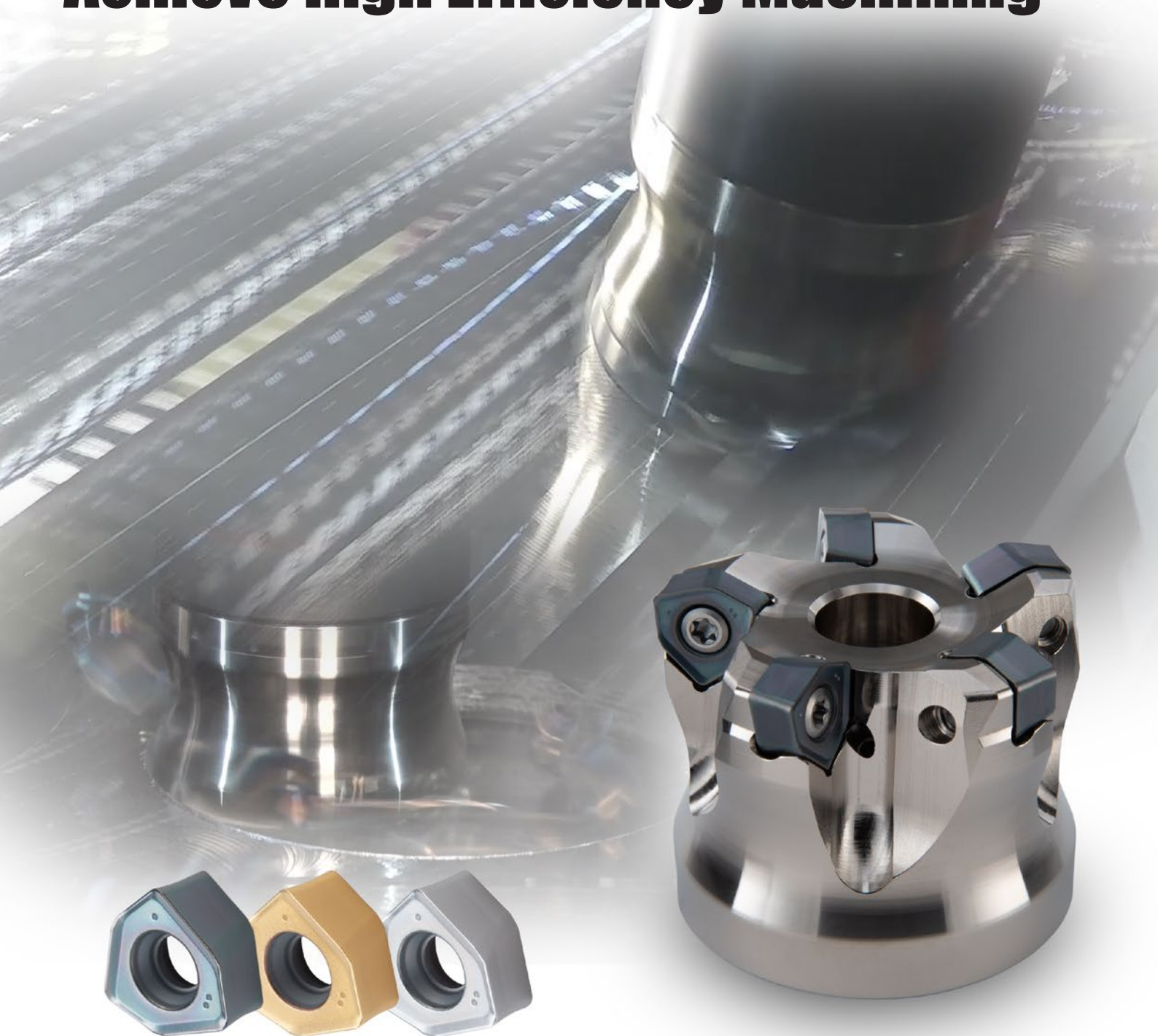


Double-sided Insert Type High Feed Radius Milling Cutter

# WJX Series

Arbor Size  
Expansion

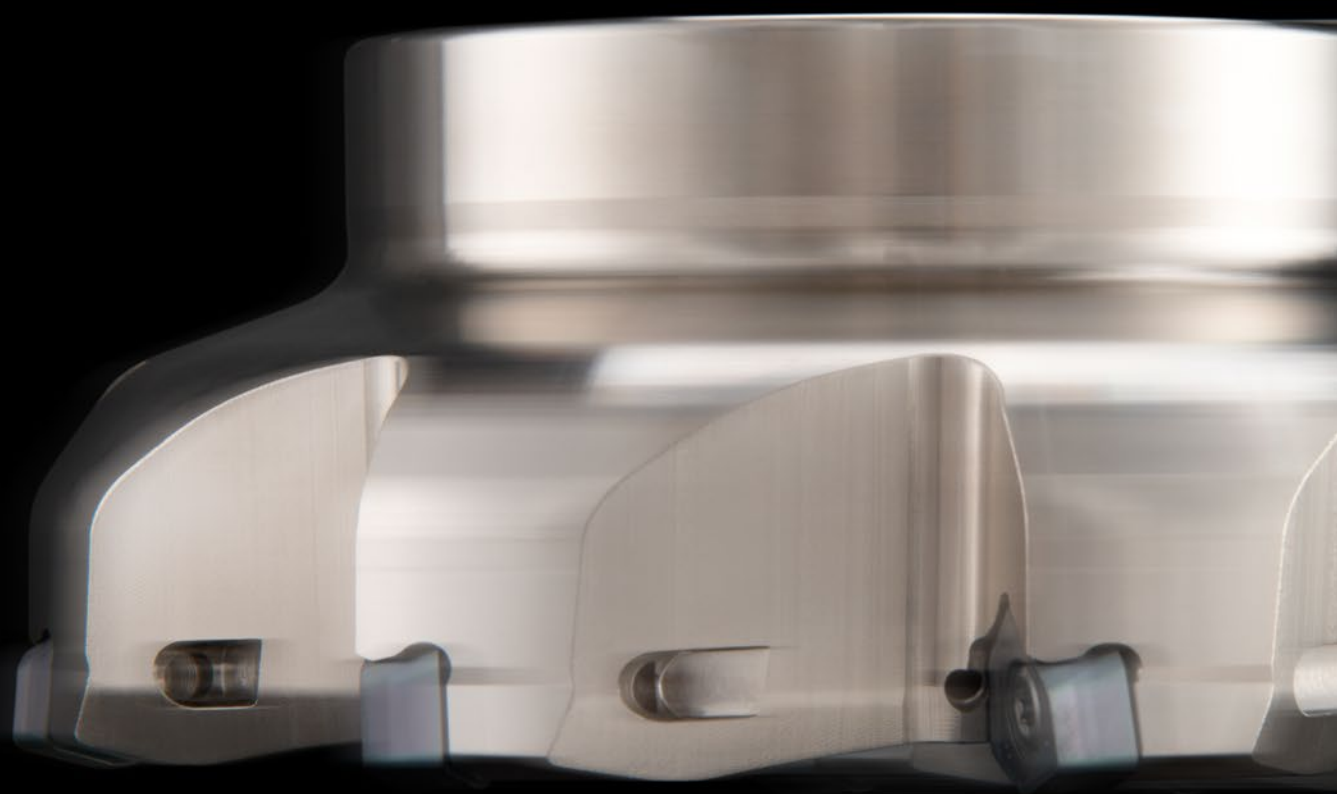
## Improved Sharpness and Stability to Achieve High Efficiency Machining



# Fast Sha

## WJX Series

High feed radius milling cutter, with stronger double-sided insert type. Experiences low cutting resistance on start up, maintains stable machining even during interrupted machining and large depth of cut.



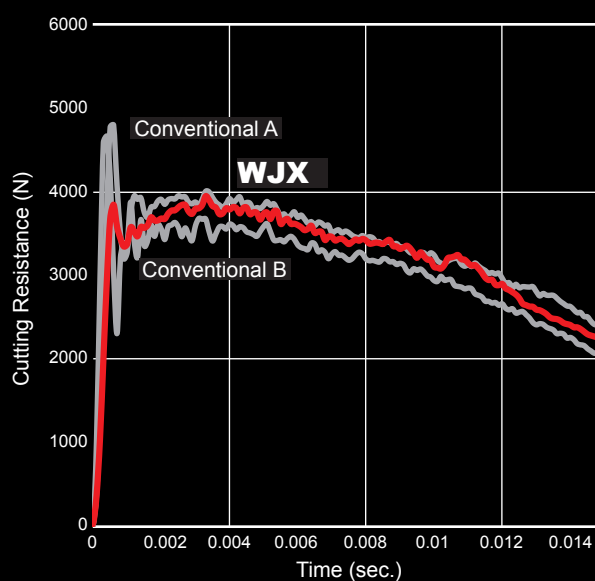
# up Strong

強く

## <Cutting Conditions>

Workpiece Material : AISI 4140  
Cutter Dia. : DCX=φ63mm  
Cutting Speed :  $v_c=150\text{m/min}$   
Feed per Tooth :  $f_z=1.5\text{mm/t.}$   
Depth of Cut :  $a_p=1.5\text{mm}$   
Width of Cut :  $a_e=31.5\text{mm}$   
Cutting Mode : Single Insert

WJX produces low cutting resistance when entering the cut.



# Reliable Milling Cutter even in High Efficiency Machining

Covers both high feed and large depth of cut, for high efficiency machining.  
Economical double-sided insert provides the capability for multi-functionality.  
Provides excellent sharpness and gives a long tool life, reducing cutting noise.  
The WJX series was developed for creating reliable and economical tools even in high efficiency machining.



## Unconventional Cutting Edge Design for Stable Milling



### Wiper Cutting Edge

The wiper edge offers good surface finishes sufficient for rough machining.

### Straight Cutting Edge

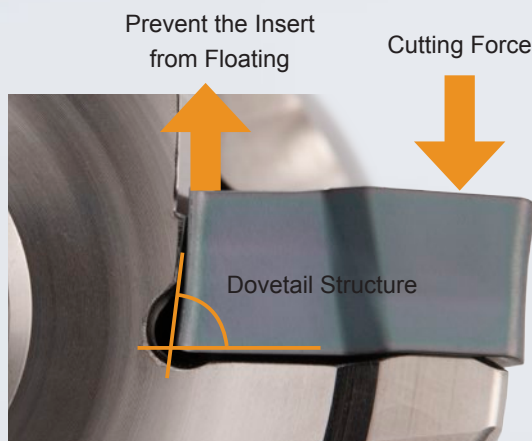
The straight cutting edge extending to the maximum depth of cut (APMX) allows for high feed machining even at large depths of cut.

### Minor Cutting Edge

Stable chip formation is possible with the straight cutting edge even at high ramping angle.

## Highly-reliable Clamping System

The dovetail structure prevents the insert from floating and gives stable clamping without using a clamp bridge.



## Complex Shape Flank Face Suitable for Ramping

The flank shape combines the strength and economy of negative inserts, with the sharpness and multi-functionality of positive inserts.



Single-sided : Positive Insert  
Ramping Performance  
Sharpness



Double-sided : Negative Insert  
Cost Efficiency  
Insert Strength  
Fracture Resistance



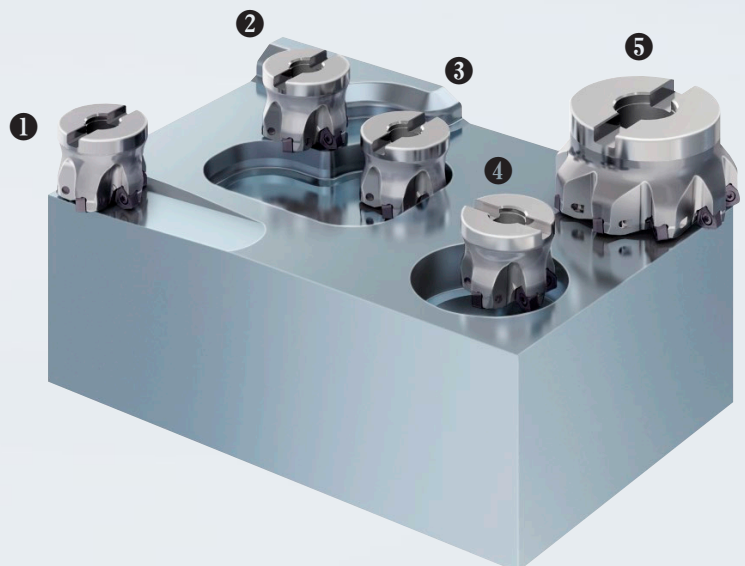
YouTube

## Different Types of Milling Cover a Wide Variety of Situations

- ① Ramping
- ② Shoulder Milling
- ③ Pocket Milling
- ④ Helical Milling
- ⑤ Face Milling

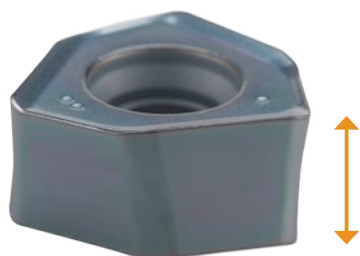


YouTube



## High Strength Insert with Increased Insert Thickness

Increased thickness prevents the inserts from fracturing and makes the cutter body resistant to breakage.



**WJX**



Cutting Length 4.8m



Conventional

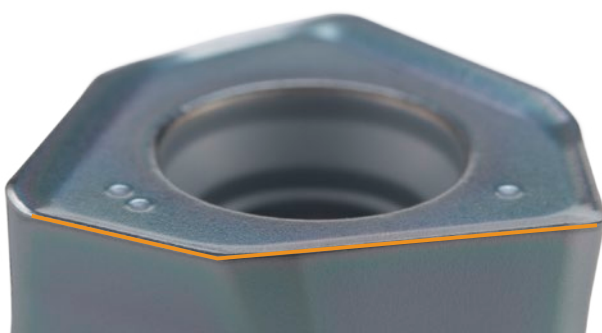


Cutting Length 3.6m

<Cutting Conditions>  
 Workpiece Material : AISI 4140  
 Cutter Dia. : DCX=ø63mm  
 Cutting Speed :  $vc=150$  m/min  
 Feed per Tooth :  $fz=2.0$  mm/t.  
 Depth of Cut :  $ap=2$  mm  
 Width of Cut :  $ae=45$  mm  
 Cutting Mode : Dry Cutting  
 Single Insert

## Good Chip Formation

The cutting edge forms short chips that prevent the cutter body from chip jamming and tangling as well as allowing for easy cleaning inside of machine tools.



YouTube



**WJX**



Conventional

<Cutting Conditions>  
 Workpiece Material : AISI 4140  
 Cutter Dia. : DCX=ø63mm  
 Cutting Speed :  $vc=150$  m/min  
 Feed per Tooth :  $fz=2.0$  mm/t.  
 Depth of Cut :  $ap=2$  mm  
 Width of Cut :  $ae=45$  mm  
 Cutting Mode : Dry Cutting  
 Single Insert

# PVD Coated Grade for Milling

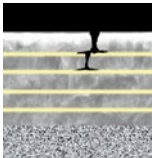
## MP6100/MP7100/MP9100 Series

### TOUGH-Σ Technology

A fusion of the separate coating technologies; PVD and multi-layering provides extra toughness.

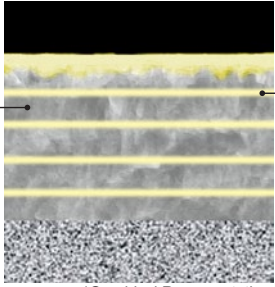
**Base Layer**  
**High Al-(Al, Ti)N**

The new technology Al-(Al, Ti)N coating provides stabilisation of the high hardness phase and succeeds in dramatically improving wear, crater and welding resistance.



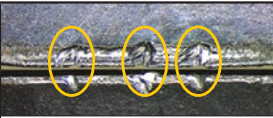
\*Graphical Representation.

**Al-Ti-Cr-N Based PVD Coating**



\*Graphical Representation.

**Best Layer of Each Workpiece Material**

|          |                                                                                   |          |                                                                                                            |
|----------|-----------------------------------------------------------------------------------|----------|------------------------------------------------------------------------------------------------------------|
| <b>P</b> |  | (Al,Cr)N | <br>Thermal Cracks      |
| <b>M</b> |  | TiN      | <br>Notching            |
| <b>S</b> |  | CrN      | <br>Welding by Chipping |

### VP15TF

Stable machining properties are enabled when the coating is combined with a high wear and fracture resistant carbide substrate.

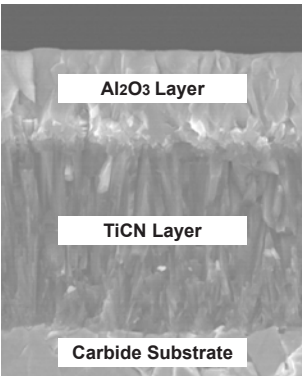
### VP30RT

Ideal for heavy interrupted cutting of stainless and general steels because of the excellent fracture resistance properties.

## CVD Coated Grade for Milling of Steels and Stainless Steels

### **NEW** MC7020

MC7020 suppresses crater wear which occurs in high speed cutting, and achieves stable processing in high efficiency machining.



Structure of **MC7020**

### Improved Wear Resistance

The micro-grain wear resistant Al<sub>2</sub>O<sub>3</sub> and fibrous TiCN layers deliver excellent wear resistance in high speed cutting.

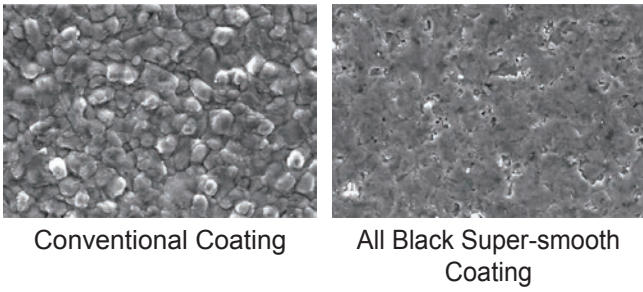
### Improved Fracture Resistance

Use of a specially developed cemented carbide that provides superior resistance to fracture and thermal cracking prevents the cutting edge from sudden fracturing.

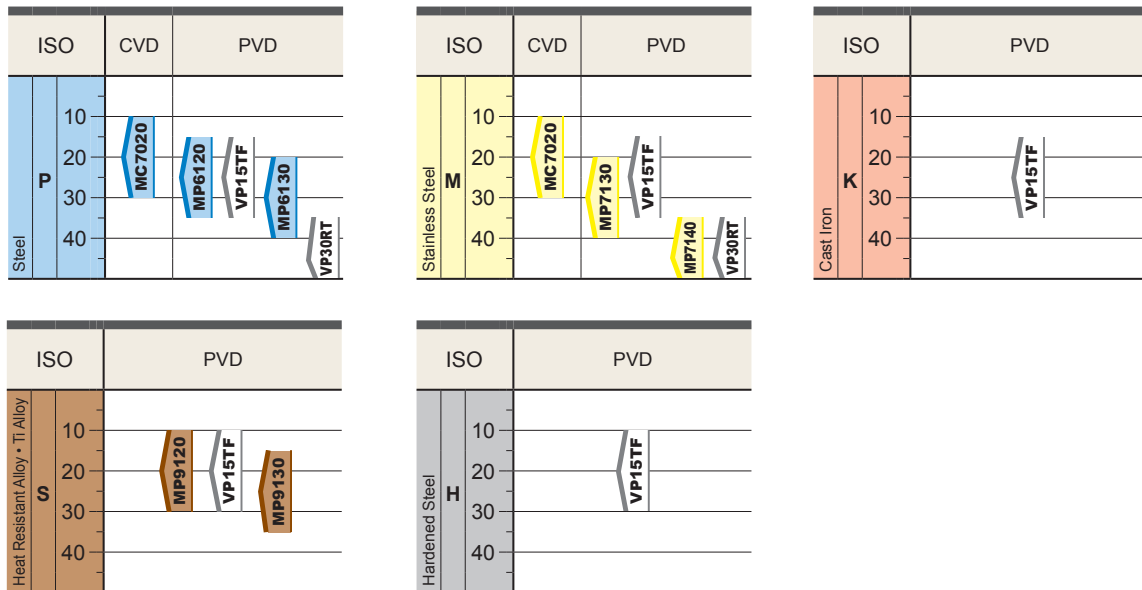
### Reduced Abnormal Damage

An extremely smooth black super-smooth coating prevents abnormal damage such as chip welding.

### Comparison of Coating Surface



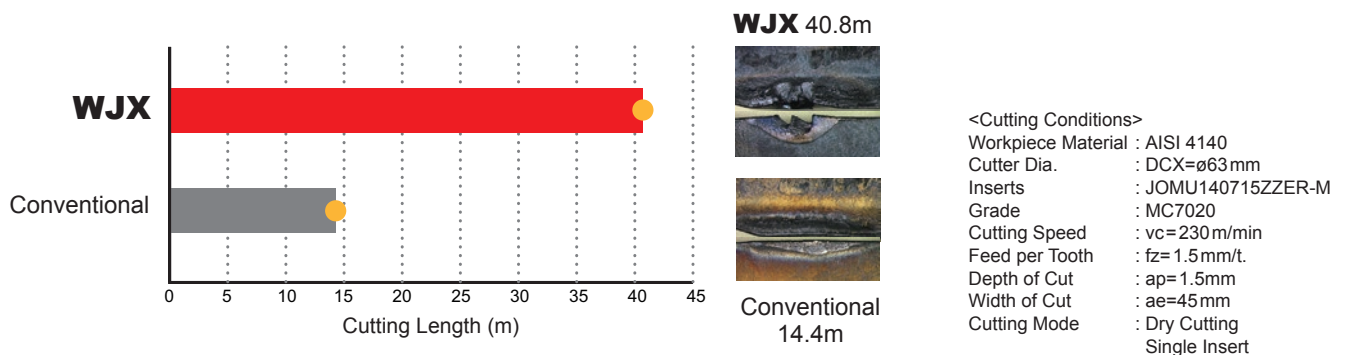
## Insert Grades for a Wide Range of Materials



## Cutting Performance

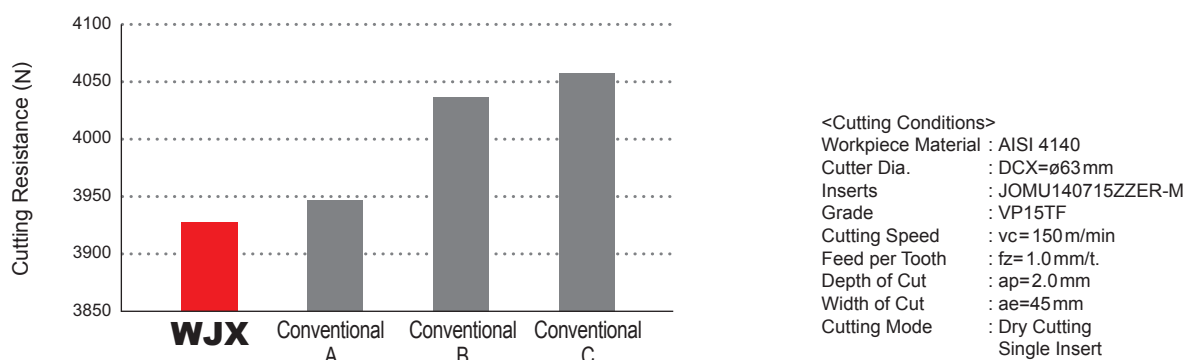
### AISI 4140 Wear Resistance Comparison

MC7020 has excellent crater wear resistance in high speed cutting.



### AISI 4140 Cutting Resistance Comparison

WJX reduces the spindle load for low cutting resistance.



# MULTI-FUNCTIONAL MILLING



## WJX 50/52

NEW

P

M

K

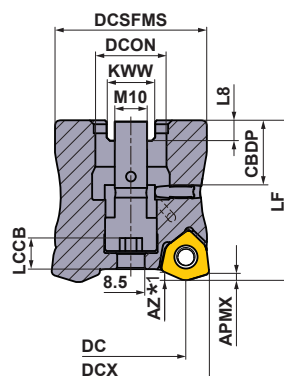
N

S

H



ø50  
ø52



Right hand tool holder only.  
The set bolt is built in.  
A 7mm Allen wrench is used to tighten the set bolt.

### Arbor Type

With Coolant Hole

GAMP: -7° T: +12°  
GAMF: -10° I: +7°

DCX = mm size, DCON = inch size, DCON = mm size

| DCX | Order Number   | Stock | *2   | DC   | LF | DCON   | WT<br>(kg) | APMX | RMPX | RPMX<br>(min <sup>-1</sup> ) |
|-----|----------------|-------|------|------|----|--------|------------|------|------|------------------------------|
|     |                | R     | No.T |      |    |        |            |      |      |                              |
| 50  | WJX14-050A03AR | ●     | 3    | 34.5 | 50 | 22     | 0.4        | 2    | 4.4° | 5000                         |
| 50  | WJX14-050A04AR | ●     | 4    | 34.5 | 50 | 22     | 0.4        | 2    | 4.4° | 5000                         |
| 50  | WJX14R05003BA  | ●     | 3    | 34.5 | 50 | 22.225 | 0.4        | 2    | 4.4° | 5000                         |
| 50  | WJX14R05004BA  | ●     | 4    | 34.5 | 50 | 22.225 | 0.4        | 2    | 4.4° | 5000                         |
| 52  | WJX14-052A04AR | ●     | 4    | 36.5 | 50 | 22     | 0.4        | 2    | 4.1° | 5000                         |

\*1 Refer to page 14, for the maximum drilling depth (AZ).

\*2 Number of Teeth

Note 1) The maximum spindle speeds **RPMX** are set to ensure tool and insert stability.

Note 2) When using the tool at high spindle speeds, ensure that the tool and arbor are correctly balanced.

Note 3) The milling cutter has a built-in set bolt. The set bolt cannot be replaced.  
Therefore, absolutely do not disassemble the milling cutter.

CUTTING CONDITIONS > P12,13,14

### Mounting Dimensions

| DCX | Order Number   | DCON   | CBDP | LCCB | DCSFMS | KWW  | L8  |
|-----|----------------|--------|------|------|--------|------|-----|
| 50  | WJX14-050A03AR | 22     | 20   | 18.3 | 47     | 10.4 | 6.3 |
| 50  | WJX14-050A04AR | 22     | 20   | 18.3 | 47     | 10.4 | 6.3 |
| 50  | WJX14R05003BA  | 22.225 | 20   | 18.3 | 47     | 8.4  | 5   |
| 50  | WJX14R05004BA  | 22.225 | 20   | 18.3 | 47     | 8.4  | 5   |
| 52  | WJX14-052A04AR | 22     | 20   | 18.3 | 47     | 10.4 | 6.3 |

### Spare Parts

| Tool Holder Type |      |        |       |
|------------------|------|--------|-------|
|                  |      |        |       |
| WJX14            | TS5R | TKY20T | MK1KS |

\* Clamp Torque (N · m) : TS5R = 5.0

● : Inventory maintained in Japan.

# Double-sided Insert Type High Feed Radius Milling Cutter

## MULTI-FUNCTIONAL MILLING



# WJX

P M K N S H



Fig.1  
ø63  
ø66  
ø80  
ø100

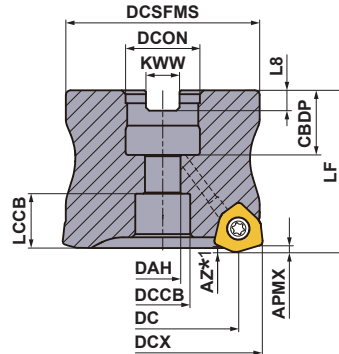
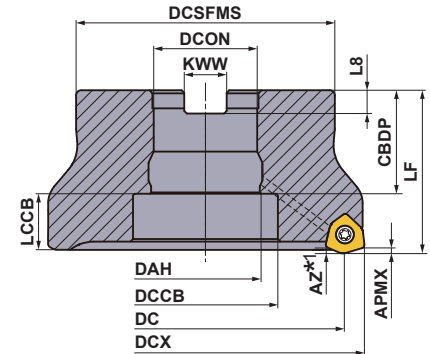


Fig.2  
ø125  
ø160



Right hand tool holder only.

### Arbor Type

With Coolant Hole

GAMP: -6° T: +13°  
GAMF: -10° I: +7°

DCX=mm size, DCON=inch size, DCON=mm size

| DCX               |                   | Set Bolt  | Geometry |  |
|-------------------|-------------------|-----------|----------|--|
| DCON<br>inch size | DCON<br>mm size   |           |          |  |
| ø63               | ø63(22)           | HSC10030H | ①        |  |
|                   | ø63(27), ø66, ø80 | HSC12035H |          |  |
| ø80, ø100         | ø100              | HSC16040H |          |  |
| ø125              | ø125, ø160        | MBA20040H |          |  |
| ø160              |                   | MBA24045H | ②        |  |

| DCX | Order Number   | Stock<br>R | *2<br>No.T | DC    | LF | DCON   | WT<br>(kg) | APMX | RMPX | RPMX<br>(min <sup>-1</sup> ) | Fig. |
|-----|----------------|------------|------------|-------|----|--------|------------|------|------|------------------------------|------|
| 63  | WJX14-063A04AR | ●          | 4          | 47.5  | 50 | 22     | 0.7        | 2    | 3°   | 18200                        | 1    |
| 63  | WJX14-063A05AR | ●          | 5          | 47.5  | 50 | 22     | 0.7        | 2    | 3°   | 18200                        | 1    |
| 63  | WJX14R06304BA  | ●          | 4          | 47.5  | 50 | 22.225 | 0.7        | 2    | 3°   | 18200                        | 1    |
| 63  | WJX14R06305BA  | ●          | 5          | 47.5  | 50 | 22.225 | 0.7        | 2    | 3°   | 18200                        | 1    |
| 63  | WJX14-063X05AR | ●          | 5          | 47.5  | 50 | 27     | 0.6        | 2    | 3°   | 18200                        | 1    |
| 66  | WJX14-066X05AR | ●          | 5          | 50.4  | 50 | 27     | 0.7        | 2    | 2.8° | 17700                        | 1    |
| 80  | WJX14-080A05AR | ●          | 5          | 64.4  | 50 | 27     | 1.2        | 2    | 2.1° | 15600                        | 1    |
| 80  | WJX14-080A06AR | ●          | 6          | 64.4  | 50 | 27     | 1.2        | 2    | 2.1° | 15600                        | 1    |
| 80  | WJX14R08005DA  | ●          | 5          | 64.4  | 63 | 31.75  | 1.4        | 2    | 2.1° | 15600                        | 1    |
| 80  | WJX14R08006DA  | ●          | 6          | 64.4  | 63 | 31.75  | 1.4        | 2    | 2.1° | 15600                        | 1    |
| 100 | WJX14R10006DA  | ●          | 6          | 84.4  | 63 | 31.75  | 2.5        | 2    | 1.5° | 13500                        | 1    |
| 100 | WJX14R10007DA  | ●          | 7          | 84.4  | 63 | 31.75  | 2.5        | 2    | 1.5° | 13500                        | 1    |
| 100 | WJX14-100A06AR | ●          | 6          | 84.4  | 63 | 32     | 2.5        | 2    | 1.5° | 13500                        | 1    |
| 100 | WJX14-100A07AR | ●          | 7          | 84.4  | 63 | 32     | 2.5        | 2    | 1.5° | 13500                        | 1    |
| 125 | WJX14R12507EA  | ●          | 7          | 109.4 | 63 | 38.1   | 3.2        | 2    | 1.2° | 11600                        | 2    |
| 125 | WJX14R12509EA  | ●          | 9          | 109.4 | 63 | 38.1   | 3.1        | 2    | 1.2° | 11600                        | 2    |
| 125 | WJX14-125B07AR | ●          | 7          | 109.4 | 63 | 40     | 3.2        | 2    | 1.2° | 11600                        | 2    |
| 125 | WJX14-125B09AR | ●          | 9          | 109.4 | 63 | 40     | 3.1        | 2    | 1.2° | 11600                        | 2    |
| 160 | WJX14-160B09AR | ●          | 9          | 144.4 | 63 | 40     | 4.9        | 2    | 0.8° | 9900                         | 2    |
| 160 | WJX14R16009FA  | ●          | 9          | 144.4 | 63 | 50.8   | 4.5        | 2    | 0.8° | 9900                         | 2    |

\*1 Refer to page 14, for the maximum drilling depth (AZ).

\*2 Number of Teeth

Note 1) The maximum spindle speeds **RPMX** are set to ensure tool and insert stability.

Note 2) When using the tool at high spindle speeds, ensure that the tool and arbor are correctly balanced.

CUTTING CONDITIONS > P12,13,14

● : Inventory maintained in Japan.

## Spare Parts

(mm)

| Tool Holder Type |  |  |  |
|------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                  | Clamp Screw                                                                       | Wrench (Insert)                                                                    | Anti-seize Lubricant                                                                |
| <b>WJX14</b>     | TS5R                                                                              | TKY20T                                                                             | MK1KS                                                                               |

★ Clamp Torque (N • m) : TS5R = 5.0

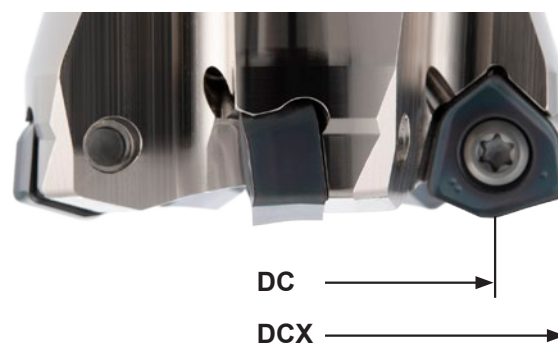
## Mounting Dimensions

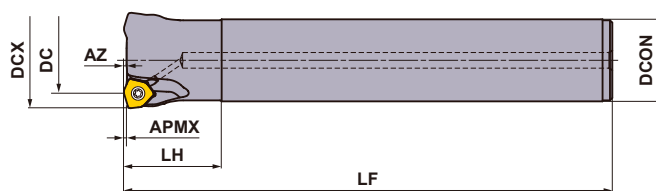
(mm)

| DCX | Order Number   | DCON   | CBDP | DAH | DCCB | LCCB | DCSFMS | KWW  | L8  | Fig. |
|-----|----------------|--------|------|-----|------|------|--------|------|-----|------|
| 63  | WJX14-063A04AR | 22     | 20   | 11  | 17   | 16.7 | 60     | 10.4 | 6.3 | 1    |
| 63  | WJX14-063A05AR | 22     | 20   | 11  | 17   | 16.7 | 60     | 10.4 | 6.3 | 1    |
| 63  | WJX14R06304BA  | 22.225 | 19   | 11  | 17   | 17.7 | 60     | 8.4  | 5   | 1    |
| 63  | WJX14R06305BA  | 22.225 | 19   | 11  | 17   | 17.7 | 60     | 8.4  | 5   | 1    |
| 63  | WJX14-063X05AR | 27     | 23   | 13  | 20   | 15.7 | 60     | 12.4 | 7   | 1    |
| 66  | WJX14-066X05AR | 27     | 23   | 13  | 20   | 15.7 | 60     | 12.4 | 7   | 1    |
| 80  | WJX14-080A05AR | 27     | 23   | 13  | 20   | 15.7 | 76     | 12.4 | 7   | 1    |
| 80  | WJX14-080A06AR | 27     | 23   | 13  | 20   | 15.7 | 76     | 12.4 | 7   | 1    |
| 80  | WJX14R08005DA  | 31.75  | 32   | 17  | 26   | 19.7 | 76     | 12.7 | 8   | 1    |
| 80  | WJX14R08006DA  | 31.75  | 32   | 17  | 26   | 19.7 | 76     | 12.7 | 8   | 1    |
| 100 | WJX14R10006DA  | 31.75  | 32   | 17  | 26   | 19.7 | 96     | 12.7 | 8   | 1    |
| 100 | WJX14R10007DA  | 31.75  | 32   | 17  | 26   | 19.7 | 96     | 12.7 | 8   | 1    |
| 100 | WJX14-100A06AR | 32     | 26   | 17  | 26   | 25.7 | 96     | 14.4 | 8   | 1    |
| 100 | WJX14-100A07AR | 32     | 26   | 17  | 26   | 25.7 | 96     | 14.4 | 8   | 1    |
| 125 | WJX14R12507EA  | 38.1   | 40   | 40  | 56   | 21.7 | 100    | 15.9 | 10  | 2    |
| 125 | WJX14R12509EA  | 38.1   | 40   | 40  | 56   | 21.7 | 100    | 15.9 | 10  | 2    |
| 125 | WJX14-125B07AR | 40     | 40   | 42  | 56   | 21.7 | 100    | 16.4 | 9   | 2    |
| 125 | WJX14-125B09AR | 40     | 40   | 42  | 56   | 21.7 | 100    | 16.4 | 9   | 2    |
| 160 | WJX14-160B09AR | 40     | 40   | 42  | 56   | 21.7 | 100    | 16.4 | 9   | 2    |
| 160 | WJX14R16009FA  | 50.8   | 43   | 53  | 72   | 18.7 | 100    | 19.1 | 11  | 2    |

## Cutter Diameter and Flat Surface Milling

The maximum cutting diameter (DCX) shown in the WJX items table is not the same as the possible dimensions for plane cutting. The possible dimensions for plane cutting are given as the cutting axle DC value. Please note that this is smaller than the DCX value.





### ■ Shank Type

(mm)

| DCX | Order Number    | Stock | *    | DC   | LF  | LH | DCON | APMX | RMPX | RPMX<br>(min <sup>-1</sup> ) |
|-----|-----------------|-------|------|------|-----|----|------|------|------|------------------------------|
|     |                 | R     | No.T |      |     |    |      |      |      |                              |
| 50  | WJX14R5003SA42S | ●     | 3    | 34.5 | 150 | 50 | 42   | 2    | 4.4° | 21200                        |
| 50  | WJX14R5003SA42L | ●     | 3    | 34.5 | 250 | 50 | 42   | 2    | 4.4° | 21200                        |

**CUTTING CONDITIONS ➤ P12,13,14**

## Spare Parts

|                  |                                                                                       |                                                                                     |                                                                                       |
|------------------|---------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| Tool Holder Type |  * |  |  |
|                  | Clamp Screw                                                                           | Wrench (Insert)                                                                     | Anti-seize Lubricant                                                                  |
| <b>WJX14</b>     | TS5R                                                                                  | TKY20D                                                                              | MK1KS                                                                                 |

## ■ Inserts

(mm)

[illegible]

Right hand insert only.

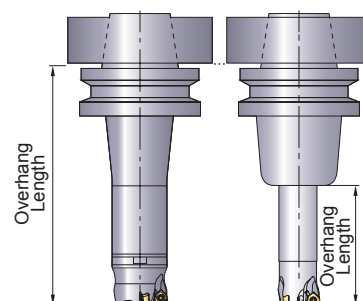
11

## Recommended Cutting Conditions

### Correction Value According to Overhang Length

Multiply the recommended cutting conditions on pages 12 and 13 by the corrections factor x overhang length.

| Type       | Cutting Dia. Max.<br>DCX | Overhang Length | Correction Value According  |                    |                    |
|------------|--------------------------|-----------------|-----------------------------|--------------------|--------------------|
|            |                          |                 | Cutting Speed<br>vc (m/min) | Depth of Cut<br>ap | Feed<br>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)

| Workpiece Material |  | Properties | Cutting Speed<br>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<br>Alloy Steels                | 180—280HB             | 120 (70—180)  | 140 (80—200)  | 200 (150—250) | 140 (80—200)  | 100 (60—150) |
|                    |  |            | Carbon Steels<br>Alloy Steels                | 280—350HB             | 120 (70—180)  | 140 (80—200)  | 200 (150—250) | 140 (80—200)  | 100 (60—150) |
|                    |  |            | Alloy Tool Steels                            | ≤350HB<br>(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<br>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<br>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%.

# Double-sided Insert Type High Feed Radius Milling Cutter

## Depth of Cut / Feed per Tooth

(mm)

|   | Workpiece Material                           | Properties            | Depth of Cut<br>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<br>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<br>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<br>(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<br>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<br>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.

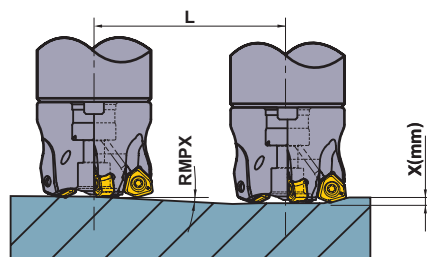
Note 2) When large vibration occurs, reduce the cutting conditions.

Note 3) For interrupted cutting, reduce the cutting speed and feed rate by 20%.

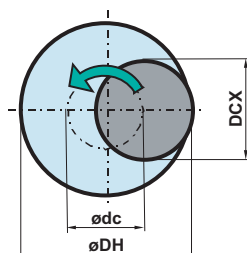
Note 4) If ap is set at 2mm or more, avoid machining on the walls or ramping.

## Maximum Capacities by Mode

### Ramping



### Helical Milling



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

$$\phi_{dc} = \phi_{DH} - DCX$$

Locus of the Center of the Tool

Desired Hole Diameter

Cutting Diameter Maximum

| Tool Holder Type | DCX | DC    | APMX | RMPX | Ramping                                 |       | Helical Milling (Blind Hole, Flat Bottom) |      | Helical Milling (Through Hole) | AZ  |
|------------------|-----|-------|------|------|-----------------------------------------|-------|-------------------------------------------|------|--------------------------------|-----|
|                  |     |       |      |      | 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.

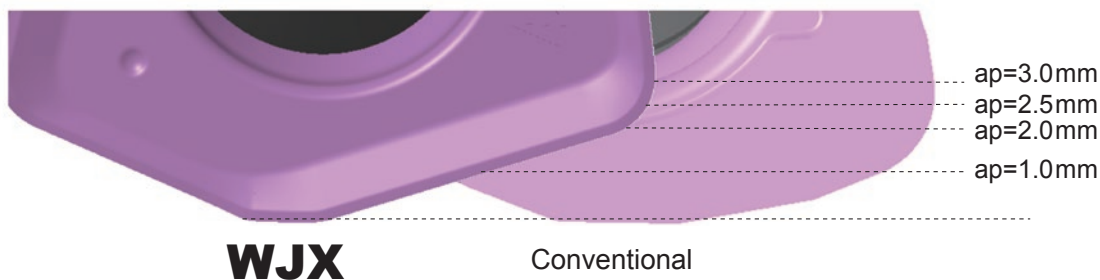
## Operational Guidance

### 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.

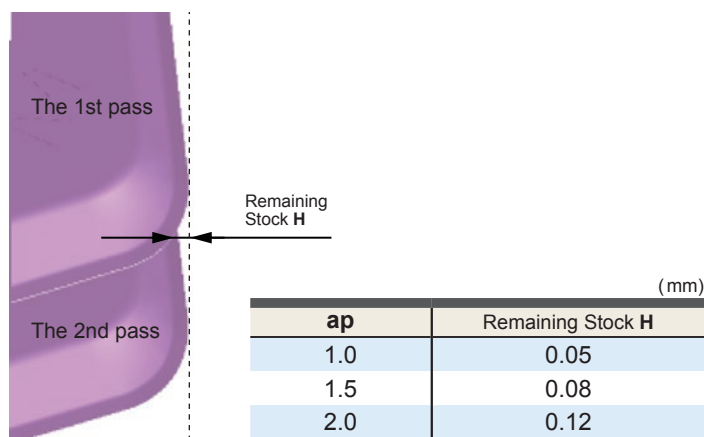
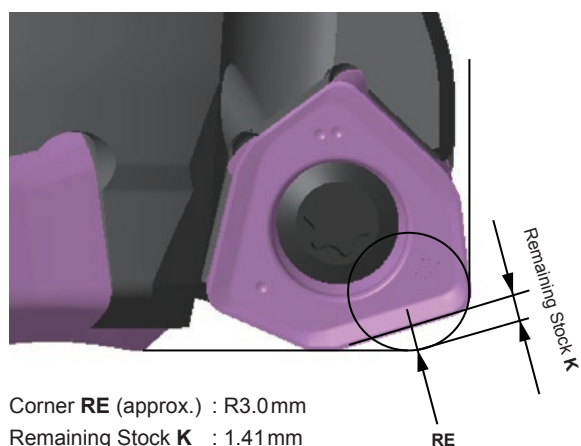


### Remaining Stock

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.



#### 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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