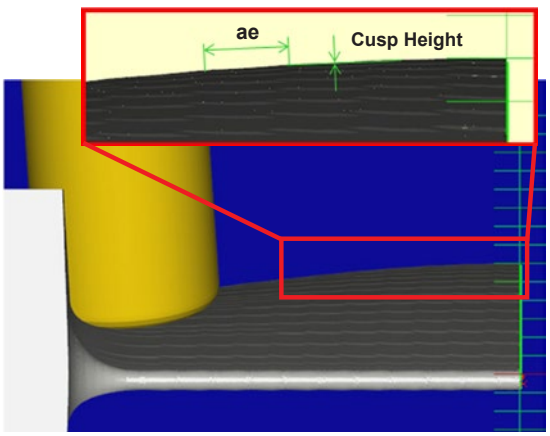
For more efficient chip evacuation.

Drastically Reduces Cutting Time

Reduces the cusp height when using the same pick feed (ae).



Set peck feed (ae) = 2.0mm, with RE5 of the ball nose end mill



Set peck feed (ae) = 2.0mm, with IMX10C8T080R10T080C

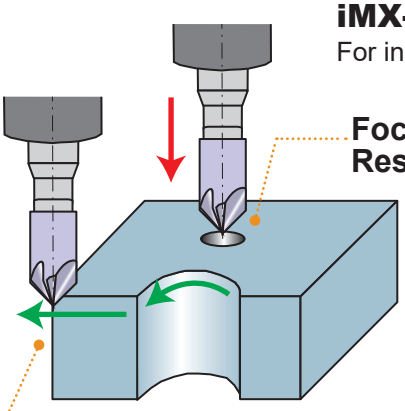
Chamfer Head

Features

Ideal geometry for different chamfering applications.

iMX-CH3L
For inner chamfer applications. 3 flute

Focusing on Vibration Resistance



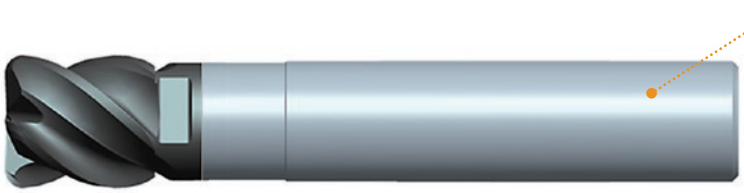
iMX-CH6V
For outer chamfer applications. 6 flute

Focusing on Tool Life

Steel Holder

Features

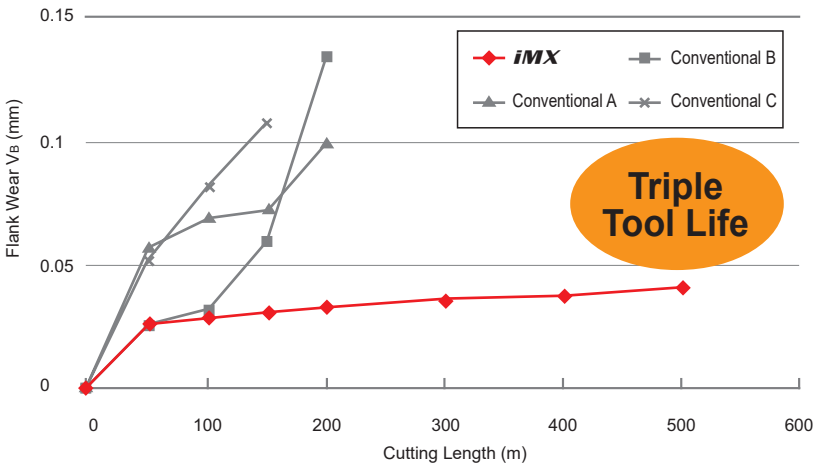
Series expansion of steel holders.



Series of cost effective and capable steel holders suitable for lower depths of cut and short overhang applications.

Cutting Performance

Tool life at least 3 times longer than conventional holders.

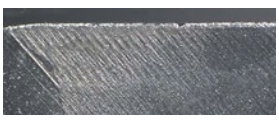


<Cutting Conditions>

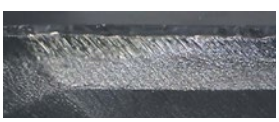
Work Material	: AISI 1055 (220HB)	Depth of Cut	: ap=5mm ae=0.5mm
Holder	: IMX10-U10N009L070S		
Head	: IMX10C4HV100R10010	Overhang Length	: 30mm
Cutting Speed	: n=5100 min^{-1} (160m/min)	Cutting Mode	: Down(Climb) Cut Wet Cutting (Emulsion)
Table Feed	: vf=1530 mm/min (0.075mm/t.)	Machining Centre	: Vertical MC (BT50)

Tip Damage

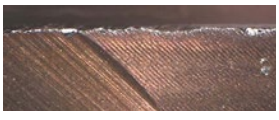
iMX-C4HV
(Cutting Length 150m)



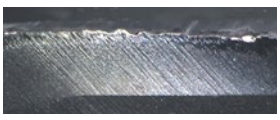
Conventional A
(Cutting Length 100m)



Conventional B
(Cutting Length 100m)



Conventional C
(Cutting Length 100m)

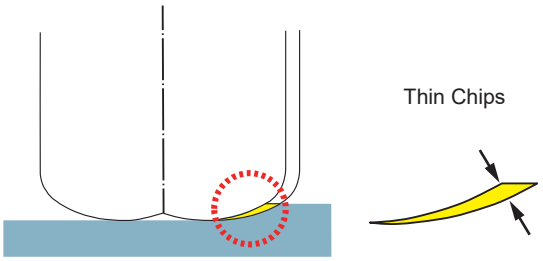


Duplex corner radius head, 4 flute, For high feed, With coolant hole

iMX-C4FD-C

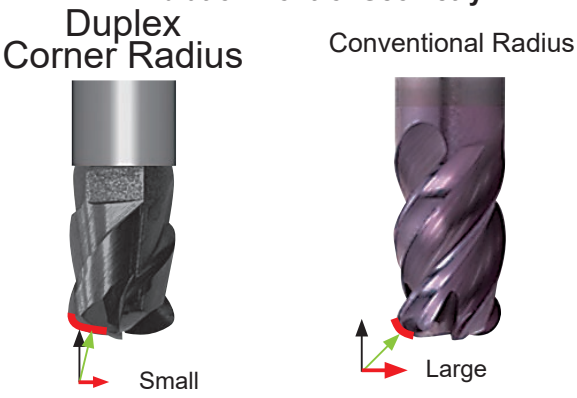
Features

High Efficiency Machining Geometry



Thin chips and a long cutting edge combine to provide both high performance and long tool life.

Vibration Control Geometry

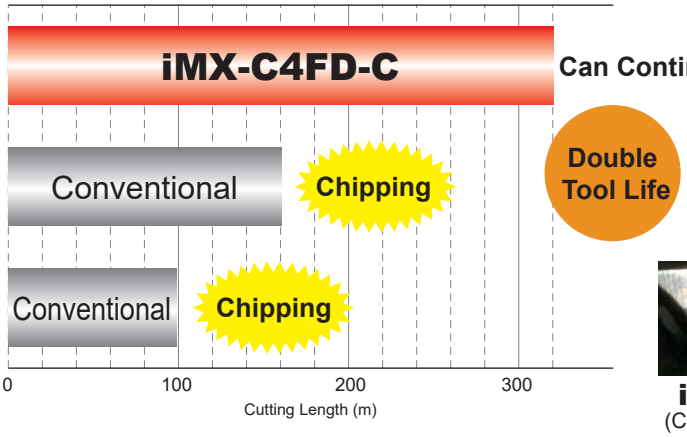


Reduced cutting resistance in the radius direction suppresses tool vibration and reduces deflection.

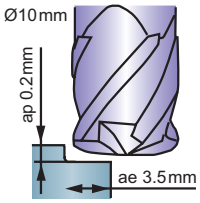
Cutting Performance

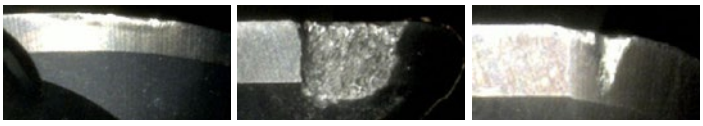
Tool Life Comparison when machining Cobalt Chromium Alloy (DC=10mm)

Tool Life (Co-Cr Alloy)



Work Material	: Co-Cr Alloy
Tool Size	: DC=10mm
Revolution	: n=3185min^{-1} (100m/min)
Table Feed	: vf=1911mm/min (0.15mm/t.)
Depth of Cut	: ap=0.2mm, ae=3.5mm
Overhang Length	: 32mm
Cutting Mode	: Down(Climb) Cut, Soluble
Machine	: Vertical MC (BT40)

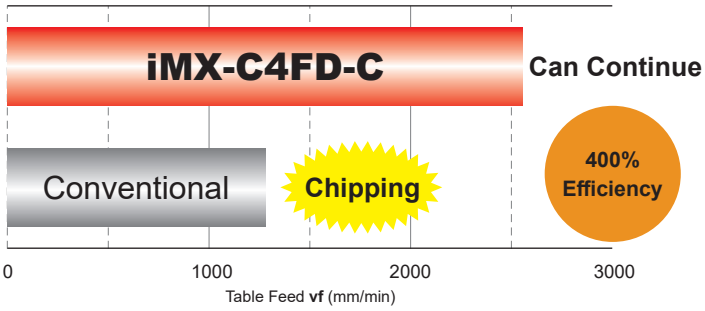




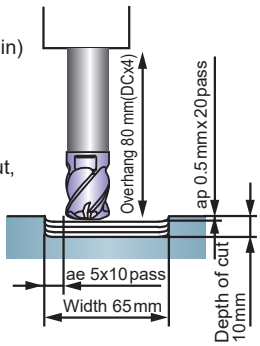
iMX-C4FD-C (Cutting Length 320m) | Conventional (Cutting Length 160m) | Conventional (Cutting Length 96m)

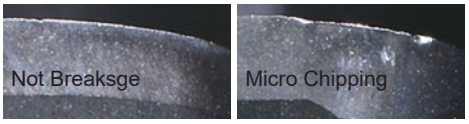
Efficiency Comparison when machining ASTM H13 (DC=20mm)

Machining Efficiency Comparison in ASTM H13



Work Material	: ASTM H13(52HRC)
Tool Size	: DC=20mm
Revolution	: n=1600min^{-1} (100m/min)
Table Feed	: vf=640-2560mm/min (0.10-0.40mm/t.)
Depth of Cut	: ap=0.5mm, ae=5mm
Overhang Length	: 80mm
Cutting Mode	: Slot & Down(Climb) Cut, Air Blow
Machine	: Vertical MC (BT50)

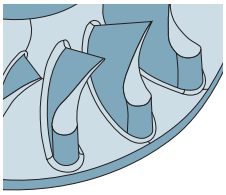
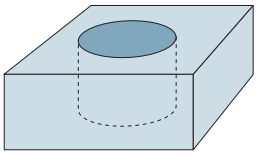
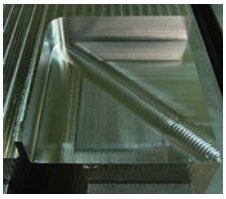


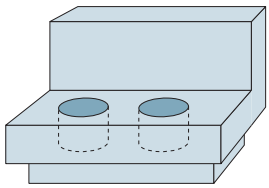
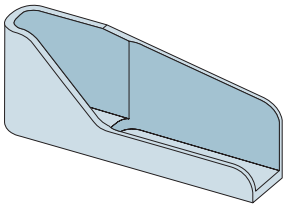
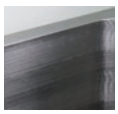


iMX-C4FD-C (Table Feed **vf** 2560mm/min) | Conventional (Table Feed **vf** 1280mm/min)

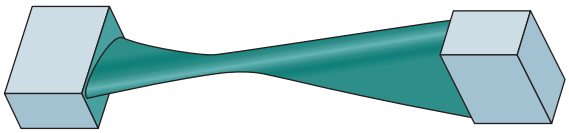
Recommended cutting conditions may vary according to the stability of the set up.

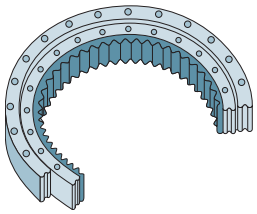
Application Examples

Holder		**IMX12-U12N041L100C**	**IMX20-U20N070L130C**	**IMX16-U16N024L080C**
Head		**IMX12B6HV12012**	**IMX20C4HV200R10021**	**IMX16C10HV160R10016**
Workpiece		AISI 1049 	Mild Steel 	Titanium Alloy (Ti-6Al4V) 
Component		Impeller for Torque Converter	Die Steel	Test Work
Intended Process		Finishing of Blade Faces	Hole Finishing	Shoulder Milling (Down(Climb) Cut)
Cutting Conditions	Cutting Speed **vc** (m/min)	200	100	151
	Feed per Tooth **fz** (mm/t.)	0.08	0.05	0.08
	Width of Cut **ae** (mm)	Approx. 1.4	1	0.5
	Depth of Cut **ap** (mm)	Approx. 1.0	3	16
	Overhang Length (mm)	—	105	52
Cutting Mode		—	Air Blow	Wet Cutting (Emulsion)
Machine		5-axis MC (HSK A63)	Vertical MC	Vertical MC
Results		The tool reduced machining time by 30% and also produced a good surface finish.	The irregular helix flutes combined with the solid carbide holder gave better performance than the conventional tools.	Machining without vibration was achieved even when the workpiece radius and tool radius were the same.

Holder		**IMX10-U10N034L090C**	**IMX20-S20L180C**
Head		**IMX10B4HV10010**	**IMX20C4HV220R10023**
Workpiece		Stainless Steel 	Titanium Alloy (Ti-6Al4V) 
Component		—	—
Intended Process		—	Deep Wall Machining
Cutting Conditions	Cutting Speed **vc** (m/min)	230	60
	Feed per Tooth **fz** (mm/t.)	0.14	0.08
	Width of Cut **ae** (mm)	1.0	0.2
	Depth of Cut **ap** (mm)	1.4	15
	Overhang Length (mm)	—	142 (L/D=7)
Cutting Mode		Air Blow	Wet Cutting (Emulsion)
Machine		Vertical MC	Vertical MC
Results		Conventional products machined 8 pieces. iMX produced a good surface finish even after machining 70 pieces, providing 9 x tool life.	The oversize type head achieved good surface finishes that reduced step differences in vertical wall surfaces.  **iMX**  Conventional

The examples shown are actual applications and can differ from the recommended cutting conditions.

Holder		**IMX20-U20N030L090C**
Head		**IMX20C15T190R10T080C**
Workpiece		Stainless Steel 
Component		Blade
Intended Process		Finished Wing Surface
Cutting Conditions	Cutting Speed **vc** (m/min)	304
	Feed per Tooth **fz** (mm/t.)	0.09
	Width of Cut **ae** (mm)	2.5
	Depth of Cut **ap** (mm)	0.4
	Overhang Length (mm)	—
Cutting Mode		Wet Cutting (Emulsion)
Machine		5-axis MC
Results		Advanced surface finishes compared to conventional tools.

Holder		**IMX12-S12L100C**
Head		**IMX12CH6V120A45**
Workpiece		AISI 4140 
Component		Swing Bearing
Intended Process		Gear Part Chamfer Milling
Cutting Conditions	Cutting Speed **vc** (m/min)	75
	Feed per Tooth **fz** (mm/t.)	0.05
	Width of Cut **ae** (mm)	2.0
	Depth of Cut **ap** (mm)	2.0
	Overhang Length (mm)	—
Cutting Mode		Dry Cutting
Machine		Machining Centre
Results		iMX achieved longer tool life than conventional tools.

For Your Safety
●Don't handle inserts and chips without gloves. ●Please machine within the recommended application range and exchange expired tools with new ones in advance of breakage. ●Please use safety covers and wear safety glasses. ●When using compounded cutting oils, please take fire precautions. ●When attaching inserts or spare parts, please use only the correct wrench or driver. ●When using rotating tools, please make a trial run to check run-out, vibration and abnormal sounds etc.

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(Tools specifications subject to change without notice.)

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