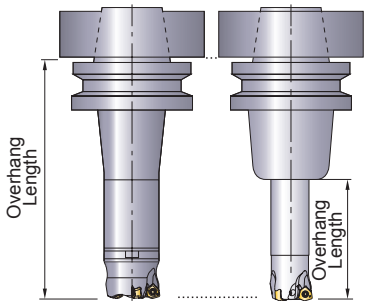
Recommended Cutting Conditions

Correction Value According to Overhang Length

(mm)

Type	Cutting Dia. Max. **DCX**	Overhang Length	Correction Value According		
			Cutting Speed **vc** (m/min)	Depth of Cut **ap**	Feed **fz**(mm/t.)
Shank Type	50	< 2.5×DCON	100%	100%	100%
		3.0×DCON	90%	100%	90%
		4.0×DCON	80%	80%	90%
Arbor Type	50—80	< 2.5×DCX	100%	100%	100%
		3.0×DCX	85%	100%	90%
		4.0×DCX	80%	80%	80%
		5.0×DCX	75%	75%	60%
		6.0×DCX	70%	70%	40%
	≥100	200	100%	100%	100%
		300	85%	100%	90%
		400	80%	80%	80%

DCON=Connection Dia.



Cutting Speed (Dry Cutting)

(mm)

	Workpiece Material	Properties	Cutting Speed **vc** (m/min)				
P			MP6130	MP6120	MC7020	VP15TF	VP30RT
	Mild Steels	≤180HB	140 (90—180)	150 (100—200)	220 (170—270)	150 (100—200)	120 (80—160)
	Carbon Steels Alloy Steels	180—280HB	120 (70—180)	140 (80—200)	200 (150—250)	140 (80—200)	100 (60—150)
	Carbon Steels Alloy Steels	280—350HB	120 (70—180)	140 (80—200)	200 (150—250)	140 (80—200)	100 (60—150)
	Alloy Tool Steels	≤350HB (Annealing)	120 (70—180)	140 (80—200)	200 (150—250)	140 (80—200)	100 (60—150)
	Pre-hardened Steels	35—45HRC	90 (50—130)	110 (70—150)	—	110 (70—150)	80 (40—120)
M			MP7130	MP7140	MC7020	VP30RT	
	Austenitic Stainless Steels	≤200HB	160 (130—200)	150 (120—180)	220 (170—270)	150 (120—180)	
	Austenitic Stainless Steels	>200HB	140 (100—200)	130 (80—180)	190 (140—240)	130 (80—180)	
	Ferritic and Martensitic Stainless Steels	≤200HB	150 (100—200)	130 (80—180)	220 (170—270)	130 (80—180)	
	Duplex Stainless Steels	≤280HB	130 (80—180)	110 (60—160)	180 (130—230)	110 (60—160)	
	Precipitation Hardening Stainless Steels	<450HB	110 (60—160)	90 (50—130)	170 (120—220)	90 (50—130)	
K			VP15TF				
	Gray Cast Irons	≤350MPa	160 (120—200)				
	Ductile Cast Irons	≤450MPa	150 (100—200)				
	Ductile Cast Irons	≤800MPa	120 (80—160)				
S			MP9130	MP9120	VP15TF		
	Heat Resistant Alloys	—	30 (20—40)	40 (20—50)	40 (20—50)		
H			VP15TF				
	Hardened Steels	40—55HRC	70 (40—100)				

Note 1) To discharge chips effectively, use an air blow when machining. When the air blow is less effective at discharging chips, we recommend wet cutting.
Note 2) When wet cutting, tool life may become shorter than dry cutting. When carrying out wet cutting for the applications recommended with dry cutting, reduce the cutting speed by 25%.
Note 3) When large vibration occurs, reduce the cutting conditions.
Note 4) For interrupted cutting, reduce the cutting speed and feed rate by 20%.

Depth of Cut / Feed per Tooth

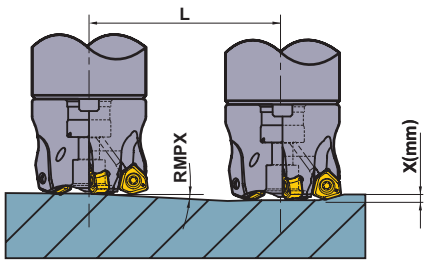
(mm)

	Workpiece Material	Properties	Depth of Cut **ap**	Cutting Dia. Max. DCX=50, 52	Cutting Dia. Max. DCX≥63
				Feed **fz**(mm/t.)	Feed **fz**(mm/t.)
P	Mild Steels	≤180HB	≤1	1.5(0.6—2.5)	1.7(0.6—2.8)
			≤1.5	1.3(0.6—2.0)	1.5(0.6—2.5)
			≤2	1.2(0.6—2.0)	1.3(0.6—2.5)
			≤2.5	0.8(0.3—1.5)	1.0(0.3—1.6)
			≤3	0.4(0.2—1.0)	0.5(0.2—1.2)
	Carbon Steels Alloy Steels	180—280HB	≤1	1.5(0.5—2.0)	1.7(0.5—2.5)
			≤1.5	1.2(0.5—1.7)	1.3(0.5—2.5)
			≤2	1.0(0.5—1.5)	1.2(0.5—2.0)
			≤2.5	0.7(0.3—1.2)	0.9(0.3—1.5)
			≤3	0.3(0.2—0.8)	0.4(0.2—1.0)
	Carbon Steels Alloy Steels	280—350HB	≤1	1.5(0.5—2.0)	1.7(0.5—2.5)
			≤1.5	1.2(0.5—1.7)	1.3(0.5—2.2)
			≤2	1.0(0.5—1.5)	1.2(0.5—2.0)
			≤2.5	0.7(0.3—1.2)	0.9(0.3—1.5)
			≤3	0.3(0.2—0.8)	0.4(0.2—1.0)
	Alloy Tool Steels	≤350HB (Annealing)	≤1	1.5(0.5—2.0)	1.7(0.5—2.5)
			≤1.5	1.2(0.5—1.7)	1.3(0.5—2.2)
			≤2	1.0(0.5—1.5)	1.2(0.5—2.0)
			≤2.5	0.7(0.3—1.2)	0.9(0.3—1.5)
			≤3	0.3(0.2—0.8)	0.4(0.2—1.0)
	Pre-hardened Steels	35—45HRC	≤1	1.3(0.4—1.7)	1.5(0.4—2.0)
			≤1.5	1.0(0.4—1.5)	1.2(0.4—1.5)
			≤2	0.8(0.4—1.2)	1.0(0.4—1.3)
M	Austenitic Stainless Steels	≤200HB	≤1	1.0(0.5—1.2)	1.0(0.5—1.2)
			≤1.5	1.0(0.5—1.0)	1.0(0.5—1.0)
	Austenitic Stainless Steels	>200HB	≤1	1.0(0.5—1.2)	1.0(0.5—1.2)
			≤1.5	1.0(0.5—1.0)	1.0(0.5—1.0)
	Ferritic and Martensitic Stainless Steels	≤200HB	≤1	1.0(0.5—1.2)	1.0(0.5—1.2)
			≤1.5	1.0(0.5—1.0)	1.0(0.5—1.0)
	Duplex Stainless Steels	≤280HB	≤1	0.8(0.4—1.0)	0.8(0.4—1.0)
			≤1.5	0.8(0.4—0.8)	0.8(0.4—0.8)
	Precipitation Hardening Stainless Steels	<450HB	≤1	0.8(0.4—1.0)	0.8(0.4—1.0)
			≤1.5	0.8(0.4—0.8)	0.8(0.4—0.8)
K	Gray Cast Irons	≤350MPa	≤1	1.7(0.6—2.5)	1.8(0.6—2.8)
			≤1.5	1.5(0.6—2.0)	1.7(0.6—2.5)
			≤2	1.3(0.6—2.0)	1.5(0.6—2.5)
			≤2.5	0.8(0.3—1.5)	1.0(0.3—1.6)
			≤3	0.4(0.2—1.0)	0.5(0.2—1.2)
	Ductile Cast Irons	≤450MPa	≤1	1.5(0.5—2.0)	1.7(0.5—2.5)
			≤1.5	1.3(0.5—1.8)	1.5(0.5—2.0)
			≤2	1.2(0.5—1.8)	1.3(0.5—2.0)
			≤2.5	0.7(0.3—1.2)	0.9(0.3—1.5)
			≤3	0.3(0.2—0.8)	0.4(0.2—1.0)
	Ductile Cast Irons	≤800MPa	≤1	1.3(0.4—1.8)	1.5(0.4—2.0)
			≤1.5	1.2(0.4—1.5)	1.3(0.4—1.8)
			≤2	1.0(0.4—1.5)	1.2(0.4—1.8)
S	Heat Resistant Alloys	—	≤1	1.0(0.3—1.3)	1.0(0.3—1.3)
			≤1.5	0.8(0.3—1.2)	0.8(0.3—1.2)
			≤2	0.7(0.3—1.2)	0.7(0.3—1.2)
H	Hardened Steels	40—55HRC	≤1	0.8(0.3—1.2)	0.8(0.3—1.2)
			≤1.5	0.6(0.3—1.0)	0.6(0.3—1.0)
			≤2	0.5(0.3—0.8)	0.5(0.3—0.8)

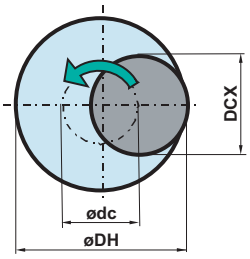
Note 1) To discharge chips effectively, use an air blow when machining. When the air blow is less effective at discharging chips, we recommend wet cutting.
Note 2) When large vibration occurs, reduce the cutting conditions.
Note 3) For interrupted cutting, reduce the cutting speed and feed rate by 20%.
Note 4) If ap is set at 2mm or more, avoid machining on the walls or ramping.

Maximum Capacities by Mode

Ramping



Helical Milling



● How to derive a locus of the center of the tool.

ødc = øDH - DCX

Locus of the Center of the Tool | Desired Hole Diameter | Cutting Diameter Maximum

(mm)

Tool Holder Type	DCX	DC	APMX	Ramping			Helical Milling (Blind Hole, Flat Bottom)		Helical Milling (Through Hole)	AZ
				RMPX	L (mm) Required Distance for X mm Depth		DH		DH	
					x = 1	x = 2	Min.	Max.	Min.	
WJX14R50	50	34.5	2	4.4°	13.0	26.0	82	97	73	2.1
WJX14-050	50	34.5	2	4.4°	13.0	26.0	82	97	73	2.1
WJX14R050	50	34.5	2	4.4°	13.0	26.0	82	97	73	2.1
WJX14-052	52	36.5	2	4.1°	14.0	28.0	86	101	77	2.1
WJX14-063	63	47.5	2	3.0°	19.1	38.2	108	123	99	2.1
WJX14R063	63	47.5	2	3.0°	19.1	38.2	108	123	99	2.1
WJX14-066	66	50.4	2	2.8°	20.5	40.9	114	129	105	2.1
WJX14-080	80	64.4	2	2.1°	27.3	54.6	142	157	133	2.1
WJX14R080	80	64.4	2	2.1°	27.3	54.6	142	157	133	2.1
WX14-100	100	84.4	2	1.5°	38.2	76.4	182	197	173	2.1
WJX14R100	100	84.4	2	1.5°	38.2	76.4	182	197	173	2.1
WJX14-125	125	109.4	2	1.2°	47.8	95.5	232	247	223	2.1
WJX14R125	125	109.4	2	1.2°	47.8	95.5	232	247	223	2.1
WJX14-160	160	144.4	2	0.8°	71.7	143.3	302	317	293	2.1
WJX14R160	160	144.4	2	0.8°	71.7	143.3	302	317	293	2.1

DCX = Cutting Dia. Max. **DC** = Cutting Dia. **DH** = Desired Hole Dia.
APMX = Depth of Cut Max. **RMPX** = Ramping Angle Max. **AZ** = Plunge Depth Max.

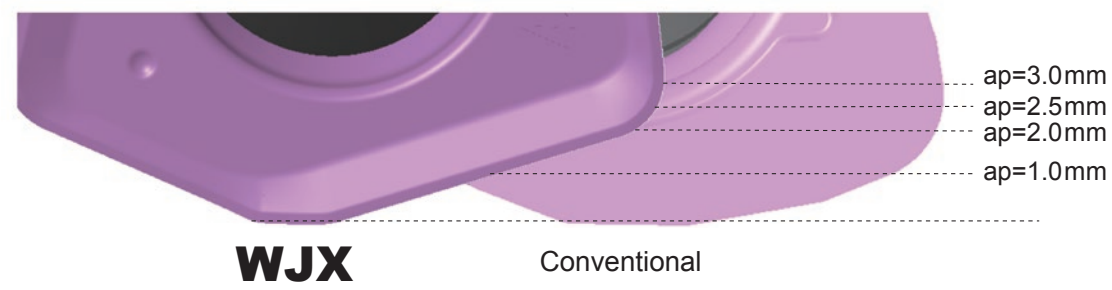
Note 1) When ramping and helical milling, it is recommended to reduce the feed per tooth.
Note 2) When ramping, helical milling and drilling, long continuous chips may be scattered so please be careful.

<Helical Milling>
To obtain a flat bottom surface when helical milling, it requires to remove “the uncut part” in the center of the workpiece material at a final pass.
When helical milling, make sure that the depth of cut per helical pass doesn’t exceed the maximum depth of cut (APMX).
<Drilling>
When drilling, set the axial feed per revolution at 0.2mm/rev or less.

Operational Guidance

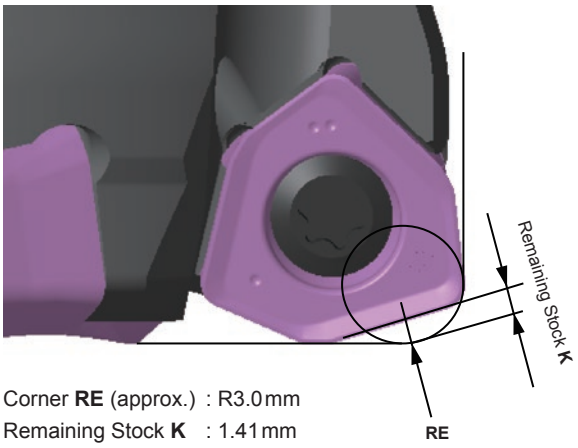
Depth of Cut

The straight cutting edge is 2.0mm at maximum depth of cut (APMX).
When plane cutting steels and cast irons, the depth of cut can be set at up to 3.0mm until you reach the corner radius.
When you exceed 2.0mm, you will need to decrease the feed rate. See the cutting conditions on page 13 for reference.

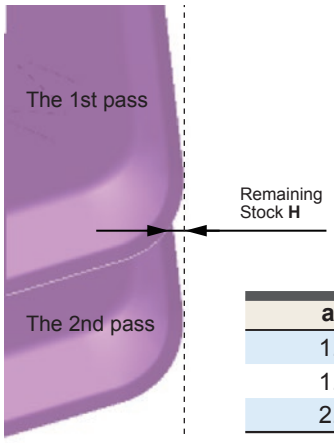


Remaining Stock

When using the WJX, please program as a radius cutter.
The approximate remaining stock **K** for the program is shown below.
Also see the table on the right for the remaining stock **H** of the vertical wall.



Corner **RE** (approx.) : R3.0mm
Remaining Stock **K** : 1.41mm



(mm)

ap	Remaining Stock **H**
1.0	0.05
1.5	0.08
2.0	0.12