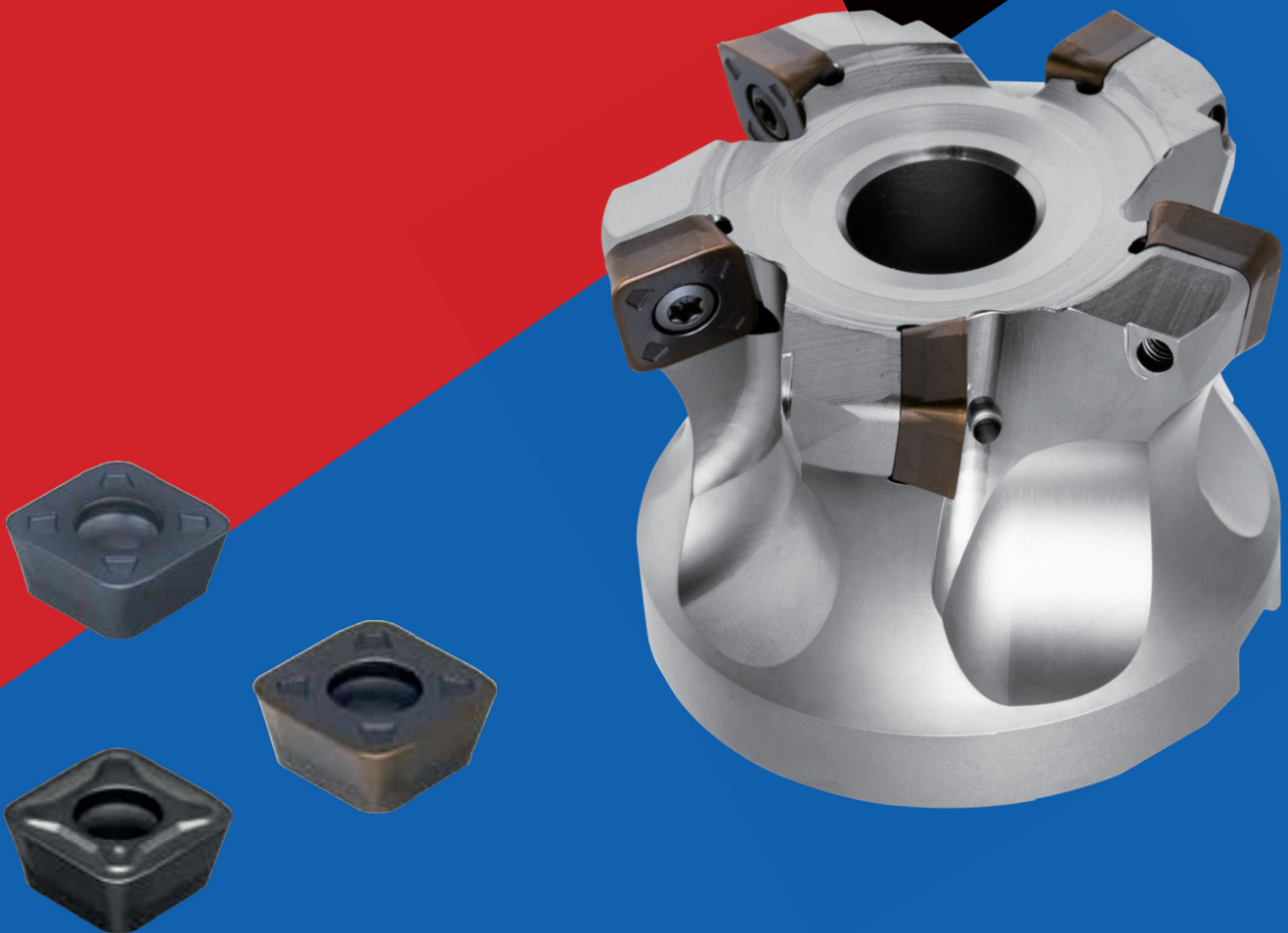


Radius Mill TR4F type

# TR4F

Turbo roughing 4 corner fast-feed



**MOLDINO Tool Engineering Europe GmbH**

# TR4F - TURBO TYPE ROUGHING 4 CORNER FAST-FEED

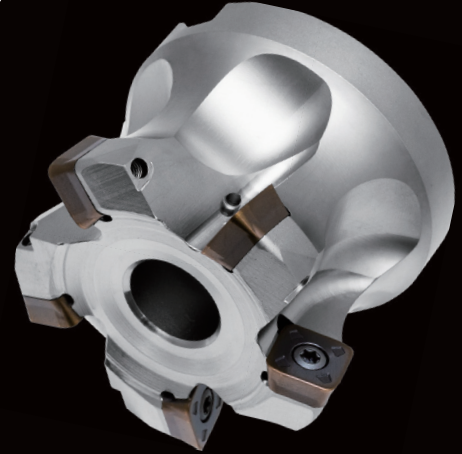
## Features of TR4F

**01** New body shape for improved chip removal

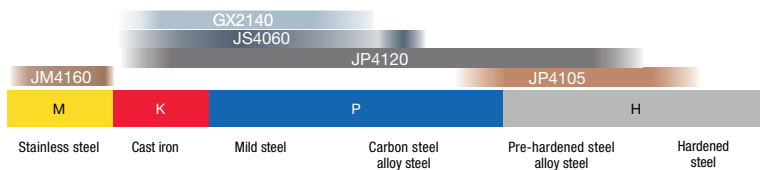
**02** Unique high-strength insert design

**03** Unequal pitch

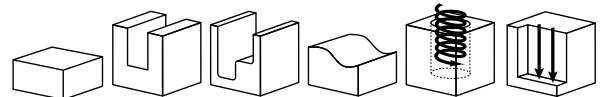
**Line-up:** 12 bodies, 3 insert types and grades  
**DCX:** 50 - 100 mm  
**Varieties:** 120 possible combinations



## Recommended usage

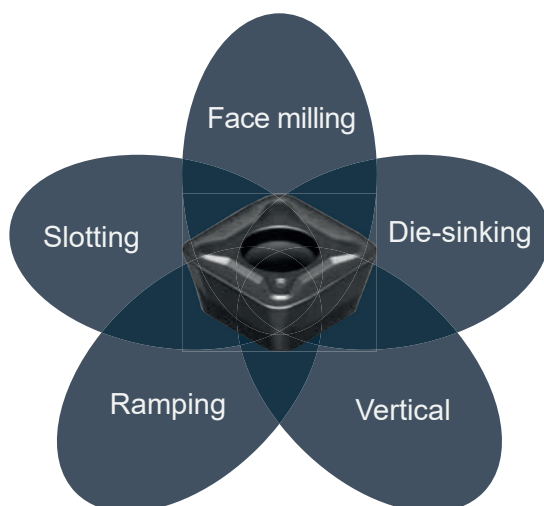


## Applications



## Customer need and product benefit

High-efficient and versatile roughing processes with maximized process safety.



## Challenge

Efficiency in big volume roughing is decreased by the need for high process safety and reliability.  
 The risk for unexpected trouble prevents the customer from using the tool's full potential, especially in automated processes.

## Solution

With its unique body and high-strength insert design, TR4F offers extraordinary metal removal rates even in unstable or changing conditions.  
 Easy usage, long tool life and a broad variety of insert grades meet the customer's need for reliable machining of a wide range of applications and work materials.

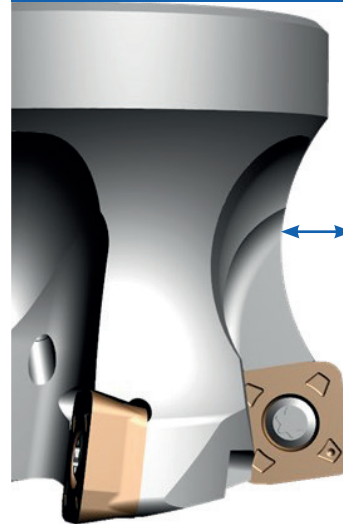
## Feature 01 New body shape for improved chip removal

### Wide open pockets



Offers excellent chip removal performance due to large open pocket.

### Improved clearance



Suppresses chip clogging between tool and wall and prevents from critical recutting of chips.

## Feature 02 Unique high-strength insert design

### TR4F



110%

135%

### Conventional



100%

100%

**i** Increased insert cross-section and clamp area for improved stability and maximized feed per tooth. Optimized cutting-edge design generates compact helical-shaped chips for controlled evacuation at walls.

## Feature 03 Unequal pitch

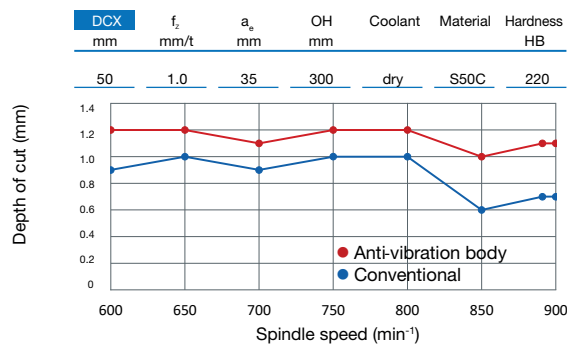
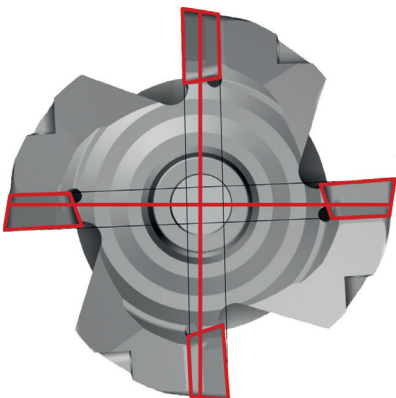


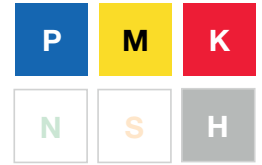
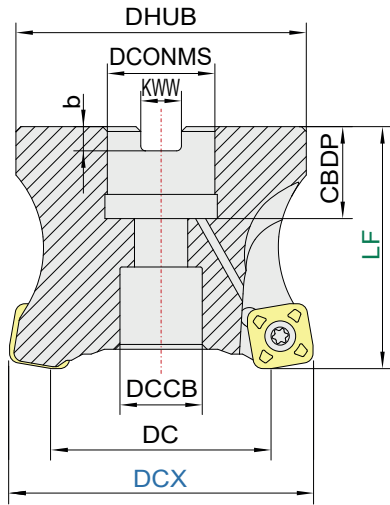
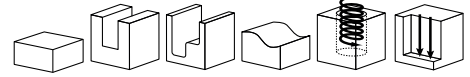
Fig. Comparison of the maximum depth of cut ( $L/DCX=6$ )  
 (DCX 50,  $f_z=1.0$ mm/t,  $a_e=35$ mm, OH=300mm, Dry, full set, S50C(220HB))



The unequal pitch of TR4F reduces vibrations which are a main factor for chattering and reduced tool life.

**i** TR4F achieves around 20% higher efficiency compared to conventional tools with equal pitch.

## TR4F Lineup and dimensions



Diameter holder only	
-0,1/-0,2 mm	
CAM R	Torque
3 mm	2.9 Nm

ID Code	Item code	Stock	NOF	Size (mm)										Inner cooling
				DCX	DCONMS	DHUB	LF	CBDP	KWW	b	DC	DCCB		
FH631	TR4F4050BM-4	•	4	50	22	47	50	17	8.4	5	32.4	17	•	
FH632	TR4F4050BM-5	•	5	50	22	47	50	17	8.4	5	32.4	17	•	
FH633	TR4F4052BM-5-22	•	5	52	22	47	50	20	10.4	6.3	34.4	17	•	
FH634	TR4F4052BM-5-27	•	5	52	27	47	50	22	12.4	7	34.4	20	•	
FH635	TR4F4063BM-4-22	•	4	63	22	48	50	20	10.4	6.3	45.4	17	•	
FH636	TR4F4063BM-5-22	•	5	63	22	48	50	20	10.4	6.3	45.4	17	•	
FH637	TR4F4063BM-6-22	•	6	63	22	48	50	20	10.4	6.3	45.4	17	•	
FH638	TR4F4066BM-5-27	•	5	66	27	60	50	22	12.4	7	48.4	20	•	
FH639	TR4F4080BM-5-27	•	5	80	27	60	70	22	12.4	7	62.4	20	•	
FH640	TR4F4080BM-7-27	•	7	80	27	60	70	22	12.4	7	62.4	20	•	
FH641	TR4F4100BM-6-32	•	6	100	32	78	70	25.5	14.4	8.0	82.4	26	•	
FH642	TR4F4100BM-8-32	•	8	100	32	78	70	25.5	14.4	8.0	82.4	26	•	

**NOTE:** The Arbor screw is sold separately.

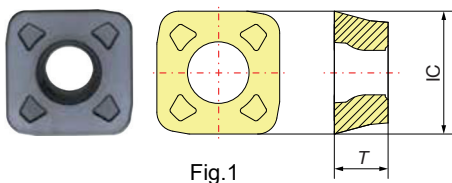


Fig.1

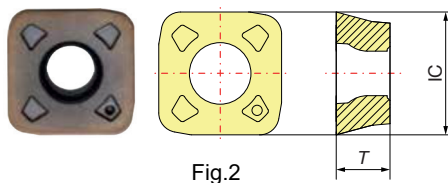


Fig.2

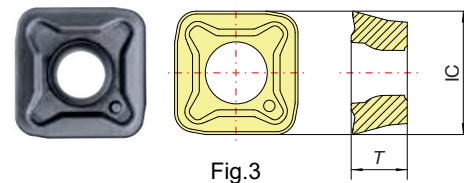


Fig.3

### SDNW120520TR

Recommended standard insert.  
Ideal for general high-feed cutting.

### SDNW120520TR-P

Continuous (uninterrupted) cut insert for short overhangs. Ideal for pre-hardened steels.

### SDMT120520TR

Breaker type insert. Ideal for rough machining and low-horsepower M/C.

Item code	Tolerance class	CAM R (mm)	Grades					Size (mm)		Fig.
			GX2140	JS4060	JM4160	JP4120	JP4105	IC	T	
			ID codes							
SDNW120520TR	N	3	WF834	WF833	WF832	WF831	WF830	12.7	5.56	1
SDNW120520TR-P			-	-	-	WF835	-			2
SDMT120520TR	M	3	WF839	WF838	WF837	WF836*	-			5.76

\*Can be used to process precipitation-hardened stainless steel.



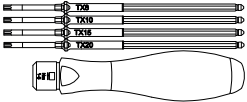
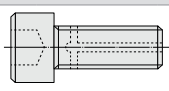
**NOTE:** Please note that JS and GX coating do not cause a reaction in conductive touch sensors.

• Stocked item

○ Non-Stock Item

## TR4F Parts and insert grades

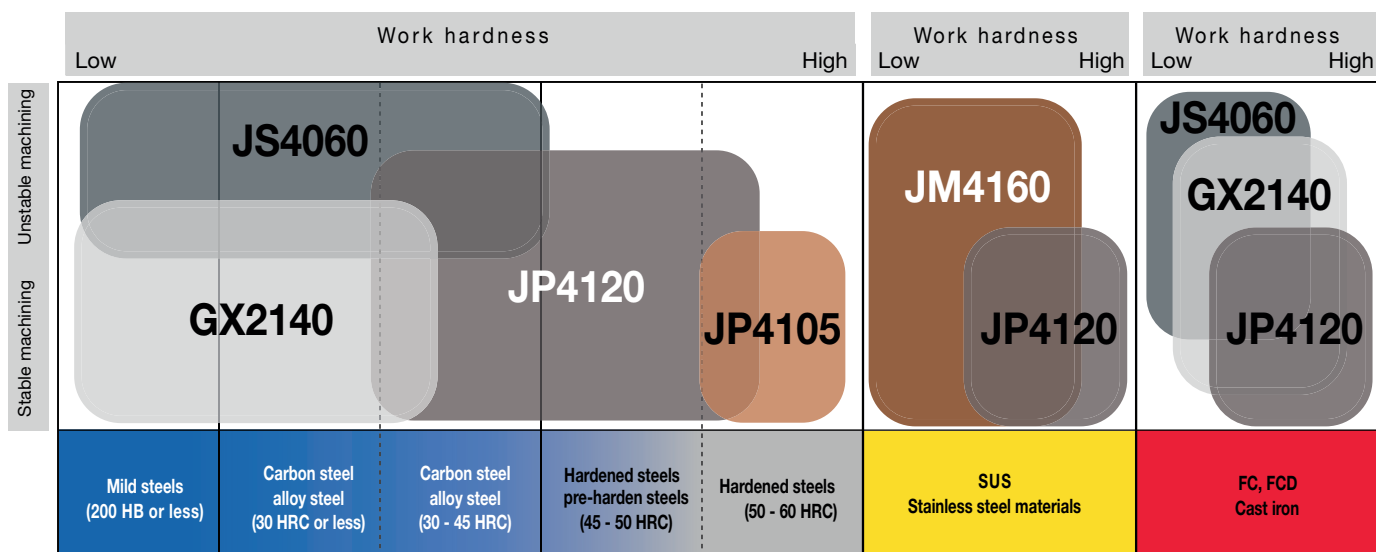
### Parts selection

Parts	Clamp screw		Torque blade		Torque wrench set		Arbor screw			
										
	Torque: 2.9 Nm				Adjustable torque: 1-5 Nm					
	ID code	Item code	ID code	Item code	ID code	Item code	DCONMS	ID code	Item code	Type
	ET035	262-141	NT166	T15-TORQUE	NT163	TORQUE-FIX	22 mm	ET180	100-178	M10x25
							27 mm	ET064	100-179	M12x30
							32 mm	ET181	100-180	M16x35

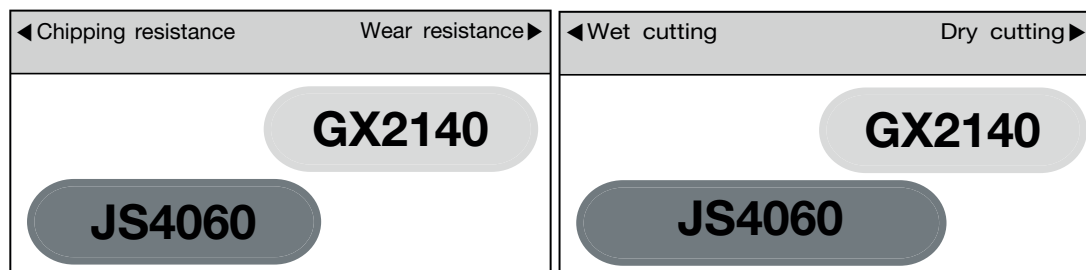
**NOTE:** The clamp screw is a consumable part. Since replacement life depends on the use environment, it is recommended that it is replaced at an early stage. Includes two spare clamp screws per body.

### Insert grade classification and usage recommendation

#### Grade map for work material

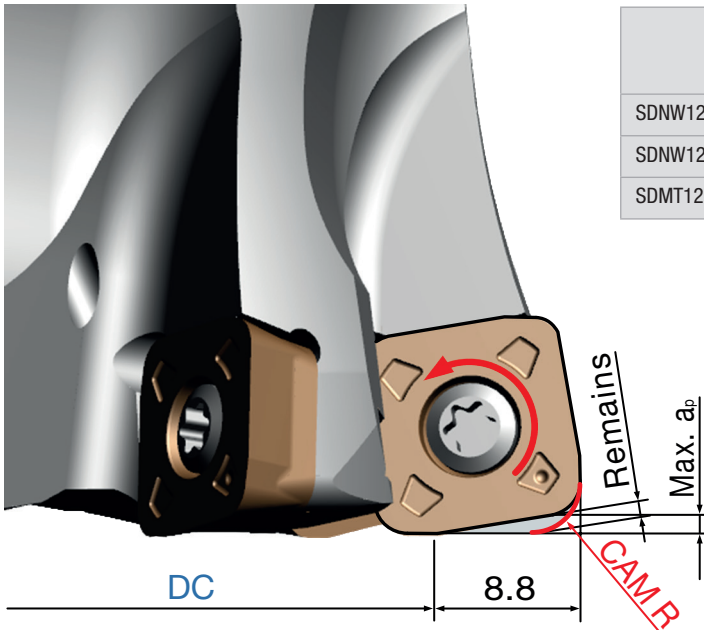


#### Grade map for less than 35HRC



## TR4F Programming and usage instruction

### CAM radius and corner change

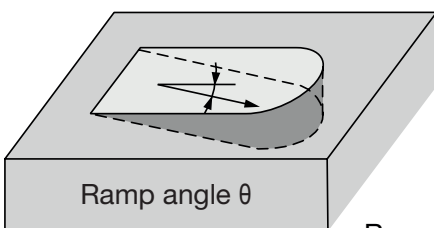


Inserts	CAM R (mm)	Max. Remains (mm)	Max. $a_p$ (mm)
SDNW120520TR	3.0	1.0	1.2
SDNW120520TR-P			
SDMT120520TR			

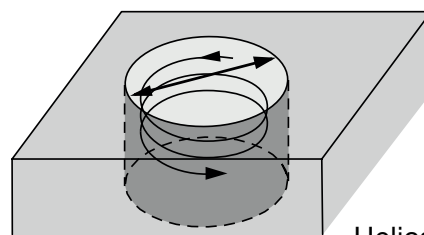


**Turn the insert counterclockwise upon corner change!**

### Ramping and helical milling



Ramping



Helical hole diameter

Helical milling

Process	Insert type	Parameter	DCX					
			50	52	63	66	80	100
Ramping	All types	Maximum ramp angle $\theta$	2°	2°	2°	2°	1.5°	1°
		Recommendation	1°					
Helical milling		Hole diameter (mm)	82-96	86-100	108-122	114-128	142-156	182-196
		Helical pitch (mm)	0.5					



- The ramp angle should be set within the ranges listed above.
- Ramp angles of 1° or less are recommended.
- For hole diameters outside the ranges listed above, a pilot hole should be drilled before milling.
- Set the helical cutting angle, so the cutting depth per revolution does not exceed 0.5 mm.

## TR4F General technical information

GX2140		JS4060		JP4120		JP4105	
JM4160							
M	K	P		H			
Stainless steel	Cast iron	Mild steel	Carbon steel alloy steel	Pre-hardened steel alloy steel	Hardened steel		

ISO 513 Symbol	Description	Examples
<b>P</b>	Non-alloy steel, low alloy steel, high alloy steel, ferritic/martensitic stainless steel, tool steel	1.2343 / X38CrMoV5-1; 1.2738 / 40CrMnNiMo8; 1.0503 / C45; 1.0570 / ST52-3; 1.1730 / C45W; 1.7131 / 16MnCr5; 1.7225 / 42CrMo4; 1.3343 / HS6-5-2; 1.0511 / C40; 1.2312 / 40CrMnMoS8-6; 1.2311 / 40CrMnMo7; 1.2344 / X40CrMoV5-1; 1.2767 / X45NiCrMo4; 1.2083 / X42Cr13; 1.2085 / X33CrS16; 1.2714 / 55NiCrMoV7; 1.2842 / 90MnCrV8;
<b>M</b>	Austenitic stainless steel	1.4301 / X5CrNi18-9; 1.4401 / X5CrNiMo17-12-2; 1.4404 / X2CrNiMo17-13-2; 1.4828 / X15CrNiSi20 12
<b>K</b>	Grey cast iron (GG), nodular cast iron (GGG), malleable cast iron	0.6025 / GG-25; GGG-40.3; 0.8155 / GTS-55-04
<b>N</b>	Aluminum wrought all, copper alloy, aluminum-cast, alloyed, non-metallic	2.0060 / E-Cu57; 2.0321 / CuZn37; 3.0255 / Al99.5; 3.5103 / MgSE3Zn27r1
<b>S</b>	High temperature alloys, titanium and Ti alloys	1.4864 / X12NiCrSi36 16; 2.4856 / NiCr22Mo9Nb; 1.4977 / X40CoCrNi20 20; 2.4669 / NiCr15Fe7TiAl
<b>H</b>	Hardened steel, chilled cast iron, cast iron	

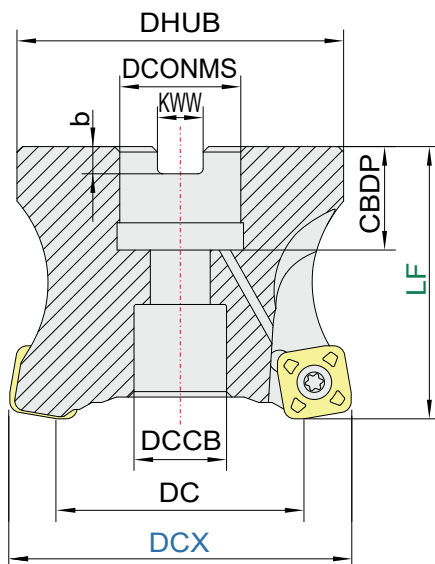
Recommended



Suitable



NOT recommended



Drawing nomenclature (mm)	
b	Depth of keyway
CBDBP	Connection bore depth
DCCB	Counterbore diameter connection bore
DCONMS	Connection diameter machine side
DC	Cutting diameter (bottom)
DCX	Cutting diameter maximum
DHUB	Hub diameter
LF	Functional length
KWW	Keyway width

Cutting parameters	
$a_e$	Radial depth of cut (mm)
$a_p$	Axial depth of cut (mm)
$f_z$	Feed per tooth (mm/t)
n	Revolutions per minute ( $\text{min}^{-1}$ )
$V_c$	Cutting speed (m/min)
$V_f$	Feed rate (mm/min)
NOF	Number of cutting edges

**Feed rate (mm/min)**

$$V_f = n \cdot \text{NOF} \cdot f_z$$

**Revolutions per Minute ( $\text{min}^{-1}$ )**

$$n = \frac{V_c \cdot 1000}{\pi \cdot \text{DCX}}$$

## **Attentions on Safety**

### **1. Cautions regarding handling**

- (1) When removing the tool from its case (packaging), be careful that the tool does not pop out or is dropped. Be particularly careful regarding contact with the tool flutes.
- (2) When handling tools with sharp cutting flutes, be careful not to touch the cutting flutes directly with your bare hands.

### **2. Cautions regarding mounting**

- (1) Before use, check the outside appearance of the tool for scratches, cracks, etc. and that it is firmly mounted in the collet chuck, etc.
- (2) When preparing for use, be sure that the inserts are firmly mounted in place and that they are firmly mounted on the arbor, etc.
- (3) If abnormal chattering, etc. occurs during use, stop the machine immediately and remove the cause of the chattering.

### **3. Cautions during use**

- (1) Before use, confirm the dimensions and direction of rotation of the tool and milling work material.
- (2) The numerical values in the standard cutting conditions table should be used as criteria when starting new work. The cutting conditions should be adjusted as appropriate when the cutting depth is large, the rigidity of the machine being used is low, or according to the conditions of the work material.
- (3) Cutting tools are made of a hard material. During use, they may break and fly off. In addition, cutting chips may also fly off. Since there is a danger of injury to workers, fire, or eye damage from such flying pieces, a safety cover should be attached when work is performed and safety equipment such as safety goggles should be worn to create a safe environment for work.
- (4) There is a risk of fire or inflammation due to sparks, heat due to breakage, and cutting chips. Do not use where there is a risk of fire or explosion. Please caution of fire while using oil base coolant, fire prevention is necessary.
- (5) Do not use the tool for any purpose other than that for which it is intended.

### **4. Cautions regarding regrinding**

- (1) If regrinding is not performed at the proper time, there is a risk of the tool breaking. Replace the tool with one in good condition, or perform regrinding.
- (2) Grinding dust will be created when regrinding a tool. When regrinding, be sure to attach a safety cover over the work area and wear safety clothes such as safety goggles, etc.
- (3) This product contains the specified chemical substance cobalt and its inorganic compounds. When performing regrinding or similar processing, be sure to handle the processing in accordance with the local laws and regulations regarding prevention of hazards due to specified chemical substances.

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**The diagrams and table data are examples of test results and are not guaranteed values.**

**For more details please check our digital tool database**



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