

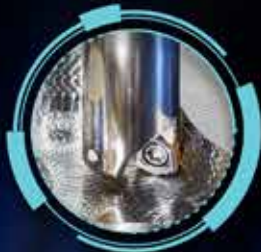
# FAST FEED MILLING

## Quick Tool Selector Guide

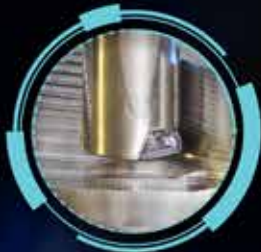
Metric Version



**TANG4FEED**  
HI-FEED MILLING



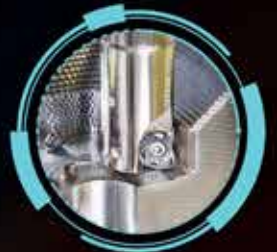
**MICRO3FEED**  
MF 300 ENDMILL



**NAN3FEED**  
NANO FEED MILL



**MILL4FEED**  
HIGH FEED



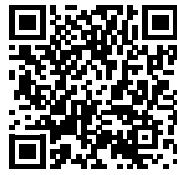
**LOGIQ4FEED**  
HIGH FEED MILLING



# ISCAR Features **INDUSTRY 4.0** Milling Tool Assemblies Online

[www.iscar.com](http://www.iscar.com)

**SCAN ME**



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## Faster & Much Faster

The remarkable progress made in the area of rough milling in the 1990's saw the introduction of fast feed milling (FF), also referred to as high feed milling (HFM). These highly efficient methodologies overturned established views and brought radical new ideas to the field.

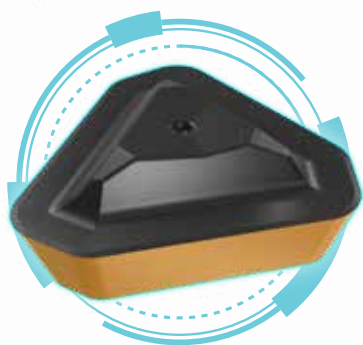
Rather than use the traditional high metal removal technique – milling with considerable depths and widths of cut – users of the new approach continued to machine with similar width of cuts, although they used a much smaller depth of cut and applied much faster speeds with substantially increased feed per tooth.

Milling with a large axial depth of cut (DOC) requires the kind of cutting force provided by high-power machine tools, whereas FF roughing with shallow DOC needs a lot less

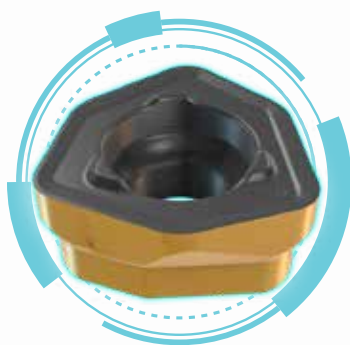
machine power, although the cutting tool should run fast. Therefore, light-duty machines featuring axis drives with sufficient velocity are sufficient for FF milling.

Energy saving shallow-cut “fast” technology provides an excellent alternative to power consuming deep-cut methods. Impressive high metal removal rates (MRR) at reduced power input is not the only advantage of the strategy- FF milling delivers two additional benefits.

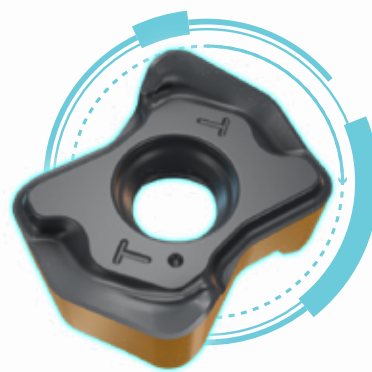
Shallow DOC enables contours to be produced that are very close to the final required shape of a machined surface, reducing or even eliminating semi-finish passes. In addition, the small cutting edge angles of FF milling cutters allows considerable increases in feeds and speeds per tooth (fz) due to the effect of chip thinning.



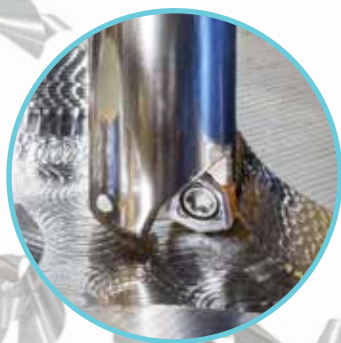
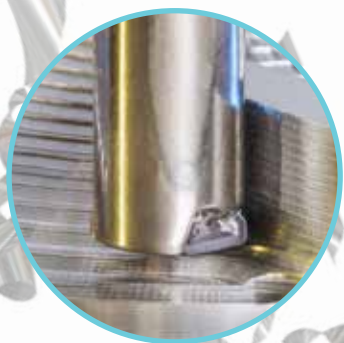
**NAN3FEED**  
NANO FEED MILL

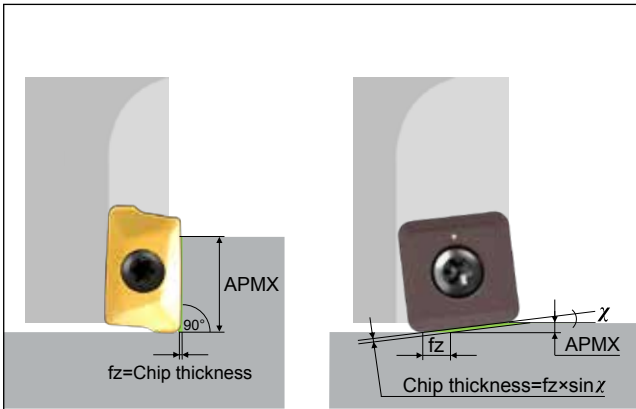


**MICRO3FEED**  
MF 300 ENDMILL



**LOGIQ4FEED**  
HIGH FEED MILLING

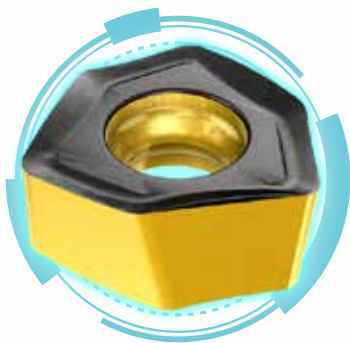




Although FF strategies began in the area of indexable milling, they soon extended to solid carbide endmills and became popular in the global die and mold making industry due to their efficiency when machining complicated shapes and cavities, especially of small sizes. Due to diverse and frequent changing working programs, fast low-power machining centers and advanced CAD/CAM software, die and mold producers quickly saw the value of the new strategy.

This advantageous geometry minimizes the radial effect of the cutting force and maximizes its axial influence, resulting in forces that act towards the spindle axis, i.e. the direction of maximum machine tool rigidity. The result - improved milling stability, reduced vibrations, prolonged tool life, reduced power consumption and increased productivity.

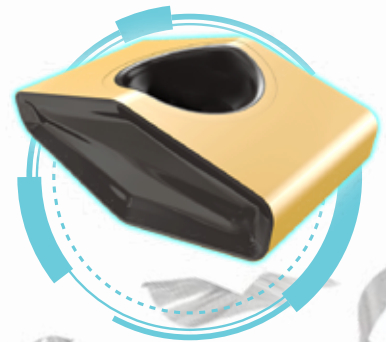
Although carbide endmills were the most commonly used cutting tools, FF milling cutters of relatively small diameters were also very popular prior to the introduction of the new strategy. Subsequently, the FF approach came to fast feed facing ("triple F") and opened the way to the development of various indexable face milling cutters. Now, given the amount of face milling that takes place in this major global area, general engineering is the main consumer of these tools.



**HELI6 FEED**  
UPFEED LINE



**MILL4 FEED**  
HIGH FEED



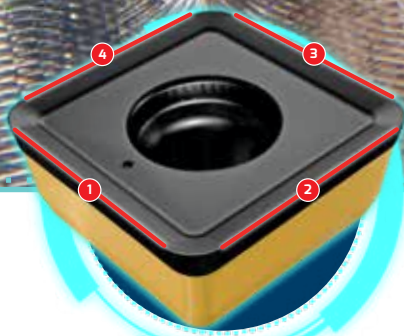
**TANG4 FEED**  
HI-FEED MILLING





# MILL4FEED

HIGH FEED



**4 Cutting Edged  
Square Insert**



**Highly Durable  
Straight Cutting Edge**

## Fast Feed Milling Cutters

These milling cutters are a key factor in fast feed milling techniques. The cutter geometry, designed for efficient chip thinning, needs to ensure correct distribution of the cutting force components. There are two principal geometrical approaches. The first design requires the cutting edge of an FF milling cutter to be an arc of a great circle.

Another concept is based on using one or two straight edges that are chords of the arc. In both cases, the small cutting edge angle (usually 9-17°) meets the requirements of chip thinning and total cutting force. Ensuring the geometry of solid carbide fast feed endmills and replaceable milling heads demands the specific shape of a cutting edge, while in indexable milling it may be provided by the appropriate location of an insert of even a simple profile.



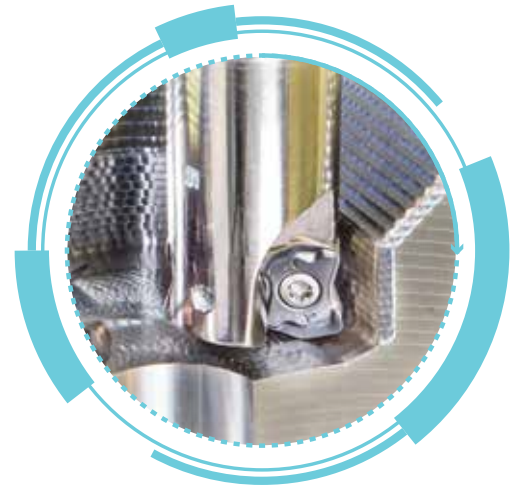
Although the introduction of innovative carbide grades and advances in the form of rake faces has further improved progress in FF milling cutters, the essential element of fast feed milling – geometry – remains constant.

Chip thinning due to the cutting edge of a FF milling cutter is the arc of a great circle (or the chords that approximate the arc), making the cutter a toroidal tool. The latter being rotated around their axis produces a torus or ring-shape. A typical representation of a toroidal tool is a milling cutter carrying round (button) inserts.

The cutting edge angle of the cutter is not a constant value but varies depending on the axial depth of cut from 0 to 90°. Decreasing depth reduces the cutting edge angle resulting in thinner chips. The programmed feed per tooth for a cutter with round inserts relates to the maximal



**NAN<sup>3</sup>FEED**  
NANO FEED MILL



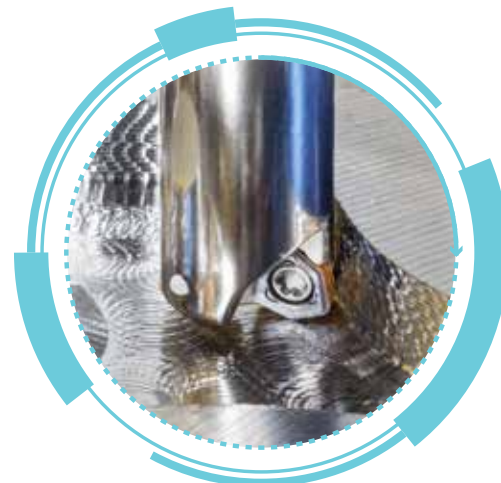
**LOGIQ<sup>4</sup>FEED**  
HIGH FEED MILLING







**TANG4FEED**  
HI-FEED MILLING



**MICRO3FEED**  
MF 300 ENDMILL

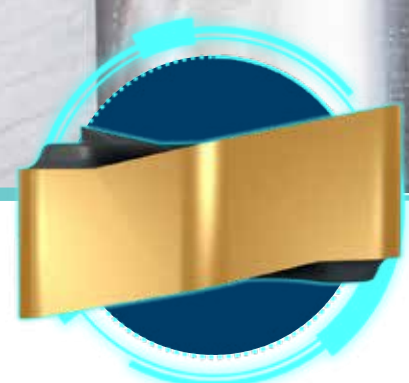
diameter of the cutter, i.e. to the maximal depth of cut (it is equal to the insert radius) and the maximal cutting edge angle.

But if the cutter mills under the maximal depth, the chip is thinner; and therefore the programmed feed should be increased correspondingly in order to produce the chips of required thickness. The same situation is observed in ball-nose milling tools, and explains why FF cutters run so fast.

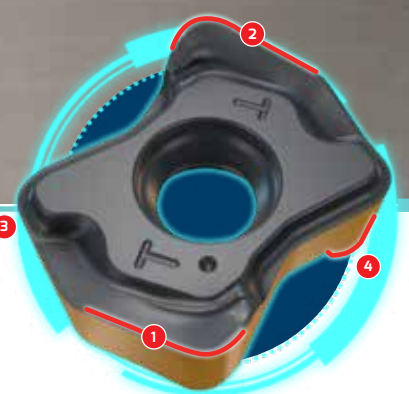
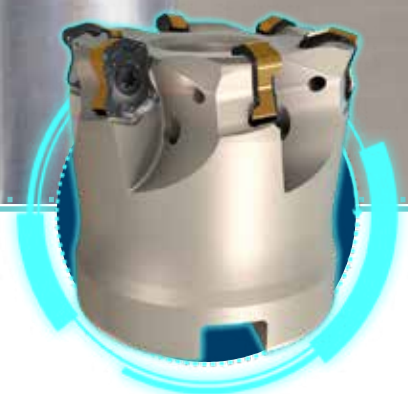
ISCAR offers a wide variety of fast feed milling families that represent different classes of indexable tools, solid carbide endmills and solid carbide interchangeable heads with Multi-Master threaded connections. This guide is intended for quick selection of the most suitable fast milling tool for a specific application depending on the material to be machined, the type of operation (like milling plane, pocket etc.), machining stock, and others.



**LOGIQ4FEED**  
HIGH FEED MILLING



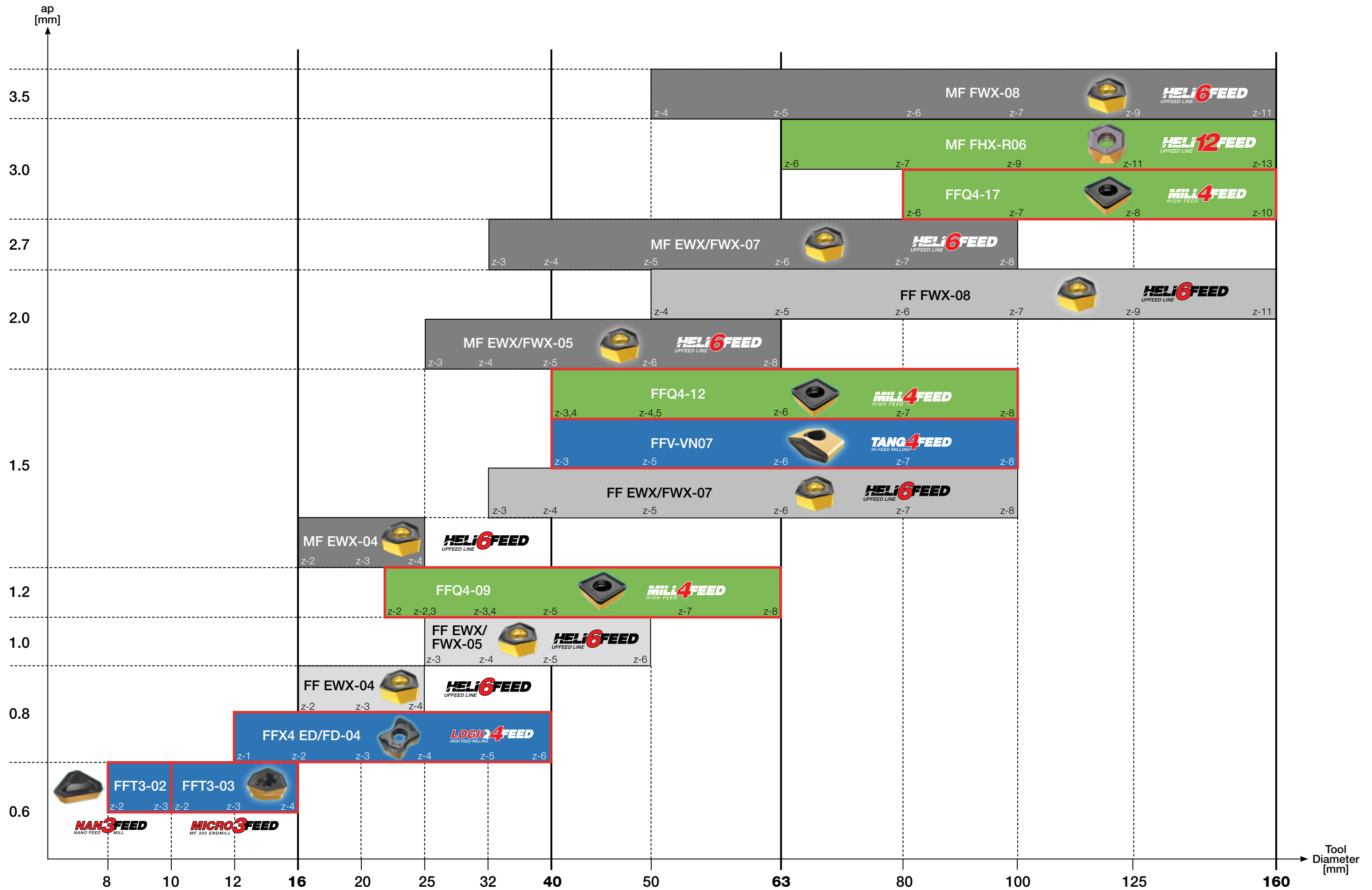
**Twisted Shape  
High Rake Angle**



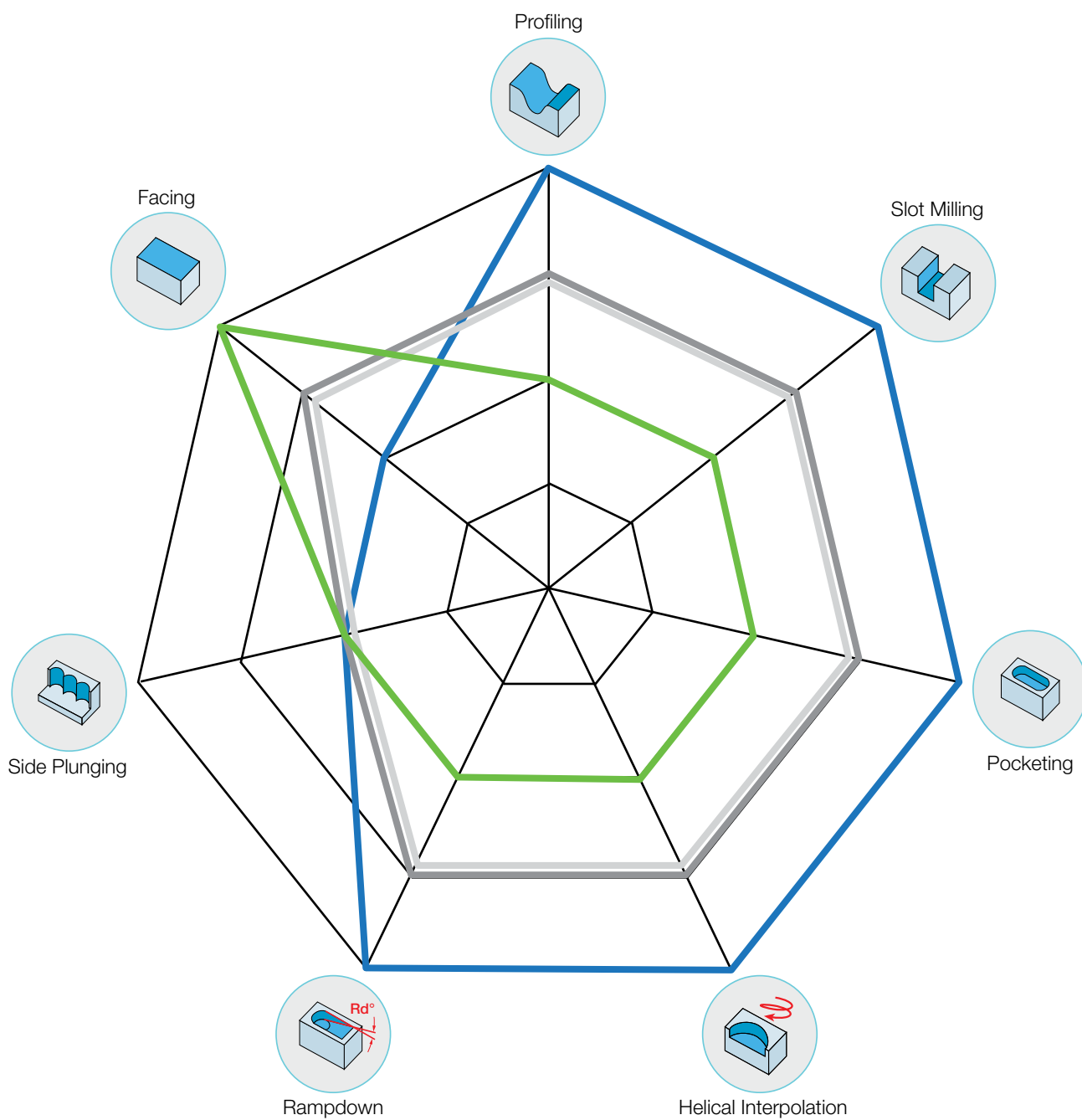
**Unique Insert Shape**



# ISCAR Fast Feed (High Feed) Milling Chart



# General Application Chart



- Recommended mainly for pocket milling
- Recommended mainly for face milling
- Recommended for general applications
- Recommended for general applications  
Suitable for machines with a limited table feed or heavy workpiece
- Z-X Number of inserts
- LOGIQ campaign

# Fast Feed Family Selector for Indexable Inserts

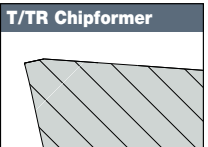
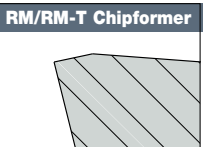

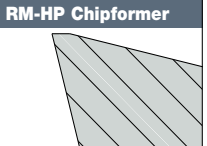
Range of diameters (mm)	Family	Description	APMX (mm)	Available diameters (mm) for configuration			Insert			
				End-mill	Multi-Master		Description	Chipformer	No. of sides	No. edges
Ø8-16	NAN3FEED	FFT3 EFM-02	0.6	8-10	8-10		FFT3 TXMT 020105T	T	1	3
	MICRO3FEED	FFT3 EFM-03	0.6	10-16	10-16		FFT3 WXMT 030206T	T	1	3
	LOGIQ4FEED	FFX4 ED	0.8	12-16	16		FFX4 XNMT 040310	T, HP	2	4
	HELI6FEED	FF EWX-04	0.8	16	16		H600 WXCU 040310	T, HP	2	6
	HELI6FEED	MF EWX-04	1.5	16	16		H600 WXCU 040310	T, HP	2	6

Range of diameters (mm)	Family	Description	APMX (mm)	Available diameters (mm) for configuration				Insert			
				End-mill	Multi-Master	FLEX-FIT	Face-mill	Description	Chipformer	No. of sides	No. edges
Ø20-40	LOGIQ4FEED	FFX4 ED/FD	0.8	20-32		20-35	32-40	FFX4 XNMT 040310	T, HP	2	4
	HELI6FEED	FF EWX-04	0.8	20	20-25	20-25		H600 WXCU 040310	T, HP	2	6
	HELI6FEED	FF EWX/FWX-05	1.0	20-40	25	25-40	40	H600 WXCU 05T312	T, HP	2	6
	MILL4FEED	FFQ4-09	1.2	22-35		22-40	40	FFQ4 SOMT 0904	T, RM-T, HP	1	4
	HELI6FEED	MF EWX-04	1.5	20		20-25		H600 WXCU 040310	T, HP	2	6
	HELI6FEED	FF EWX/FWX-07	1.5	32-40		32-40	40	H600 WXCU 070515	T, HP	2	6
	TANG4FEED	FFV-D-R-07	1.5				40	FF VNMT 0706ZN	ER, ETR	2	4
	MILL4FEED	FFQ4-12	1.5				40	FFQ4 SOMT 1205	T, T20, RM-T, HP, RM-HP	1	4
	HELI6FEED	MF EWX/FWX-05	2.0	25-32		25-32	40	H600 WXCU 05T312	T, HP	2	6
HELI6FEED	MF EWX/FWX-07	2.7	32-40		32	40	H600 WXCU 070515	T, HP	2	6	

Range of diameters (mm)	Family	Description	APMX (mm)	Available diameters (mm) for configuration			Insert			
				Facemill			Description	Chipformer	No. of sides	No. edges
Ø50-63	HELI6FEED	FF FWX-05	1.0	50-52			H600 WXCU 05T312	T, HP	2	6
	MILL4FEED	FFQ4-09	1.2	50-63			FFQ4 SOMT 0904	T, RM-T, HP	1	4
	HELI6FEED	FF FWX-07	1.5	50-63			H600 WXCU 070515	T, HP	2	6
	TANG4FEED	FFV-D-R-VN07	1.5	50-63			FF VNMT 0706ZN	ER, ETR	2	4
	MILL4FEED	FFQ4-12	1.5	50-63			FFQ4 SOMT 1205	T, T20, RM-T, HP, RM-HP	1	4
	HELI6FEED	MF FWX-05	2.0	50-63			H600 WXCU 05T312	T, HP	2	6
	HELI6FEED	FF FWX-08	2.0	50-63			H600 WXCU 0806	T, HP, RM	2	6
	HELI6FEED	MF FWX-07	2.7	50-63			H600 WXCU 070515	T, HP	2	6
	HELI12FEED	MF FHX-R06	3.0	63			H1200 HXCU 0606	TR, HPR	2	12
HELI6FEED	MF FWX-08	3.5	50-63			H600 WXCU 0806	T, HP, RM	2	6	

Range of diameters (mm)	Family	Description	APMX (mm)	Available diameters (mm) for configuration			Insert			
				Facemill			Description	Chipformer	No. of sides	No. edges
Ø80-160	HELI6FEED	FF FWX-07	1.5	80-100			H600 WXCU 070515	T, HP	2	6
	TANG4FEED	FFV-D-R-VN07	1.5	80-100			FF VNMT 0706ZN	ER, ETR	2	4
	MILL4FEED	FFQ4-12	1.5	66-100			FFQ4 SOMT 1205	T, T20, RM-T, HP, RM-HP	1	4
	HELI6FEED	FF FWX-08	2.0	66-160			H600 WXCU 0806	T, HP, RM	2	6
	HELI6FEED	MF FWX-07	2.7	80-100			H600 WXCU 070515	T, HP	2	6
	MILL4FEED	FFQ4-17	3.0	80-160			FFQ4 SOMT 1706	T, RM-T, HP	1	4
	HELI12FEED	MF FHX-R06	3.0	80-160			H1200 HXCU 0606	TR, HPR	2	12
	HELI6FEED	MF FWX-08	3.5	66-160			H600 WXCU 0806	T, HP, RM	2	6

## Insert Chipformer Types

 <p><b>T/TR Chipformer</b></p>	<p>T / TR - For steel, ferritic and martensitic stainless steel, cast iron and hardened steel</p>	 <p><b>RM/RM-T Chipformer</b></p>	<p>RM / RM-T - For interrupted cut and for machining near straight wall shoulders of steel, ferritic and martensitic stainless steel, cast iron and hardened steel</p>
 <p><b>HP/HPR Chipformer</b></p>	<p>HP / HPR - For austenitic stainless steel and high temperature alloys</p>	 <p><b>RM-HP Chipformer</b></p>	<p>RM-HP - For interrupted cut and for machining near straight wall shoulders of austenitic stainless steel and high temperature alloys</p>

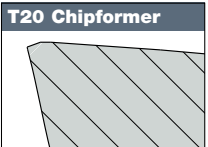
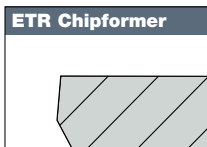
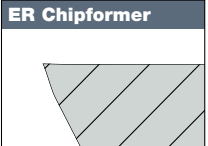
Range of fz (mm/t)	Radius for Programming	Applications							Material Groups					
									P	M	K	S	H	
0.20-0.70	1.1	○	○	●	●	○	●	●	●					
0.20-0.80	1.1	○	●	●	●	○	●	●	●			○	○	○
0.20-1.20	1.8	○	●	●	●	○	●	●	●		●	●	●	○
0.20-0.70	1.9	○	○	○	○	○	○	○	○	●	●	○	●	○
0.20-0.50	2.6	○	○	○	○	○	○	○	○	●	●	○	●	○

Range of fz (mm/t)	Radius for Programming	Applications							Material Groups					
									P	M	K	S	H	
0.20-1.20	1.8	○	●	●	●	○	●	●	●	●	●	●	●	○
0.20-0.70	1.9	○	○	○	○	○	○	○	○	●	●	●	●	○
0.30-1.00	2.3	○	○	○	○	○	○	○	○	●	●	●	●	●
0.40-1.50	2.5	●	○	○	○	○	○	○	○	●	●	●	●	●
0.20-0.70	2.6	○	○	○	○	○	○	○	○	●	●	●	●	○
0.40-1.40	3.1	○	○	○	○	○	○	○	○	●	●	●	●	○
0.40-1.80	2.8	○	○	●	●	○	●	●	●	●	●	●	●	○
0.40-2.00	3.1	●	○	○	○	○	○	○	○	●	●	●	●	○
0.20-0.60	3.3	○	○	○	○	○	○	○	○	●	●	●	●	○
0.20-0.80	4.1	○	○	○	○	○	○	○	○	●	●	●	●	○

Range of fz (mm/t)	Radius for Programming	Applications							Material Groups					
									P	M	K	S	H	
0.30-1.00	2.3	○	○	○	●	○	○	○	○	●	●	●	●	●
0.40-1.50	2.5	●	○	○	○	○	○	○	○	●	●	●	●	●
0.40-1.40	3.1	○	○	○	○	○	○	○	○	●	●	●	●	○
0.40-1.80	2.8	○	●	●	●	○	●	●	●	○	○	○	●	○
0.40-2.00	3.1	●	○	○	○	○	○	○	○	●	●	●	●	○
0.20-0.60	3.3	○	○	○	○	○	○	○	○	●	●	●	●	○
0.40-1.50	3.3 & 3.7 for RM	○	○	○	○	○	○	○	○	●	●	●	●	○
0.20-0.80	4.1	○	○	○	○	○	○	○	○	●	●	●	●	○
0.10-0.65	5.4	●								●	○	○	●	○
0.20-0.80	4.8 & 5.2 for RM	○	○	○	○	○	○	○	○	●	●	●	●	○

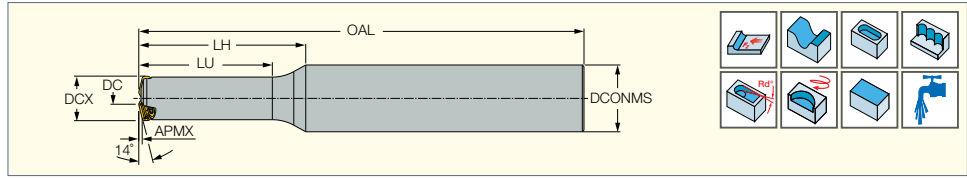
Range of fz (mm/t)	Radius for Programming	Applications							Material Groups					
									P	M	K	S	H	
0.40-1.40	3.1	○	○	○	○	○	○	○	○	●	●	●	●	○
0.40-1.80	2.8	○	●	●	●	○	●	●	●	○	○	○	●	○
0.40-2.00	3.1	●	○	○	○	○	○	○	○	●	●	●	●	○
0.40-1.50	3.3 & 3.7 for RM	○	○	○	○	○	○	○	○	●	●	●	●	○
0.20-0.80	4.1	○	○	○	○	○	○	○	○	●	●	●	●	○
0.40-2.00	5.5	●	○	○	○	○	○	○	○	●	●	●	●	○
0.10-0.65	5.4	●								●	○	○	○	○
0.20-0.80	4.8 & 5.2 for RM	○	○	○	○	○	○	○	○	●	●	●	●	○

● - Most suitable ○ - Suitable ○ - May be used

 <p><b>T20 Chipformer</b></p>	<p>T20 - For gray and nodular cast iron</p>	 <p><b>ETR Chipformer</b></p>	<p>ETR - Tangential insert with reinforced cutting edges for interrupted cut and unfavorable conditions</p>
 <p><b>ER Chipformer</b></p>	<p>ER - Tangential insert for general applications</p>		

**FFT3 EFM-02**

Small Diameter Endmills Carrying Single-Sided Triangular Inserts for Fast Feed Milling



Designation	DCX	DC	APMX	CICT <sup>(1)</sup>	LU	LH	OAL	DCONMS	Shank <sup>(2)</sup>	RMPX <sup>(3)</sup>	
<b>FFT3 EFM D08-2-060-C10-02</b>	8.00	2.20	0.60	2	17.0	20.0	60.00	10.00	C	10.8	0.03
<b>FFT3 EFM D08-2-080-C12-02</b>	8.00	2.20	0.60	2	26.0	30.0	80.00	12.00	C	10.8	0.05
<b>FFT3 EFM D10-3-070-C10-02</b>	10.00	4.20	0.60	3	19.5	20.0	70.00	10.00	C	4.7	0.04
<b>FFT3 EFM D10-3-090-C12-02</b>	10.00	4.20	0.60	3	30.0	33.0	90.00	12.00	C	4.7	0.06

• Radius for programming 1.1 mm <sup>(1)</sup> Number of inserts <sup>(2)</sup> C-Cylindrical <sup>(3)</sup> Maximum ramping angle

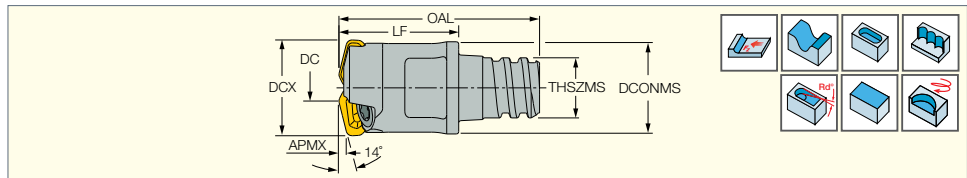
**Spare Parts**

Designation		
<b>FFT3 EFM-02</b>	SR M2X0.4-2.9 T6-HG <sup>(a)</sup>	T-6/5 MAGNET 3X3

<sup>(a)</sup> Recommended tightening torque: 0.5 N·m

**FFT3 EFM-MM 02**

Small Diameter Endmills with a MULTI-MASTER Threaded Adaptation Carrying Triangular Inserts for Fast Feed Milling



Designation	DCX	DC	APMX	CICT <sup>(1)</sup>	LF	DCONMS	THSZMS	OAL	DRVS <sup>(2)</sup>	RMPX <sup>(3)</sup>	
<b>FFT3 EFM D08/.31-2MMT05-02</b>	8.00	2.20	0.60	2	10.00	7.60	T05	16.75	5.5	10.8	0.01
<b>FFT3 EFM D10/.39-3MMT06-02</b>	10.00	4.20	0.60	3	10.00	9.70	T06	16.30	8.0	4.7	0.01

• Radius for programming 1.1 mm <sup>(1)</sup> Number of inserts <sup>(2)</sup> Key flat size <sup>(3)</sup> Maximum ramping angle

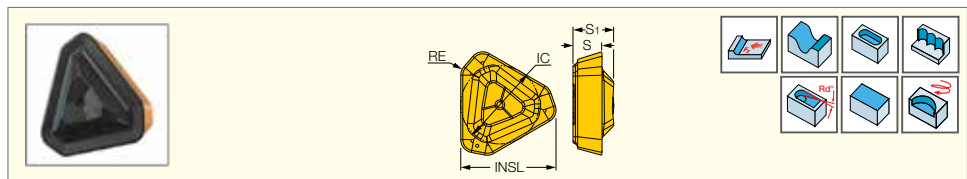
**Spare Parts**

Designation		
<b>FFT3 EFM-MM 02</b>	SR M2X0.4-2.9 T6-HG <sup>(a)</sup>	T-6/5 MAGNET 3X3

<sup>(a)</sup> Recommended tightening torque: 0.5 N·m

**FFT3 TXMT 02**

Triangular Miniature Inserts for Fast Feed Milling at Small Depth of Cut



Designation	Dimensions					IC830	Recommended Machining Data	
	INSL	IC	RE	S	S <sub>1</sub>		a <sub>D</sub> (mm)	f <sub>Z</sub> (mm/t)
<b>FFT3 TXMT 020105T</b>	3.66	2.00	0.50	1.10	1.56	•	0.20-0.60	0.20-0.70

### Recommended Machining Conditions for FFT3-02 Fast Feed Endmills

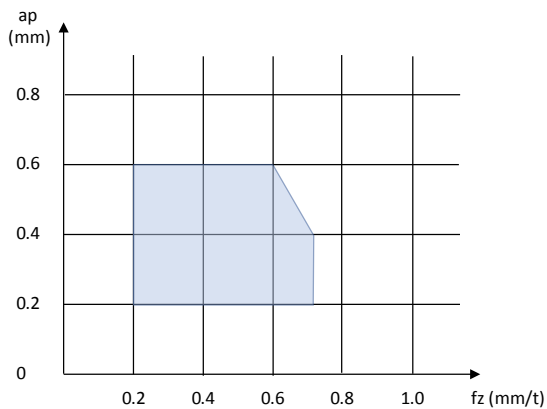
ISO class DIN/ISO 513	Workpiece material					D.O.C. ap [mm]	Cutting speed Vc, [m/min]	Feed Fz [mm/tooth]	Coolant
	Description	ISCAR mat. group*	Hardness, HB	Typical representative					
				AISI/SAE/ASTM	DIN W.-Nr.				
<b>P</b>	Non-alloy steel	1-5	130-180	1020	1.0402	0.20-0.60	120-200	0.20-0.70	Dry/Wet
	Low alloy steel	6-8	260-300	4340	1.6582		100-180	0.20-0.70	Dry/Wet
		9	HRC 35-42**	3135	1.5710		100-130	0.20-0.60	Dry/Wet
	High alloy steel	10-11	200-220	H13	1.2344		80-150	0.20-0.60	Dry/Wet
	Ferritic/martensitic stainless steel	12-13	200	420	1.4021		80-150	0.20-0.60	Dry/Wet

\* ISCAR material group in accordance with VDI 3323 standard

\*\* Quenched and tempered

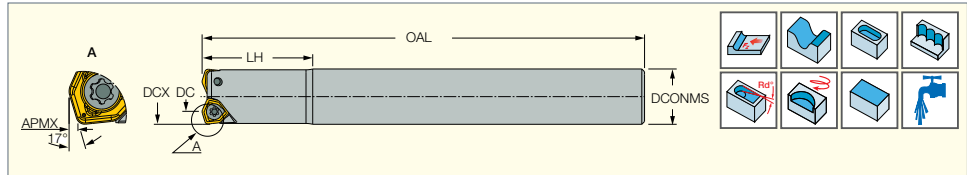
For machining in unstable conditions, the recommended cutting data should be reduced by 20-30%

### Application Range FFT3-02



**FFT3 EFM-03**



Endmills Carrying Single-Sided Small Trigon Inserts for Fast Feed Milling



Designation	DCX	DC	APMX	CICT <sup>(1)</sup>	LH	OAL	DCONMS	Shank <sup>(2)</sup>	RMPX <sup>(3)</sup>	kg
<b>FFT3 EFM D10-2-080-C10-03</b>	10.00	5.60	0.60	2	20.0	80.00	10.00	C	6.9	0.11
<b>FFT3 EFM D12-3-120-C12-03</b>	12.00	7.60	0.60	3	25.0	120.00	12.00	C	4.7	0.14
<b>FFT3 EFM D16-4-140-C16-03</b>	16.00	11.60	0.60	4	35.0	140.00	16.00	C	2.9	0.18

• Radius for programming 1.1 mm <sup>(1)</sup> Number of inserts <sup>(2)</sup> C-Cylindrical <sup>(3)</sup> Maximum ramping angle

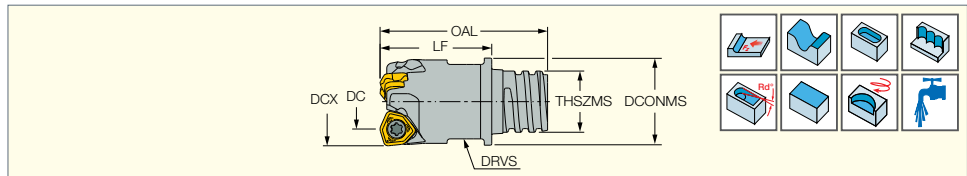
**Spare Parts**

Designation		
<b>FFT3 EFM-03</b>	TS 18041/HG <sup>(a)</sup>	T-6IP/51

<sup>(a)</sup> Recommended tightening torque: 0.5 N-m

**FFT3 EFM-MM 03**



Endmills with a MULTI-MASTER Threaded Adaptation Carrying Single-Sided Small Trigon Inserts for Fast Feed Milling



Designation	DCX	DC	APMX	CICT <sup>(1)</sup>	LF	DCONMS	THSZMS	OAL	DRVS <sup>(2)</sup>	RMPX <sup>(3)</sup>	kg
<b>FFT3 EFMD10/.39-2MMT06-03</b>	10.00	5.60	0.60	2	10.00	9.70	T06	16.30	8.0	6.9	0.02
<b>FFT3 EFMD12/.47-3MMT08-03</b>	12.00	7.60	0.60	3	15.00	11.70	T08	22.50	10.0	4.7	0.03
<b>FFT3 EFMD16/.63-4MMT10-03</b>	16.00	11.60	0.60	4	20.00	15.30	T10	31.30	13.0	2.9	0.05

• Radius for programming 1.1 mm <sup>(1)</sup> Number of inserts <sup>(2)</sup> Key flat size <sup>(3)</sup> Maximum ramping angle

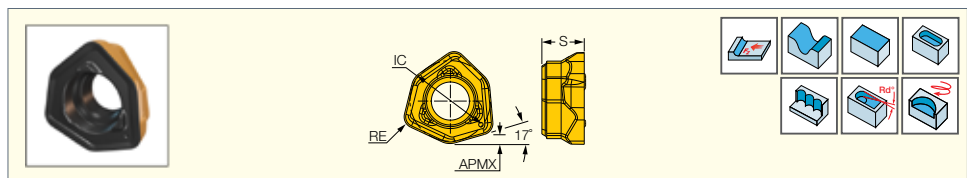
**Spare Parts**

Designation		
<b>FFT3 EFM-MM 03</b>	TS 18041/HG <sup>(a)</sup>	T-6IP/51

<sup>(a)</sup> Recommended tightening torque: 0.5 N-m

**FFT3 WXMT 03**

Single-Sided Small Trigon Inserts for Fast Feed Milling



Designation	Dimensions				Tough ↔ Hard		Recommended Machining Data	
	IC	S	RE	APMX	IC830	IC808	a <sub>0</sub> (mm)	f <sub>z</sub> (mm/t)
<b>FFT3 WXMT 030206T</b>	4.20	2.20	0.60	0.60	●	●	0.20-0.60	0.20-0.80



**Recommended Machining Conditions for FFT3-03 Fast Feed Endmills**

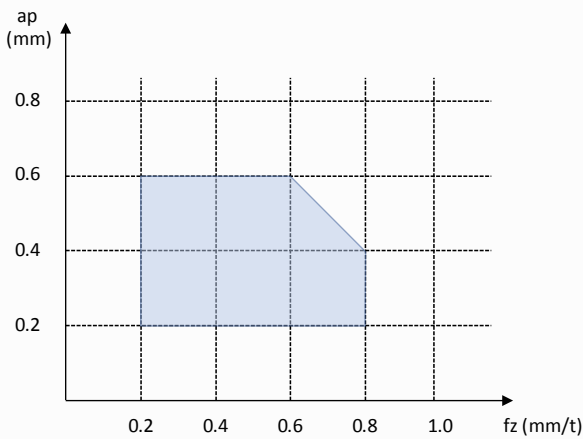
ISO class DIN/ISO 513	Workpiece material					Carbide grade	D.O.C. ap [mm]	Cutting speed Vc, [m/min]	Feed fz [mm/tooth]	Coolant	
	Description	ISCAR mat. group*	Hardness, HB	Typical representative							
				AISI/SAE/ASTM	DIN W.-Nr.						
<b>P</b>	Non-alloy steel	1-5	130-180	1020	1.0402	IC808	0.20-0.60	120-200	0.30-0.80	Dry/Wet	
						IC830		110-180			
	Low alloy steel	6-8	260-300	4340	1.6582	IC808		100-180	0.30-0.70	Dry/Wet	
			9	HRC 35-42**	3135	1.5710		IC830			90-160
		High alloy steel	10-11	200-220	H13	1.2344		IC808	100-160	0.30-0.60	Dry/Wet
								IC830	90-150		
		Ferritic/martensitic stainless steel	12-13	200	420	1.4021		IC808	80-150	0.30-0.60	Dry/Wet
								IC830	70-140		
<b>K</b>	Gray cast iron	15-16	250	Class 40	0.6025 (GG25)	IC808	0.20-0.60	150-200	0.30-0.60	Dry	
	Nodular cast iron	17-18	200	Class 65-45-12	0.7050 (GGG50)	IC808		140-180			
<b>S</b>	High temperature alloys	33-35	340	Inconel 718	2.4668	IC830	0.2-0.50	25-40	0.20-0.40	Wet	
						IC808		25-35			
		36-37	HRC 30-32	AMS R56400	3.7165 (Ti6Al4V ELI)	IC830		30-50			
						IC808		25-45			
<b>H</b>	Hardened steel	38	HRC 45-49	HARDOX 450 plate		IC808	0.20-0.50	50-75	0.20-0.40	Dry/Wet	
	Chilled cast iron	40	400	Ni-Hard 1	0.9625		0.20-0.60	80-100			
	Hard cast iron	41	500	A532 IID	0.9645		0.20-0.50	50-75			

\* ISCAR material group in accordance with VDI 3323 standard

\*\* Quenched and tempered

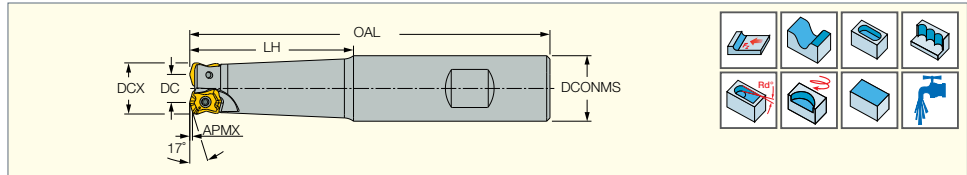
For machining in unstable conditions, the recommended cutting data should be reduced by 20-30%

**Application Range FFT3-03**



**FFX4 ED**

Endmills Carrying Small Double-Sided "Bone Shape" Inserts with 4 Cutting Edges for Fast Feed Milling



Designation	DCX	DC	APMX	CICT <sup>(1)</sup>	LH	OAL	DCONMS	RMPX <sup>(2)</sup>	Shank <sup>(3)</sup>	
FFX4 ED12-1-030-C12-04	12.00	4.60	0.80	1	30.0	90.00	12.00	3.6	C	0.07
FFX4 ED16-2-030-C16-04	16.00	8.60	0.80	2	30.0	120.00	16.00	4.3	C	0.16
FFX4 ED16-2-050-W20-04	16.00	8.60	0.80	2	50.0	110.00	20.00	4.3	W	0.20
FFX4 ED20-3-050-C20-04	20.00	12.60	0.80	3	50.0	140.00	20.00	2.7	C	0.29
FFX4 ED20-3-060-W20-04	20.00	12.60	0.80	3	60.0	120.00	20.00	2.7	W	0.24
FFX4 ED25-4-060-C25-04	25.00	17.60	0.80	4	60.0	150.00	25.00	1.8	C	0.50
FFX4 ED25-4-080-W25-04	25.00	17.60	0.80	4	80.0	140.00	25.00	1.8	W	0.45
FFX4 ED32-5-080-W32-04	32.00	24.60	0.80	5	80.0	150.00	32.00	1.2	W	0.80
FFX4 ED32-5-120-C32-04	32.00	24.60	0.80	5	120.0	205.00	32.00	1.2	C	1.02

• Radius for programming 1.8 mm <sup>(1)</sup> Number of inserts <sup>(2)</sup> Maximum ramping angle <sup>(3)</sup> C-Cylindrical, W-Weldon

**Spare Parts**

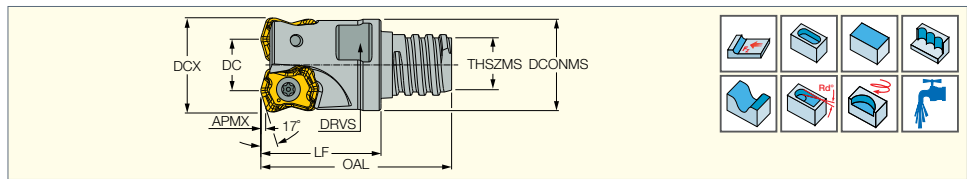
Designation		
FFX4 ED	SR M2.5X6-T7-60 <sup>(a)</sup>	T-7/51

<sup>(a)</sup> Recommended tightening torque: 0.9 N·m

**MULTI-MASTER**

**FFX4 ED-MM**

Endmills with MULTI-MASTER Adaptation Carrying Small "Bone Shape" Inserts with 4 Cutting Edges for Fast Feed Milling



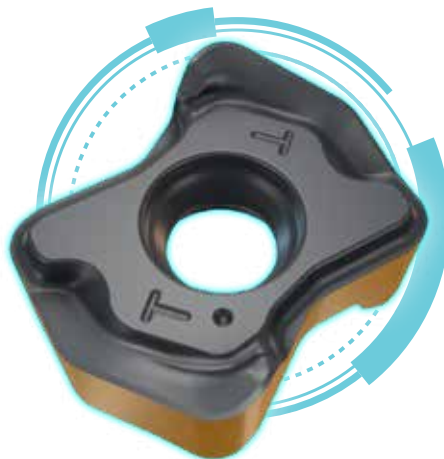
Designation	DCX	DC	CICT <sup>(1)</sup>	APMX	THSZMS	LF	OAL	RMPX <sup>(2)</sup>	DCONMS	DRVS <sup>(3)</sup>	
FFX4 ED16/.63-2-MMT10-04	16.00	8.60	2	0.80	T10	20.00	31.75	4.3	15.20	13.0	0.02

• Radius for programming 1.8 mm <sup>(1)</sup> Number of inserts <sup>(2)</sup> Maximum ramping angle <sup>(3)</sup> Key flat size

**Spare Parts**

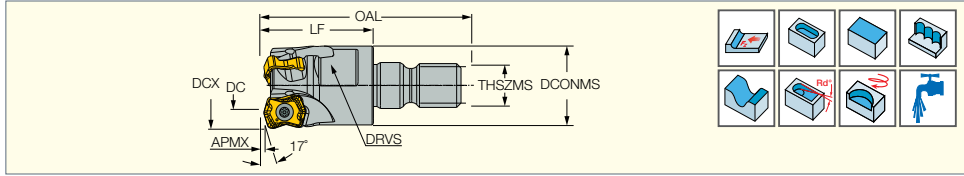
Designation		
FFX4 ED-MM	SR M2.5X6-T7-60 <sup>(a)</sup>	T-7/51

<sup>(a)</sup> Recommended tightening torque: 0.9 N·m



**FFX4 ED-M**

Endmills with FLEXFIT Adaptation  
Carrying Small "Bone Shape" Inserts with  
4 Cutting Edges for Fast Feed Milling



Designation	DCX	DC	CICT <sup>(1)</sup>	APMX	THSZMS	LF	OAL	RMPX <sup>(2)</sup>	DCONMS	DRVS <sup>(3)</sup>	
<b>FFX4 ED20/.78-3-M10-04</b>	20.00	12.60	3	0.80	M10	25.00	45.00	2.7	18.00	15.0	0.04
<b>FFX4 ED25/.98-4-M12-04</b>	25.00	17.60	4	0.80	M12	30.00	52.00	1.8	21.00	19.0	0.08
<b>FFX4 ED32/1.26-5-M16-04</b>	32.00	24.60	5	0.80	M16	35.00	60.00	1.2	29.00	27.0	0.18
<b>FFX4 ED35/1.38-5-M16-04</b>	35.00	27.60	5	0.80	M16	35.00	60.00	1.1	29.00	27.0	0.20

• Radius for programming 1.8 mm <sup>(1)</sup> Number of inserts <sup>(2)</sup> Maximum ramping angle <sup>(3)</sup> Key flat size

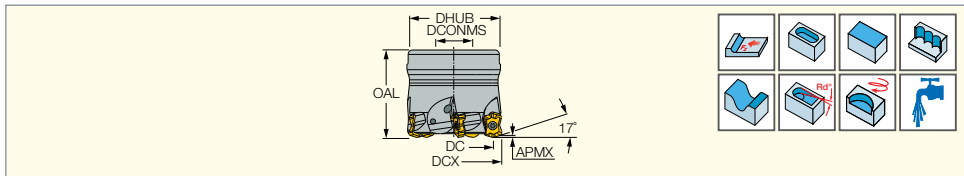
**Spare Parts**

Designation		
<b>FFX4 ED-M</b>	SR M2.5X6-T7-60 <sup>(a)</sup>	T-7/51

<sup>(a)</sup> Recommended tightening torque: 0.9 N·m

**FFX4 FD**

Face Mills Carrying Small "Bone Shape" Inserts with 4 Cutting Edges for Fast Feed Milling



Designation	DCX	DC	CICT <sup>(1)</sup>	APMX	OAL	DCONMS	DHUB	RMPX	
<b>FFX4 FD032-5-16-04</b>	32.00	24.60	5	0.80	40.00	16.00	38.00	1.2	0.12
<b>FFX4 FD040-6-16-04</b>	40.00	32.60	6	0.80	40.00	16.00	38.00	0.9	0.23

• Radius for programming 1.8 mm <sup>(1)</sup> Number of inserts

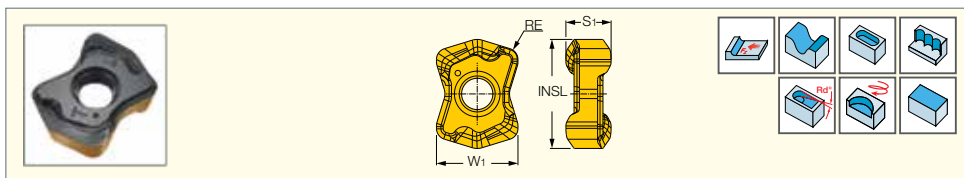
**Spare Parts**

Designation			
<b>FFX4 FD032-5-16-04</b>	SR M2.5X6-T7-60 <sup>(a)</sup>	T-7/51	SR M8X25-D11.5
<b>FFX4 FD040-6-16-04</b>	SR M2.5X6-T7-60 <sup>(a)</sup>	T-7/51	SR M8X25DIN912

<sup>(a)</sup> Recommended tightening torque: 0.9 N·m

**FFX4 XNMU**

Small "Bone Shape" Inserts with 4 Cutting Edges for Fast Feed Milling



Designation	Dimensions				Tough ↔ Hard						Recommended Machining Data	
	INSL	S <sub>1</sub>	RE	W <sub>1</sub>	IC882	IC840	IC830	IC5820	IC808	IC810	a <sub>p</sub> (mm)	f <sub>z</sub> (mm/t)
<b>FFX4 XNMU 040310HP</b>	9.58	3.97	1.00	7.16	•	•	•	•	•	•	0.20-0.80	0.20-0.90
<b>FFX4 XNMU 040310T</b>	9.58	3.95	1.00	7.16	•	•	•	•	•	•	0.20-0.80	0.20-1.20

• HP- for austenitic stainless steel and high temperature alloys • T- for steel, ferritic and martensitic stainless steel, cast iron and hardened steel

**Recommended Machining Conditions for FFX4 Fast Feed Cutters**

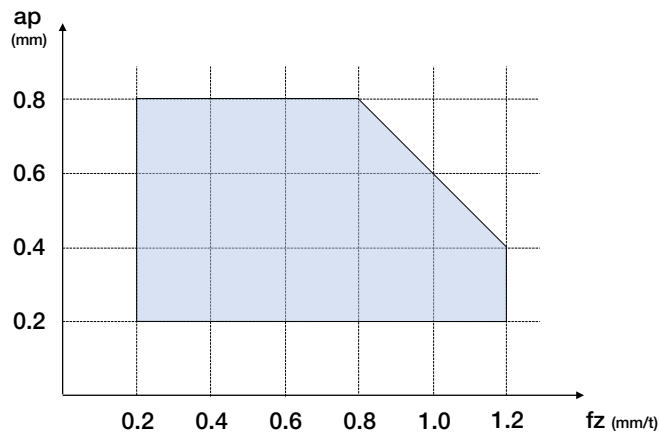
ISO class DIN/ISO 513	Description	Workpiece material				Insert type	Carbide grade	D.O.C. ap [mm]	Cutting Speed & Feed		Coolant				
		ISCAR mat. group*	Hardness, HB	Typical materials					Vc [m/min]	fz [mm/tooth]					
				AISI/SAE/ ASTM	DIN W.-Nr.										
<b>P</b>	Non-alloy steel	1-5	130-180	1020	1.0402	T	IC808	0.2-0.8	150-220	0.2-1.0	Dry				
		6-8	260-300	4340	1.6582				140-200	0.2-1.2	Dry/Wet				
	Low alloy steel	9	HRC 35-42**	3135	1.5710				IC808	140-200	0.2-0.9	Dry/Wet			
									IC830	120-180	0.2-1.1	Dry/Wet			
		10-11	200-220	H13	1.2344				IC808	130-180	0.2-0.8	Dry			
									IC830	120-160	0.2-1.0	Dry/Wet			
	Ferritic/martensitic stainless steel	12-13	200	420	1.4021				IC808	120-170	0.2-0.8	Dry			
									IC830	100-150	0.2-0.9	Dry/Wet			
	<b>M</b>	Austenitic stainless steel	14	200	304L				1.4306	HP	0.2-0.8	IC830	80-120	0.2-0.9	Wet
													IC840	80-140	
IC5820						100-160	0.2-0.7								
IC882						80-130	0.2-0.8								
<b>K</b>	Gray cast iron	15-16	250	Class 40	0.6025 (GG25)	T	0.2-0.8	IC810	150-220	0.4-1.2	Dry				
	Nodular cast iron	17-18	200	Class 65-45-12	0.7050 (GGG50)			IC810	120-200	0.4-1.2					
<b>S</b>	High temperature alloys	33-35	340	Inconel 718	2.4668	HP	0.2-0.8	IC882	20-30	0.2-0.7	Wet				
								IC5820	25-35	0.2-0.6					
								IC840	25-35	0.2-0.6					
								IC830	25-30	0.2-0.7					
		36-37	HRC 30-32	AMS R56400	3.7165 (Ti6Al4V ELI)			IC882	25-35	0.2-0.7					
								IC5820	25-40	0.2-0.6					
								IC840	25-35	0.2-0.6					
								IC830	20-30	0.2-0.7					
<b>H</b>	Hardened steel	38	HRC 45-49	HARDOX 450 plate		T	0.2-0.8	IC808	50-75	0.2-0.5	Dry				

\* ISCAR material group in accordance with VDI 3323 standard

\*\* Quenched and tempered

For machining in unstable conditions, the recommended cutting data should be reduced by 20-30%

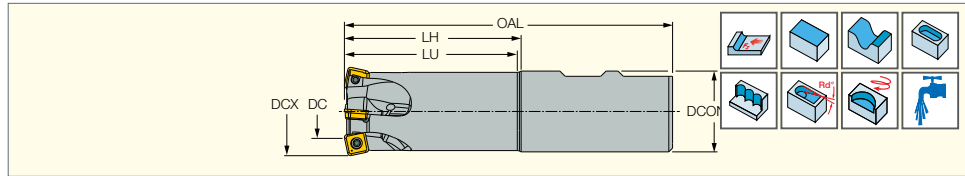
**Application Range FFX4**



# MILL4FEED

## FFQ4 D-W-09

Fast Feed Endmills Carrying Single-Sided Inserts with 4 Cutting Edges



Designation	DC	DCX	APMX	AE <sup>(1)</sup>	CICT <sup>(2)</sup>	LH	OAL	DCONMS	RMPX <sup>(3)</sup>	kg
FFQ4 D022-2-044-W20-09	7.70	22.00	1.20	6.0	2	44.0	94.00	20.00	8.2	0.19
FFQ4 D025-3-050-W25-09	10.70	25.00	1.20	6.0	3	50.0	106.00	25.00	5.5	0.25
FFQ4 D032-4-064-W25-09	17.70	32.00	1.20	6.0	4	64.0	120.00	25.00	3.2	0.50
FFQ4 D035-5-070-W32-09	20.70	35.00	1.20	6.0	5	70.0	130.00	32.00	2.7	0.70

• Radius for programming 2.5 mm <sup>(1)</sup> Plunging width <sup>(2)</sup> Number of inserts <sup>(3)</sup> Maximum ramping angle

### Spare Parts

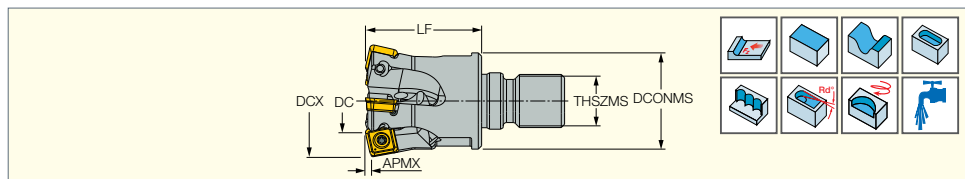
Designation		
FFQ4 D-W-09	SR M3X0.5-L7.4 IP9 <sup>(a)</sup>	IP-9/151

<sup>(a)</sup> Recommended tightening torque: 2.0 N-m

# MILL4FEED

## FFQ4 D-M-09

Fast Feed Endmills with FLEXFIT Threaded Adaptation Carrying Single-Sided Inserts with 4 Cutting Edges



Designation	DC	DCX	APMX	AE <sup>(1)</sup>	CICT <sup>(2)</sup>	LF	OAL	DCONMS	THSZMS	RMPX <sup>(3)</sup>	kg
FFQ4 D022-02-M10-09	7.70	22.00	1.20	6.0	2	25.00	45.00	18.00	M10	8.2	0.04
FFQ4 D025-02-M12-09	10.70	25.00	1.20	6.0	2	30.00	52.00	21.00	M12	5.5	0.05
FFQ4 D025-03-M12-09	10.70	25.00	1.20	6.0	3	30.00	52.00	21.00	M12	5.5	0.07
FFQ4 D032-03-M16-09	17.70	32.00	1.20	6.0	3	35.00	60.00	29.00	M16	3.2	0.14
FFQ4 D032-04-M16-09	17.70	32.00	1.20	6.0	4	35.00	60.00	29.00	M16	3.2	0.14
FFQ4 D035-05-M16-09	20.70	35.00	1.20	6.0	5	35.00	60.00	29.00	M16	2.7	0.16
FFQ4 D040-05-M16-09	25.70	40.00	1.20	6.0	5	35.00	60.00	29.00	M16	2.0	0.18

• Radius for programming 2.5 mm <sup>(1)</sup> Plunging width <sup>(2)</sup> Number of inserts <sup>(3)</sup> Maximum ramping angle

### Spare Parts

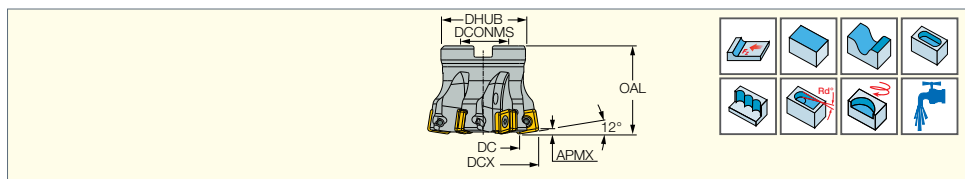
Designation		
FFQ4 D-M-09	SR M3X0.5-L7.4 IP9 <sup>(a)</sup>	IP-9/151

<sup>(a)</sup> Recommended tightening torque: 2.0 N-m

# MILL4FEED

## FFQ4 D-09




Fast Feed Face Mills Carrying Single-Sided Inserts with 4 Cutting Edges



Designation	DC	DCX	APMX	AE <sup>(1)</sup>	CICT <sup>(2)</sup>	OAL	DCONMS	DHUB	RMPX <sup>(3)</sup>	kg
FFQ4 D40-05-16-09	25.70	40.00	1.20	6.0	5	35.00	16.00	38.00	2.0	0.17
FFQ4 D50-07-22-09	35.70	50.00	1.20	6.0	7	40.00	22.00	48.00	1.5	0.32
FFQ4 D52-07-22-09	37.70	52.00	1.20	6.0	7	40.00	22.00	48.00	1.4	0.34
FFQ4 D63-08-22-09	48.70	63.00	1.20	6.0	8	45.00	22.00	48.00	1.1	0.49

• Radius for programming 2.5 mm <sup>(1)</sup> Plunging width <sup>(2)</sup> Number of inserts <sup>(3)</sup> Maximum ramping angle

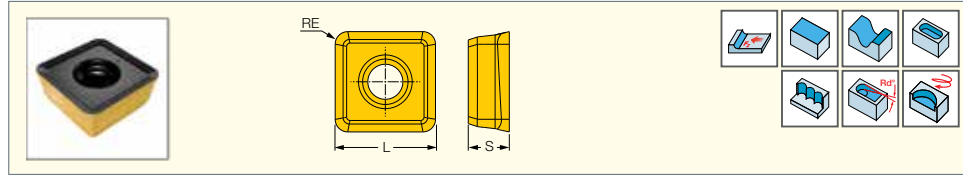
### Spare Parts

Designation			
FFQ4 D40-05-16-09	SR M3X0.5-L7.4 IP9 <sup>(a)</sup>	IP-9/151	SR M8X25DIN912
FFQ4 D50-07-22-09	SR M3X0.5-L7.4 IP9 <sup>(a)</sup>	IP-9/151	SR M10X25 DIN912
FFQ4 D52-07-22-09	SR M3X0.5-L7.4 IP9 <sup>(a)</sup>	IP-9/151	SR M10X25 DIN912
FFQ4 D63-08-22-09	SR M3X0.5-L7.4 IP9 <sup>(a)</sup>	IP-9/151	SR M10X30 DIN912

<sup>(a)</sup> Recommended tightening torque: 2.0 N-m

**FFQ4 SOMT 0904**

Square Single-Sided Inserts with 4 Cutting Edges for Fast Feed Milling



Designation	Dimensions			Tough ↔ Hard					Recommended Machining Data	
	L	S	RE	IC882	IC830	IC5820	IC808	IC810	$a_p$ (mm)	$f_z$ (mm/t)
<b>FFQ4 SOMT 090412T</b>	8.50	3.90	1.20		•		•	•	0.50-1.20	0.40-1.50
<b>FFQ4 SOMT 0904RM-T</b>	8.50	3.80	1.20				•		0.50-1.20	0.40-1.50
<b>FFQ4 SOMT 090412HP</b>	8.50	3.80	1.20	•	•	•	•		0.50-1.20	0.40-1.40

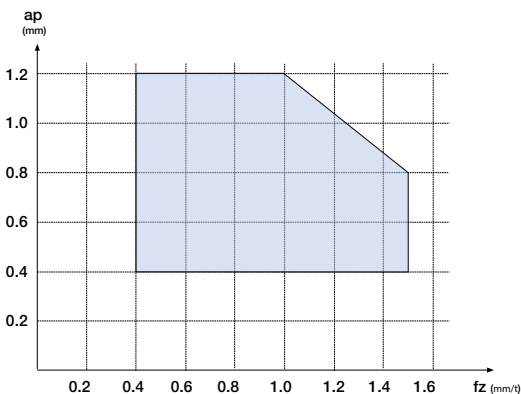
• T - type for steel, ferritic and martensitic stainless steel, cast iron and hardened steel • RM-T type for interrupted cut and machining near straight shoulders on steel, ferritic and martensitic stainless steel, cast iron and hardened steel • HP - type for austenitic stainless steel and high temperature alloys

**Recommended Machining Conditions for FFQ4-09 Fast Feed Mills**

ISO class DIN/ISO 513	Workpiece Material					Insert type	Carbide grade	D.O.C. $a_p$ [mm]		Cutting speed $V_c$ , [m/min]	Feed $f_z$ [mm/tooth]		Coolant
	Description	ISCAR mat. group*	Hardness, HB	Typical materials AISI/SAE/ ASTM	DIN W.-Nr.			Recommended	Range		Recommended	Range	
<b>P</b>	Non-alloy steel	1-5	130-180	1020	1.0402	T / RM-T	IC808	1.0	0.4-1.2	150-220	1.2	0.5-1.5	Dry
	Low alloy steel	6-8	260-300	4340	1.6582		IC830			140-200	1.3	0.5-1.5	Dry/Wet
							IC808			140-200	1.2	0.5-1.5	Dry
		9	HRC 35-42**	3135	1.5710		IC830			120-180	1.3	0.5-1.5	Dry/Wet
							IC808			130-180	1.2	0.5-1.4	Dry
	High alloy steel	10-11	200-220	H13	1.2344		IC830			120-160	1.2	0.5-1.4	Dry/Wet
							IC808			120-170	1.2	0.5-1.4	Dry
	Ferritic/martensitic stainless steel	12-13	200	420	1.4021		IC830			100-150	1.3	0.5-1.4	Dry/Wet
IC808						110-160	1.2	0.5-1.4	Dry				
<b>M</b>	Austenitic stainless steel	14	200	304L	1.4306	HP	IC830	1.0	0.4-1.2	80-140	1.0	0.5-1.2	Wet
							IC808			100-160	1.0	0.5-1.2	
							IC5820			100-160	1.0	0.5-1.3	
							IC882			80-130	1.0	0.5-1.4	
<b>K</b>	Gray cast iron	15-16	250	Class 40	0.6025 (GG25)	T / RM-T	IC810	1.0	0.4-1.2	150-220	1.2	0.5-1.5	Dry
	Nodular cast iron	17-18	200	Class 65-45-12	0.7050 (GGG50)								
<b>S</b>	High temperature alloys	33-35	340	Inconel 718	2.4668	HP	IC882	1.0	0.4-1.2	20-30	0.6	0.4-1.0	Wet
							IC5820			23-35	0.6	0.5-1.0	
		IC830	23-35	0.6	0.5-1.0								
		IC808	25-40	0.6	0.4-1.0								
	36-37	HRC 35-40	AMS R56400	3.7165 (Ti6Al4V ELI)	IC882		20-30			0.6	0.5-1.0		
					IC5820		20-30			0.6	0.4-1.0		
					IC830		20-45			0.6	0.5-1.0		
					IC808		20-30			0.6	0.5-1.0		
<b>H</b>	Hardened steel	38	HRC 45-49	HARDOX 450 plate	T / RM-T	IC808	1.0	0.4-1.2	50-75	0.5	0.4-0.5	Dry	

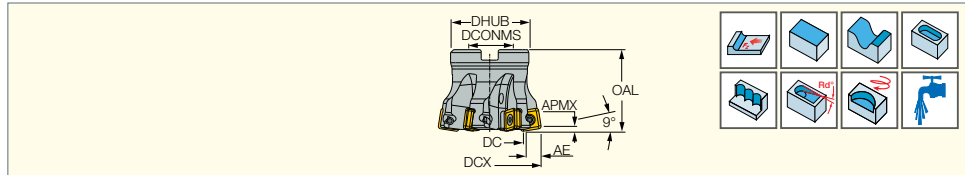
\* ISCAR material group in accordance with VDI 3323 standard \*\* Quenched and tempered  
For machining in unstable conditions, the recommended cutting data should be reduced by 20-30%

**Application Range FFQ4-09**



**FFQ4 D-12**

Fast Feed Face Mills Carrying Single-Sided Inserts with 4 Cutting Edges



Designation	DC	DCX	APMX	AE <sup>(1)</sup>	CICT	OAL	DHUB	DCONMS	Arbor	RMPX	
FFQ4 D040-3-16-12	18.00	40.00	1.50	10.0	3	45.00	38.00	16.00	A	4.3	0.23
FFQ4 D040-4-16-12	18.00	40.00	1.50	10.0	4	45.00	38.00	16.00	A	4.3	0.22
FFQ4 D050-4-22-12	28.00	50.00	1.50	10.0	4	50.00	48.00	22.00	A	2.7	0.38
FFQ4 D050-5-22-12	28.00	50.00	1.50	10.0	5	50.00	48.00	22.00	A	2.7	0.37
FFQ4 D052-5-22-12	29.00	52.00	1.50	10.0	5	50.00	48.00	22.00	A	2.5	0.39
FFQ4 D063-6-22-12	41.00	63.00	1.50	10.0	6	50.00	48.00	22.00	A	1.8	0.50
FFQ4 D066-6-27-12	43.00	66.00	1.50	10.0	6	50.00	60.00	27.00	A	1.6	0.65
FFQ4 D080-7-27-12	58.00	80.00	1.50	10.0	7	50.00	60.00	27.00	A	1.2	0.84
FFQ4 D100-8-32-12	78.00	100.00	1.50	10.0	8	50.00	78.00	32.00	B	0.9	1.30

• Radius for programming 3.1 mm

<sup>(1)</sup> Plunging width

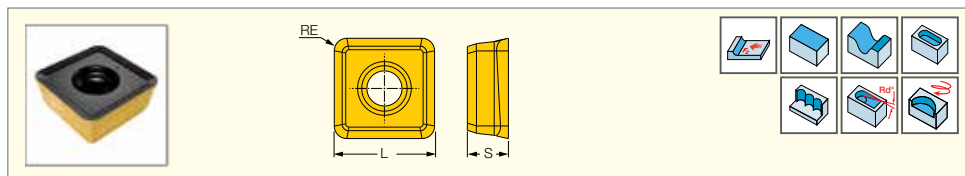
**Spare Parts**

Designation					
FFQ4 D040-3-16-12	SR M4X0.7-L9.6 IP15 <sup>(a)</sup>	SW6-T	BLD IP15/S7		SR PS 118-0416
FFQ4 D040-4-16-12	SR M4X0.7-L9.6 IP15 <sup>(a)</sup>	SW6-T	BLD IP15/S7		SR PS 118-0416
FFQ4 D050-4-22-12	SR M4X0.7-L9.6 IP15 <sup>(a)</sup>	SW6-T	BLD IP15/S7	SR M10X35 DIN912	
FFQ4 D050-5-22-12	SR M4X0.7-L9.6 IP15 <sup>(a)</sup>	SW6-T	BLD IP15/S7	SR M10X35 DIN912	
FFQ4 D052-5-22-12	SR M4X0.7-L9.6 IP15 <sup>(a)</sup>	SW6-T	BLD IP15/S7	SR M10X35 DIN912	
FFQ4 D063-6-22-12	SR M4X0.7-L9.6 IP15 <sup>(a)</sup>	SW6-T	BLD IP15/S7	SR M10X35 DIN912	
FFQ4 D066-6-27-12	SR M4X0.7-L9.6 IP15 <sup>(a)</sup>	SW6-T	BLD IP15/S7	SR M12X30DIN912	
FFQ4 D080-7-27-12	SR M4X0.7-L9.6 IP15 <sup>(a)</sup>	SW6-T	BLD IP15/S7	SR M12X30DIN912	
FFQ4 D100-8-32-12	SR M4X0.7-L9.6 IP15 <sup>(a)</sup>	SW6-T	BLD IP15/S7		

<sup>(a)</sup> Recommended tightening torque: 4.8 N·m

**FFQ4 SOMT 1205**

Square Single-Sided Inserts with 4 Cutting Edges for Fast Feed Milling



Designation	Dimensions			Tough ↔ Hard					Recommended Machining Data	
	L	S	RE	IC882	IC830	IC5820	IC808	IC810	a <sub>c</sub> (mm)	f <sub>z</sub> (mm/t)
FFQ4 SOMT 1205RM-HP	12.70	5.20	1.60		•				0.50-1.50	0.40-1.80
FFQ4 SOMT 1205RM-T	12.70	5.20	1.60		•		•		0.50-1.50	0.40-2.00
FFQ4 SOMT 120516HP	12.70	5.20	1.60	•	•	•	•		0.50-1.50	0.40-1.80
FFQ4 SOMT 120516T	12.70	5.20	1.60		•		•		0.50-1.50	0.40-2.00
FFQ4 SOMT 120516T20	12.70	5.20	1.60					•	0.50-1.50	0.40-2.00

• RM-HP- for interrupted cut and machining next to shoulders of austenitic stainless steel and high temperature alloys • RM-T- for interrupted cut and machining next to shoulders of steel, ferritic and martensitic stainless steel, cast iron and hardened steel • HP- for austenitic stainless steel and high temperature alloys • T- for steel, ferritic and martensitic stainless steel, cast iron and hardened steel • T20- for gray and nodular cast iron

**Recommended Machining Conditions for FFQ4-12 Fast Feed Face Mills**

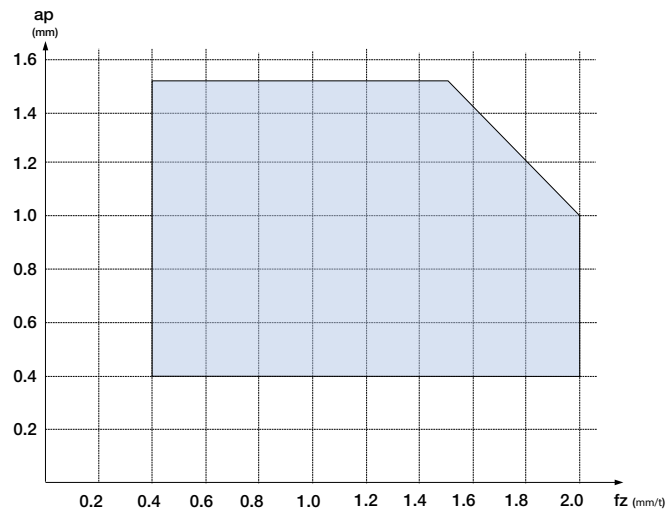
ISO class DIN/ISO 513	Workpiece Material					Insert type	Carbide grade	D.O.C. ap [mm]		Cutting speed Vc, [m/min]	Feed fz [mm/tooth]		Coolant
	Description	ISCAR mat. group*	Hardness, HB	Typical representative				Recommended	Range		Recommended	Range	
				AISI/SAE/ASTM	DIN W.-Nr.								
<b>P</b>	Non-alloy steel	1-5	130-180	1020	1.0402	T/ RM-T	IC808	1.5	0.5-1.5	150-220	1.5	0.5-2.0	Dry
							IC830			140-200	1.6	0.5-2.0	Dry/Wet
	Low alloy steel	6-8	260-300	4340	1.6582		IC808			140-200	1.5	0.5-2.0	Dry
							IC830			120-180	1.6	0.5-2.0	Dry/Wet
	High alloy steel	9	HRC 35-42**	3135	1.5710		IC808			130-180	1.5	0.5-1.8	Dry
							IC830			120-160	1.5	0.5-1.8	Dry/Wet
	Ferritic/martensitic stainless steel	10-11	200-220	H13	1.2344		IC808			120-170	1.3	0.5-1.8	Dry
							IC830			100-150	1.4	0.5-1.8	Dry/Wet
							IC808			110-160	1.3	0.5-1.8	Dry
							IC830			100-150	1.4	0.5-1.8	Dry/Wet
<b>M</b>	Austenitic stainless steel	14	200	304L	1.4306	HP/ RM-HP	IC830	1.5	0.5-1.5	80-140	1.0	0.5-1.5	Wet
							IC808			100-160	1.0	0.5-1.5	
							IC5820			100-160	1.0	0.5-1.6	
							IC882			80-130	1.0	0.5-1.8	
							IC810			150-220	1.5	0.5-2.0	
<b>K</b>	Gray cast iron	15-16	250	Class 40	0.6025 (GG25)	T20 / T	IC810	1.5	0.5-1.5	150-220	1.5	0.5-2.0	Dry
	Nodular cast iron	17-18	200	Class 65-45-12	0.7050 (GGG50)		IC810			120-200	1.5	0.5-2.0	
<b>S</b>	High temperature alloys	33-35	340	Inconel 718	2.4668	HP/ RM-HP	IC830	1.5	0.5-1.5	23-35	0.7	0.5-1.0	Wet
							IC808			25-40	0.7	0.4-1.0	
							IC5820			23-35	0.7	0.5-1.0	
							IC882			20-30	0.7	0.5-1.0	
							IC830			20-45	0.7	0.5-1.0	
		36-37	HRC 35-40	AMS R56400	3.7165 (Ti6Al4V)		IC808			20-30	0.7	0.4-1.0	
							IC5820			20-30	0.7	0.5-1.0	
							IC830			20-30	0.7	0.5-1.0	
							IC882			20-30	0.9	0.5-1.0	
<b>H</b>	Hardened steel	38	HRC 45-49	HARDOX 450 plate		RM-T/T	IC808	1	0.5-1.5	50-75	0.5	0.4-0.5	Dry

\* ISCAR material group in accordance with VDI 3323 standard

\*\* Quenched and tempered

For machining in unstable conditions, the recommended cutting data should be reduced by 20-30%.

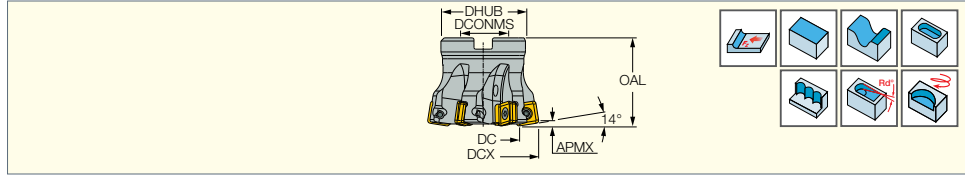
**Application Range FFQ4-12**





**FFQ4 D-17**

Fast Feed Face Mills Carrying Single-Sided Inserts with 4 Cutting Edges



Designation	DCX	DC	APMX	AE <sup>(1)</sup>	CICT <sup>(2)</sup>	OAL	DCONMS	DHUB	RMPX <sup>(3)</sup>		
<b>FFQ4 D080-06-27-17</b>	80.00	50.80	3.00	13.0	6	50.00	27.00	60.00	1.2	Y	0.78
<b>FFQ4 D100-07-32-17</b>	100.00	70.80	3.00	13.0	7	50.00	32.00	78.00	0.8	Y	1.18
<b>FFQ4 D125-08-40-17</b>	125.00	95.80	3.00	13.0	8	63.00	40.00	92.00	0.6	Y	2.48
<b>FFQ4 D160-10-40-17</b>	160.00	130.80	3.00	13.0	10	63.00	40.00	95.00	0.2	N	2.90

• Radius for programming 5.5 mm    <sup>(1)</sup> Plunging width    <sup>(2)</sup> Number of inserts    <sup>(3)</sup> Maximum ramping angle

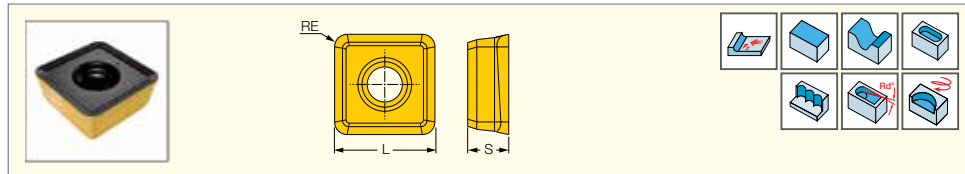
**Spare Parts**

Designation				
<b>FFQ4 D080-06-27-17</b>	SR M5-14 IP20 <sup>(a)</sup>	SW6-T	BLD IP20/S7	SR M12X30DIN912
<b>FFQ4 D100-07-32-17</b>	SR M5-14 IP20 <sup>(a)</sup>	SW6-T	BLD IP20/S7	
<b>FFQ4 D125-08-40-17</b>	SR M5-14 IP20 <sup>(a)</sup>	SW6-T	BLD IP20/S7	
<b>FFQ4 D160-10-40-17</b>	SR M5-14 IP20 <sup>(a)</sup>	SW6-T	BLD IP20/S7	

<sup>(a)</sup> Recommended tightening torque: 9.0 N-m

**FFQ4 SOMT 1706**

Square Single-Sided Inserts with 4 Cutting Edges for Fast Feed Milling



Designation	Dimensions			Tough ↔ Hard				Recommended Machining Data	
	L	S	RE	IC882	IC830	IC808	IC810	a <sub>p</sub> (mm)	f <sub>z</sub> (mm/t)
<b>FFQ4 SOMT 1706RM-T</b> <sup>(1)</sup>	17.50	6.00	2.50			•		1.20-3.00	0.40-2.00
<b>FFQ4 SOMT 170625HP</b> <sup>(2)</sup>	17.50	6.00	2.50	•	•	•		1.20-3.00	0.40-1.50
<b>FFQ4 SOMT 170625T</b> <sup>(3)</sup>	17.50	6.00	2.50		•	•	•	1.20-3.00	0.40-2.00

<sup>(1)</sup> For interrupted cut and machining next to shoulders on steel, stainless steel, cast iron and hardened steel

<sup>(2)</sup> For austenitic stainless steel and high temperature alloys

<sup>(3)</sup> For steel, ferritic and martensitic stainless steel, cast iron and hardened steel



**Recommended Machining Conditions for FFQ4-17 Fast Feed Mills**

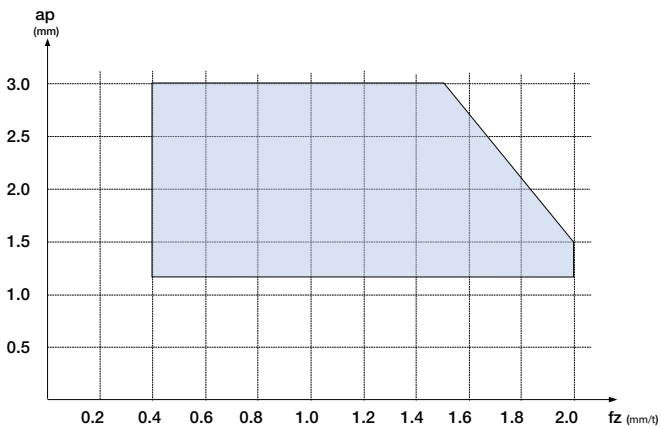
ISO class DIN/ISO 513	Description	Workpiece material				Insert type	Carbide grade	D.O.C. ap [mm]	Cutting speed Vc [m/min]	Feed fz [mm/tooth]	Coolant			
		ISCAR mat. group*	Hardness, HB	Typical material										
				AISI/SAE/ASTM	DIN W.-Nr.									
<b>P</b>	Non-alloy	1-5	130-180	1020	1.0402	T / RM-T	IC808	1.2-3.0	150-220	0.5-2.0	Dry			
							IC830		140-200	0.5-2.0	Dry/Wet			
	Low alloy steel	6-8	260-300	4340	1.6582		IC808		140-200	0.5-1.8	Dry			
							IC830		120-180	0.5-1.8	Dry/Wet			
	High alloy	10-11	200-220	H13	1.2344		IC808		130-180	0.5-1.5	Dry			
							IC830		120-160	0.5-1.5	Dry/Wet			
	Ferritic/martensitic stainless steel	12-13	200	420	1.4021		IC808		120-170	0.5-1.5	Dry			
							IC830		100-150	0.5-1.5	Dry/Wet			
	<b>M</b>	Austenitic stainless steel	14	200	304L		1.4306		HP	IC830	1.2-3.0	80-140	0.5-1.2	Wet
										IC808		100-160	0.5-1.2	
IC882						80-160		0.5-1.2						
<b>K</b>	Grey cast iron	15-16	250	Class 40	0.6025 (GG25)	T	IC810	1.2-3.0	150-220	0.5-2.0	Dry			
	Nodular cast iron	17-18	200	Class 65-45-12	0.7050 (GGG50)		IC810		120-200	0.5-2.0				
<b>S</b>	High temperature alloys	33-35	340	Inconel 718	2.4668	HP	IC830	1.2-3.0	25-35	0.4-0.8	Wet			
							IC808		25-40	0.4-0.8				
	36-37	HRC 30-32	AMS R56400	3.717 (Ti6Al4V ELI)	IC882		23-30		0.4-0.8					
					IC830		25-45		0.4-0.9					
	Hardened steel	38	HRC 45-49	HARDOX 450 plate	T / RM-T		IC808		IC808	1.2-3.0		50-75	0.4-0.6	Dry
									IC882			20-40	0.4-0.9	

\* ISCAR material group in accordance with VDI 3323 standard

\*\* Quenched and tempered

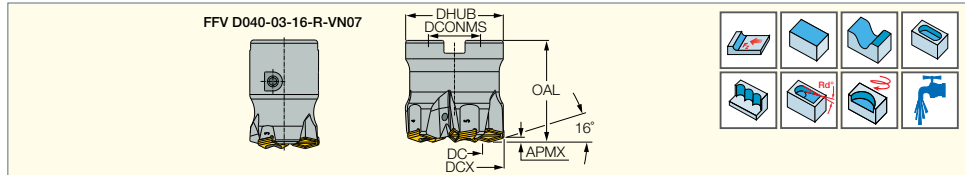
For machining in unstable conditions, the recommended cutting data should be reduced by 20-30%

**Application Range FFQ4-17**



**FFV-D-R-VN07**

Fast Feed Shell Mill Carrying  
Tangentially Clamped Inserts  
with 4 Cutting Edges



Designation	DCX	DC	APMX	CICT <sup>(2)</sup>	OAL	DCONMS	DHUB	RMPX <sup>(3)</sup>	Arbor	kg
<b>FFV D040-03-16-R-VN07</b> <sup>(1)</sup>	40.00	25.00	1.50	3	60.00	16.00	25.00	3.0	Special	0.36
<b>FFV D050-05-22-R-VN07</b>	50.00	35.00	1.50	5	50.00	22.00	48.00	3.2	A	0.47
<b>FFV D063-06-22-R-VN07</b>	63.00	48.00	1.50	6	40.00	22.00	48.00	2.2	A	1.17
<b>FFV D080-07-27-R-VN07</b>	80.00	65.00	1.50	7	50.00	27.00	60.00	1.5	A	0.81
<b>FFV D100-08-32-R-VN07</b>	100.00	85.00	1.50	8	50.00	32.00	78.00	1.2	B	1.61

• Radius for programming 2.8 mm

<sup>(1)</sup> Use on face mill adapters with the supplied retention screw

<sup>(2)</sup> Number of inserts

<sup>(3)</sup> Maximum ramping angle

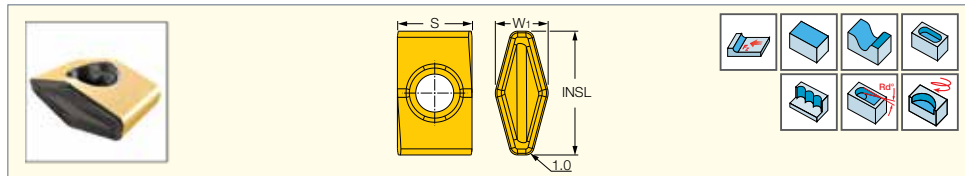
**Spare Parts**

Designation						
<b>FFV D040-03-16-R-VN07</b>	SR M4X0.7-L11.5 IP15 <sup>(a)</sup>	BLD IP15/S7	SW6-T-SH	SR M8X17-13685		HW 4.0
<b>FFV D050-05-22-R-VN07</b>	SR M4X0.7-L11.5 IP15 <sup>(a)</sup>	BLD IP15/S7	SW6-T-SH		SR PS 118-0271C	
<b>FFV D063-06-22-R-VN07</b>	SR M4X0.7-L11.5 IP15 <sup>(a)</sup>	BLD IP15/S7	SW6-T-SH	SR M10X25 DIN912		
<b>FFV D080-07-27-R-VN07</b>	SR M4X0.7-L11.5 IP15 <sup>(a)</sup>	BLD IP15/S7	SW6-T-SH			
<b>FFV D100-08-32-R-VN07</b>	SR M4X0.7-L11.5 IP15 <sup>(a)</sup>	BLD IP15/S7	SW6-T-SH			

<sup>(a)</sup> Recommended tightening torque: 5.2 N·m

**FF VNMT 0706**

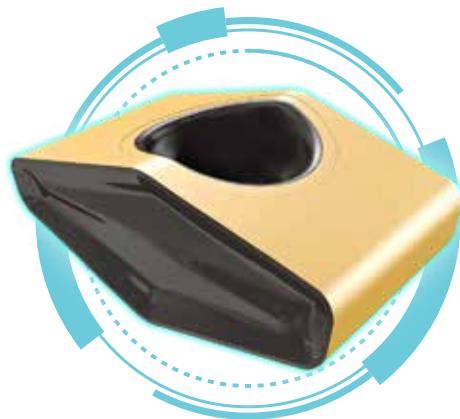
Tangentially Clamped Inserts with 4  
Cutting Edges for Fast Feed Milling



Designation	Dimensions				Tough ↔ Hard							Recommended Machining Data			
	W <sub>1</sub>	INSL	RE	S	IC882	IC845	IC840	IC830	IC5820	IC5400	IC5500	IC808	IC810	a <sub>0</sub> (mm)	f <sub>z</sub> (mm/t)
<b>FF VNMT 0706ZN-ER</b> <sup>(1)</sup>	6.40	15.00	1.00	9.05	•	•	•	•	•	•	•	•	•	0.50-1.50	0.40-1.80
<b>FF VNMT 0706ZN-ETR</b> <sup>(2)</sup>	6.40	15.00	1.00	9.05				•			•	•	•	0.50-1.50	0.40-1.80

<sup>(1)</sup> For general applications

<sup>(2)</sup> Reinforced cutting edges for interrupted cut and unfavorable conditions

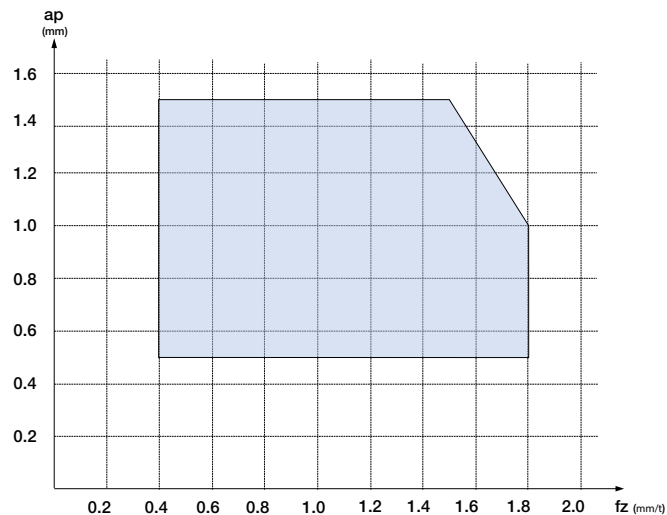


**Recommended Machining Conditions for FFV-07 Fast Feed Cutters**

ISO class DIN/ISO 513	Workpiece material					Insert type	Carbide grade	D.O.C. ap [mm]	Cutting speed Vc [m/min]	Feed fz [mm/tooth]	Coolant
	Description	ISCAR mat. group*	Hardness, HB	Typical material							
				AISI/SAE/ ASTM	DIN W.-Nr.						
<b>P</b>	Non-alloy steel	1-5	130-180	1020	1.0402	ER / ETR	IC808	0.5-1.5	150-220	0.50-1.30	Dry
							IC830		140-200	0.60-1.60	Dry/Wet
							IC845		130-180	0.70-1.80	Dry/Wet
							IC5400		150-250	0.50-1.10	Dry
	Low alloy steel	6-8	260-300	4340	1.6582		IC808		140-200	0.50-1.20	Dry
							IC830		120-180	0.50-1.50	Dry/Wet
							IC845		100-160	0.60-1.60	Dry/Wet
							IC5400		140-220	0.50-1.30	Dry
		9	HRC 35-42**	3135	1.5710		IC808		130-180	0.50-1.20	Dry
							IC830		120-160	0.50-1.40	Dry/Wet
							IC845		100-150	0.50-1.50	Dry/Wet
							IC5400		130-190	0.50-1.10	Dry
	High alloy steel	10-11	200-220	H13	1.2344		IC808		120-170	0.50-1.20	Dry
							IC830		100-150	0.50-1.30	Dry/Wet
							IC845		90-140	0.50-1.40	Dry/Wet
							IC5400		120-180	0.50-1.10	Dry
Ferritic/martensitic stainless steel	12-13	200	420	1.4021	IC808	110-160	0.50-1.20	Dry			
					IC830	100-150	0.50-1.30	Dry/Wet			
					IC845	100-140	0.50-1.40	Dry/Wet			
					IC5400	110-160	0.50-1.10	Dry			
<b>M</b>	Austenitic stainless steel	14	200	304L	1.4306	ER	0.5-1.5	IC840	80-140	0.40-0.60	Wet
								IC830	80-120	0.40-0.70	
								IC882	80-130	0.40-0.90	
								IC5820	100-160	0.40-0.80	
								IC808	100-160	0.40-0.70	
<b>K</b>	Gray cast iron	15-16	250	Class 40	0.6025 (GG25)	ER / ETR	0.5-1.5	IC810	150-220	0.50-1.80	Dry
	Nodular cast iron	17-18	200	Class 65-45-12	0.7050 (GGG50)			IC810	120-200	0.50-1.80	
<b>S</b>	High temperature alloys	33-35	340	Inconel 718	2.4668	ER	0.5-1.5	IC808	25-40	0.40-0.60	Wet
								IC840	25-35	0.40-0.50	
								IC882	20-30	0.50-0.80	
								IC5820	25-35	0.50-0.70	
								IC830	20-30	0.40-0.60	
	36-37	HRC 30-32	AMS R56400	3.7165 (Ti6Al4V ELI)	IC808			30-60	0.40-0.70		
					IC840			25-35	0.40-0.60		
					IC882			25-35	0.40-0.90		
					IC5820			20-30	0.40-0.80		
					IC830			20-30	0.40-0.70		
<b>H</b>	Hardened steel	38.1	HRC 45-49	HARDOX 450 plate		ETR	0.5-1.5	IC808	75-90	0.40-0.80	Dry

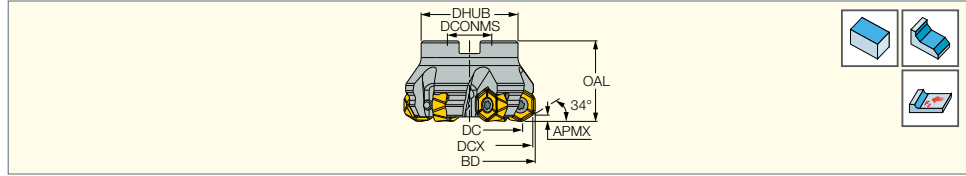
\* ISCAR material group in accordance with VDI 3323 standard \*\* Quenched and tempered  
For machining in unstable conditions, the recommended cutting data should be reduced by 20-30%

**Application Range FFV-07**



**MF FHX-R06**

34° Face Mills Carrying Hexagonal Inserts with 12 Cutting Edges



Designation	DCX	BD	DC	CICT	APMX	OAL	DHUB	DCONMS	Arbor <sup>(1)</sup>		
MF FHX D063-06-22-R06	63.00	65.40	53.40	6	3.00	40.00	48.00	22.00	A	Y	0.46
MF FHX D080-07-27-R06	80.00	82.40	70.40	7	3.00	50.00	60.00	27.00	A	Y	0.98
MF FHX D080-07-32-R06	80.00	82.40	70.40	7	3.00	50.00	66.00	32.00	A	Y	0.86
MF FHX D100-09-32-R06	100.00	102.40	90.40	9	3.00	50.00	78.00	32.00	B	Y	1.57
MF FHX D125-11-40-R06	125.00	127.40	115.40	11	3.00	50.00	92.00	40.00	B	Y	2.44
MF FHX D160-13-40-R06	160.00	162.40	150.40	13	3.00	55.00	95.00	40.00	C	N	3.48

• Radius for programming according to D1 diameter is 5.4 mm • When machining next to shoulders, maximum width of cut should be 0.3xD

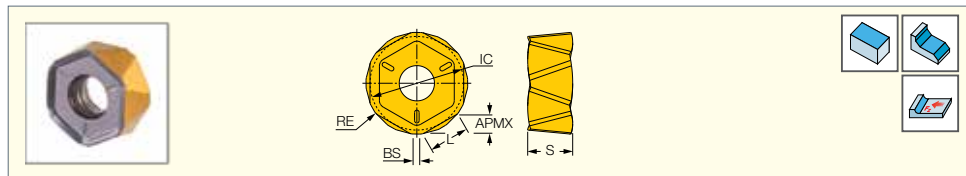
**Spare Parts**

Designation				
MF FHX D063-06-22-R06	SR 14-591/H <sup>(a)</sup>	BLD T20/S7	SW6-T	SR M10X25 DIN912
MF FHX D080-07-27-R06	SR 14-591/H <sup>(a)</sup>	BLD T20/S7	SW6-T	SR M12X30DIN912
MF FHX D080-07-32-R06	SR 14-591/H <sup>(a)</sup>	BLD T20/S7	SW6-T	SR M16X30 DIN912
MF FHX D100-09-32-R06	SR 14-591/H <sup>(a)</sup>	BLD T20/M7	SW6-T	
MF FHX D125-11-40-R06	SR 14-591/H <sup>(a)</sup>	BLD T20/M7	SW6-T	
MF FHX D160-13-40-R06	SR 14-591/H <sup>(a)</sup>	BLD T20/M7	SW6-T	

<sup>(a)</sup> Recommended tightening torque: 9.0 N-m

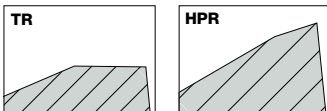
**H1200 HXCU 0606**

Double-Sided Hexagonal Inserts with 12 Cutting Edges

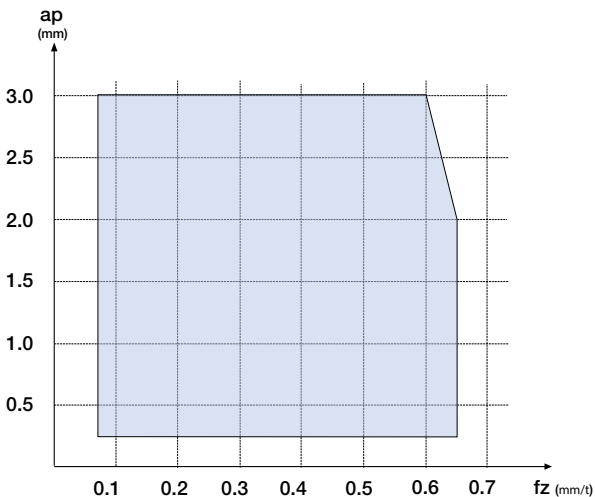


Designation	Dimensions						Tough ↔ Hard						Recommended Machining Data	
	APMX	L	BS	RE	IC	S	IC845	IC840	IC830	IC5500	IC808	IC810	a <sub>D</sub> (mm)	f <sub>Z</sub> (mm/t)
H1200 HXCU 0606-HPR	3.00	6.43	1.06	1.60	14.88	7.15	•	•	•	•	•	•	0.20-3.00	0.08-0.40
H1200 HXCU 0606-TR	3.00	6.43	1.06	1.60	14.88	7.15	•	•	•	•	•	•	0.20-3.00	0.25-0.65

• TR-for steel and cast iron, HPR-for stainless steel and high temperature alloys

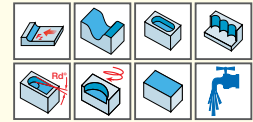
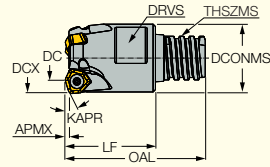


**Application Range MF FHX-R06**



**FF EWX-MM**

Fast Feed Endmills with MULTI-MASTER  
Threaded Connection Carrying Double-  
Sided Inserts with 6 Cutting Edges



Designation	DCX	DC	APMX	CICT	THSZMS	LF	OAL	DHUB	DRVS <sup>(1)</sup>	RMPX	
<b>FF EWX D16-2-MMT10-04</b>	16.00	8.60	0.80	2	T10	19.50	31.25	15.20	12.0	5.0	0.02
<b>FF EWX D20-3-MMT12-04</b>	20.00	12.60	0.80	3	T12	25.00	38.80	18.80	15.0	4.8	0.05
<b>FF EWX D25-4-MMT15-04</b>	25.00	17.60	0.80	4	T15	30.00	47.00	23.90	19.0	3.3	0.10
<b>FF EWX D25-3-MMT15-05</b>	25.00	15.00	1.00	3	T15	30.00	47.00	23.90	19.0	5.0	0.09

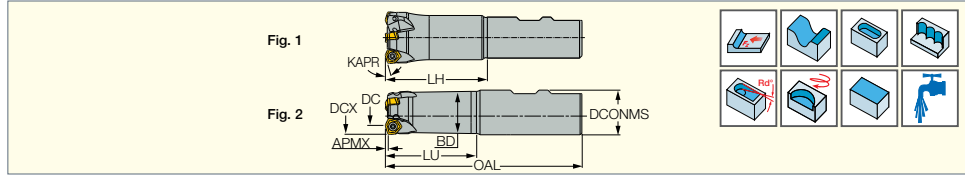
• Do not apply lubricant to the MULTI-MASTER threaded connection. <sup>(1)</sup> Width across flats (wrench should be ordered separately)

**Spare Parts**

Designation		
<b>FF EWX D16-2-MMT10-04</b>	SR M2.5X6-T7-60	T-7/51
<b>FF EWX D20-3-MMT12-04</b>	SR M2.5X6-T7-60	T-7/51
<b>FF EWX D25-4-MMT15-04</b>	SR M2.5X6-T7-60	T-7/51
<b>FF EWX D25-3-MMT15-05</b>	SR 10508600	T-9/51







**FF EWX**  
Fast Feed Endmills Carrying Double-Sided Inserts with 6 Cutting Edges



Designation	DCX	DC	APMX	CICT	BD	LU	LH	OAL	DCONMS	Shank <sup>(1)</sup>	RMPX	Fig	kg	KAPR
<b>FF EWX D16-2-030-C16-04</b>	16.00	8.60	0.80	2	14.90	30.0	-	113.00	16.00	C	5.0	2.	0.15	17.0
<b>FF EWX D16-2-030-W16-04</b>	16.00	8.60	0.80	2	14.90	30.0	-	81.00	16.00	W	5.0	2.	0.10	17.0
<b>FF EWX D16-2-050-W20-04</b>	16.00	8.60	0.80	2	14.90	50.0	-	109.00	20.00	W	5.0	2.	0.19	17.0
<b>FF EWX D16-2-070-C20-04</b>	16.00	8.60	0.80	2	14.90	70.0	-	159.00	20.00	C	5.0	2.	0.28	17.0
<b>FF EWX D16-2-080-W20-04</b>	16.00	8.60	0.80	2	14.90	80.0	-	139.00	20.00	W	5.0	2.	0.22	17.0
<b>FF EWX D20-3-040-W20-04</b>	20.00	12.60	0.80	3	18.90	40.0	-	93.00	20.00	W	4.8	2.	0.19	17.0
<b>FF EWX D20-3-050-C20-04</b>	20.00	12.60	0.80	3	18.90	50.0	-	133.00	20.00	C	4.8	2.	0.28	17.0
<b>FF EWX D20-3-060-W20-04</b>	20.00	12.60	0.80	3	18.90	60.0	-	113.00	20.00	W	4.8	2.	0.23	17.0
<b>FF EWX D20-3-100-C20-04</b>	20.00	12.60	0.80	3	18.90	100.0	-	183.00	20.00	C	4.8	2.	0.38	17.0
<b>FF EWX D20-3-100-W20-04</b>	20.00	12.60	0.80	3	18.90	100.0	-	153.00	20.00	W	4.8	2.	0.31	17.0
<b>FF EWX D25-3-050-W20-05</b>	25.00	15.00	1.00	3	23.60	50.0	53.0	110.00	25.00	W	5.0	2.	0.34	17.0
<b>FF EWX D25-3-060-C25-05</b>	25.00	15.00	1.00	3	23.60	60.0	63.0	145.00	25.00	C	5.0	2.	0.47	17.0
<b>FF EWX D25-3-080-W25-05</b>	25.00	15.00	1.00	3	23.60	80.0	83.0	140.00	25.00	W	5.0	2.	0.44	17.0
<b>FF EWX D25-3-120-C25-05</b>	25.00	15.00	1.00	3	23.60	120.0	123.0	205.00	25.00	C	5.0	2.	0.66	17.0
<b>FF EWX D25-3-120-W25-05</b>	25.00	15.00	1.00	3	23.60	120.0	123.0	180.00	25.00	W	5.0	2.	0.56	17.0
<b>FF EWX D32-4-040-C25-05</b>	32.00	22.00	1.00	4	27.00	-	40.0	180.00	25.00	C	4.0	1.	0.63	17.0
<b>FF EWX D32-4-060-W25-05</b>	32.00	22.00	1.00	4	27.00	60.0	63.0	120.00	25.00	W	4.0	1.	0.43	17.0
<b>FF EWX D32-4-060-W32-05</b>	32.00	22.00	1.00	4	27.00	-	63.0	125.00	32.00	W	4.0	2.	0.64	17.0
<b>FF EWX D32-4-070-C32-05</b>	32.00	22.00	1.00	4	30.60	70.0	73.0	155.00	32.00	C	4.0	2.	0.81	17.0
<b>FF EWX D32-4-100-W25-05</b>	32.00	22.00	1.00	4	27.00	-	100.0	160.00	25.00	W	4.0	1.	0.60	17.0
<b>FF EWX D32-4-100-W32-05</b>	32.00	22.00	1.00	4	30.60	100.0	103.0	165.00	32.00	W	4.0	2.	0.84	17.0
<b>FF EWX D32-4-120-C32-05</b>	32.00	22.00	1.00	4	30.60	120.0	123.0	205.00	32.00	C	4.0	2.	1.06	17.0
<b>FF EWX D32-4-150-W32-05</b>	32.00	22.00	1.00	4	30.60	150.0	153.0	215.00	32.00	W	4.0	2.	1.08	17.0
<b>FF EWX D40-5-L50-C32-05</b>	40.00	30.00	1.00	5	34.00	-	50.0	250.00	32.00	C	2.8	1.	1.40	17.0
<b>FF EWX D40-5-S50-C32-05</b>	40.00	30.00	1.00	5	34.00	-	50.0	150.00	32.00	C	2.8	1.	0.85	17.0
<b>FF EWX D40-5-060-W32-05</b>	40.00	30.00	1.00	5	34.00	-	60.0	125.00	32.00	W	2.8	1.	0.72	17.0
<b>FF EWX D40-5-200-W40-05</b>	40.00	30.00	1.00	5	38.60	200.0	203.0	275.00	40.00	W	2.8	2.	2.08	17.0
<b>FF EWX D32-3-060-W32-07</b>	32.00	19.00	1.50	3	30.70	60.0	63.0	125.00	32.00	W	6.3	2.	0.60	17.0
<b>FF EWX D32-3-070-C32-07</b>	32.00	19.00	1.50	3	30.70	70.0	73.0	155.00	32.00	C	6.3	2.	0.76	17.0
<b>FF EWX D32-3-100-W32-07</b>	32.00	19.00	1.50	3	30.70	100.0	103.0	165.00	32.00	W	6.3	2.	0.78	17.0
<b>FF EWX D32-3-120-C32-07</b>	32.00	19.00	1.50	3	30.70	120.0	123.0	205.00	32.00	C	6.3	2.	0.99	17.0
<b>FF EWX D40-4-S50-C32-07</b>	40.00	27.00	1.50	4	-	50.0	52.2	150.00	32.00	C	4.2	1.	0.84	17.0

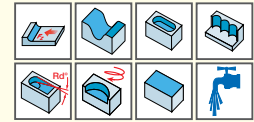
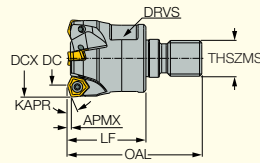
<sup>(1)</sup> C-Cylindrical, W-Weldon

**Spare Parts**

Designation				
<b>FF EWX D...-04</b>	SR M2.5X6-T7-60	T-7/51		
<b>FF EWX D...-05</b>	SR 10508600	T-9/51		
<b>FF EWX D...-07</b>	SR 34-535-SN		BLD T15/S7	SW6-T-SH

**FF EWX-M**

Fast Feed Endmills with FLEXFIT  
Threaded Connection Carrying Double-  
Sided Inserts with 6 Cutting Edges

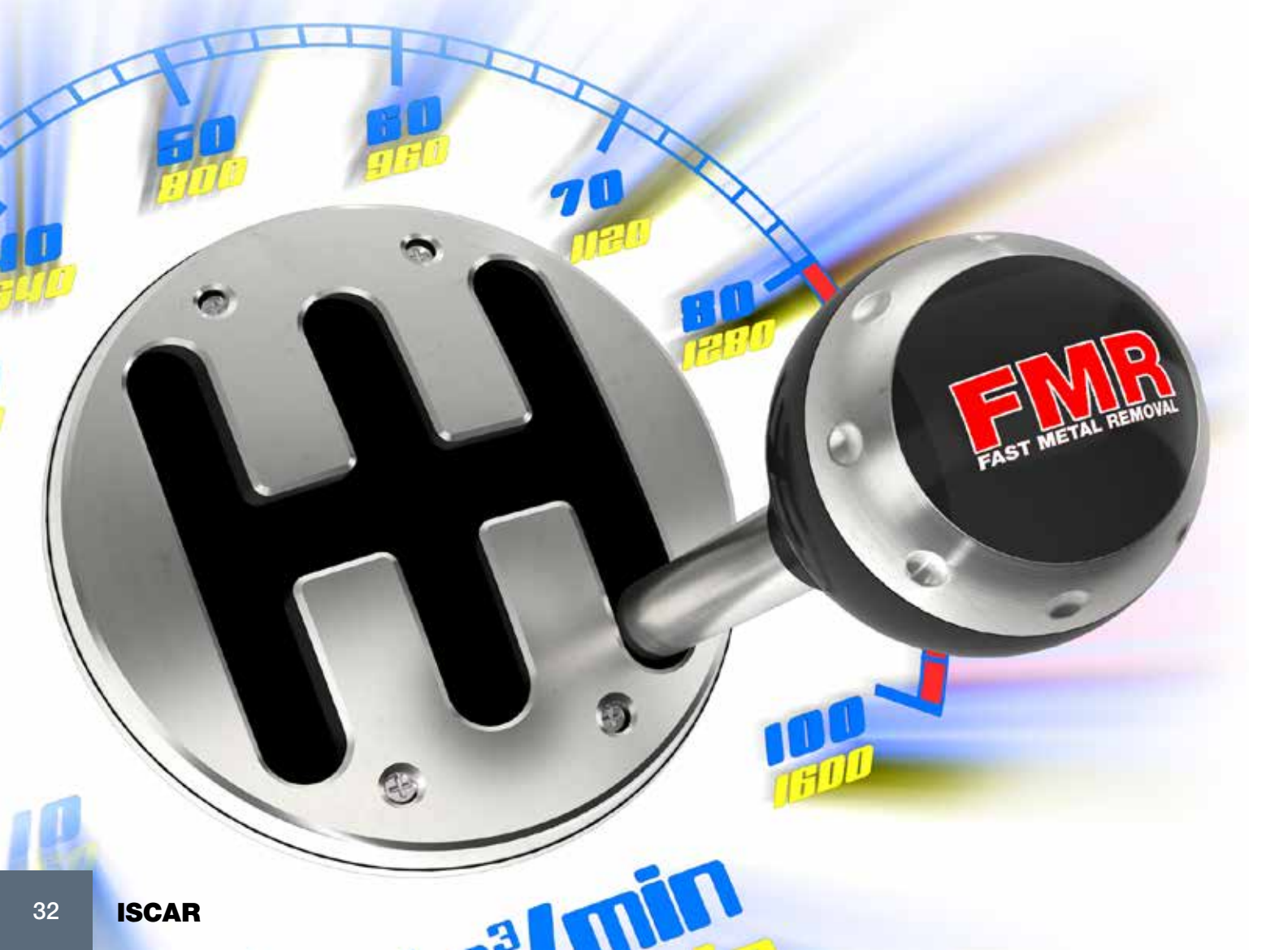


Designation	DCX	DC	APMX	CICT	LF	OAL	THSZMS	RMPX	kg	DRVS <sup>(1)</sup>
<b>FF EWX D20-3-M10-04</b>	20.00	12.60	0.80	3	25.00	45.00	M10	4.8	0.05	15.0
<b>FF EWX D25-4-M12-04</b>	25.00	17.60	0.80	4	30.00	52.00	M12	3.3	0.09	19.0
<b>FF EWX D25-3-M12-05</b>	25.00	15.00	1.00	3	30.00	52.00	M12	5.0	0.09	19.0
<b>FF EWX D32-4-M16-05</b>	32.00	22.00	1.00	4	35.00	60.00	M16	4.0	0.17	25.0
<b>FF EWX D35-4-M16-05</b>	35.00	25.00	1.00	4	35.00	60.00	M16	3.5	0.19	25.0
<b>FF EWX D40-5-M16-05</b>	40.00	30.00	1.00	5	40.00	65.00	M16	2.8	0.26	25.0
<b>FF EWX D32-3-M16-07</b>	32.00	19.00	1.50	3	35.00	60.00	M16	6.3	0.16	25.0
<b>FF EWX D40-4-M16-07</b>	40.00	27.00	1.50	4	40.00	65.00	M16	4.2	0.24	25.0

<sup>(1)</sup> Clamping wrench size

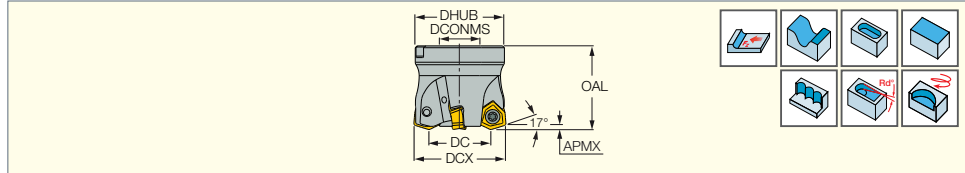
**Spare Parts**

Designation		
<b>FF EWX D20-3-M10-04</b>	SR M2.5X6-T7-60	T-7/51
<b>FF EWX D25-4-M12-04</b>	SR M2.5X6-T7-60	T-7/51
<b>FF EWX D25-3-M12-05</b>	SR 10508600	T-9/51
<b>FF EWX D32-4-M16-05</b>	SR 10508600	T-9/51
<b>FF EWX D35-4-M16-05</b>	SR 10508600	T-9/51
<b>FF EWX D40-5-M16-05</b>	SR 10508600	T-9/51
<b>FF EWX D32-3-M16-07</b>	SR 34-535-SN	
<b>FF EWX D40-4-M16-07</b>	SR 34-535-SN	





**FF FWX**  
Fast Feed Face Mills Carrying Double-Sided Inserts with 6 Cutting Edges



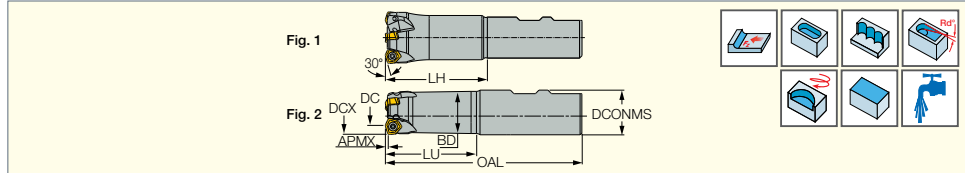
Designation	DC	DCX	APMX	CICT	OAL	DHUB	DCONMS	Arbor <sup>(1)</sup>	RMPX		
FF FWX D040-05-16-05	30.10	40.00	1.00	5	35.00	38.00	16.00	A	2.8	Y	0.20
FF FWX D050-06-22-05	40.10	50.00	1.00	6	40.00	48.00	22.00	A	2.0	Y	0.36
FF FWX D052-06-22-05	42.10	52.00	1.00	6	40.00	48.00	22.00	A	1.9	Y	0.37
FF FWX D040-04-16-07	27.00	40.00	1.50	4	35.00	38.00	16.00	A	4.2	Y	0.18
FF FWX D050-05-22-07	37.00	50.00	1.50	5	40.00	48.00	22.00	A	2.9	Y	0.33
FF FWX D052-05-22-07	39.00	52.00	1.50	5	40.00	48.00	22.00	A	2.8	Y	0.33
FF FWX D063-06-22-07	50.00	63.00	1.50	6	40.00	61.00	22.00	A	2.1	Y	0.58
FF FWX D080-07-32-07	67.00	80.00	1.50	7	55.00	76.00	32.00	A	1.6	Y	1.38
FF FWX D100-08-32-07	87.00	100.00	1.50	8	50.00	78.00	32.00	B	1.2	Y	1.47
FF FWX D050-04-22-08	34.00	50.00	2.00	4	45.00	48.00	22.00	A	4.8	Y	0.34
FF FWX D052-04-22-08	36.00	52.00	2.00	4	45.00	48.00	22.00	A	4.5	Y	0.37
FF FWX D063-05-22-08	47.00	63.00	2.00	5	45.00	61.00	22.00	A	3.3	Y	0.61
FF FWX D063-05-27-08	47.00	63.00	2.00	5	50.00	61.00	27.00	A	3.3	Y	0.65
FF FWX D066-05-22-08	50.00	66.00	2.00	5	45.00	61.00	22.00	A	3.1	Y	0.68
FF FWX D066-05-27-08	50.00	66.00	2.00	5	50.00	61.00	27.00	A	3.1	Y	0.72
FF FWX D080-06-32-08	64.00	80.00	2.00	6	55.00	76.00	32.00	A	2.3	Y	1.24
FF FWX D100-07-32-08	84.00	100.00	2.00	7	50.00	78.00	32.00	B	1.7	Y	1.42
FF FWX D125-09-40-08	109.00	125.00	2.00	9	55.00	90.00	40.00	B	1.3	Y	2.37
FF FWX D160-11-40-08	144.00	160.00	2.00	11	55.00	95.00	40.00	C	1.0	N	3.47

**Spare Parts**

Designation					
FF FWX D040-05-16-05	SR 10508600	T-9/51			SR M8X25DIN912
FF FWX D050-06-22-05	SR 10508600	T-9/51			SR M10X25 DIN912
FF FWX D052-06-22-05	SR 10508600	T-9/51			SR M10X25 DIN912
FF FWX D040-04-16-07	SR 34-535-SN		BLD T15/S7	SW6-T-SH	SR M8X25-D11.5
FF FWX D050-05-22-07	SR 34-535-SN		BLD T15/S7	SW6-T-SH	SR M10X25 DIN912
FF FWX D052-05-22-07	SR 34-535-SN		BLD T15/S7	SW6-T-SH	SR M10X25 DIN912
FF FWX D063-06-22-07	SR 34-535-SN		BLD T15/S7	SW6-T-SH	SR M10X25 DIN912
FF FWX D080-07-32-07	SR 34-535-SN		BLD T15/S7	SW6-T-SH	SR M16X30 DIN912
FF FWX D100-08-32-07	SR 34-535-SN		BLD T15/M7	SW6-T-SH	
FF FWX D050-04-22-08	SR 14-591/H		BLD T20/S7	SW6-T	SR M10X25 DIN912
FF FWX D052-04-22-08	SR 14-591/H		BLD T20/S7	SW6-T	SR M10X25 DIN912
FF FWX D063-05-22-08	SR 14-591/H		BLD T20/S7	SW6-T	SR M10X25 DIN912
FF FWX D063-05-27-08	SR 14-591/H		BLD T20/S7	SW6-T	SR M12X30DIN912
FF FWX D066-05-22-08	SR 14-591/H		BLD T20/S7	SW6-T	SR M10X25 DIN912
FF FWX D066-05-27-08	SR 14-591/H		BLD T20/S7	SW6-T	SR M12X30DIN912
FF FWX D080-06-32-08	SR 14-591/H		BLD T20/S7	SW6-T	SR M16X30 DIN912
FF FWX D100-07-32-08	SR 14-591/H		BLD T20/M7	SW6-T	
FF FWX D125-09-40-08	SR 14-591/H		BLD T20/L7	SW6-T	
FF FWX D160-11-40-08	SR 14-591/H		BLD T20/L7	SW6-T	

**MF EWX**

Moderate Feed Endmills  
Carrying Double-Sided Inserts  
with 6 Cutting Edges



Designation	DCX	DC	APMX	CICT	LU	LH	OAL	DCONMS	Shank <sup>(1)</sup>	BD	RMPX	Fig	kg
MF EWX D16-2-040-W20-04	16.00	9.00	1.50	2	40.0	47.0	99.00	20.00	W	14.90	3.8	2	0.16
MF EWX D20-3-050-C20-04	20.00	13.00	1.50	3	50.0	52.7	134.00	20.00	C	18.90	2.4	2	0.24
MF EWX D20-3-050-W20-04	20.00	13.00	1.50	3	50.0	52.7	104.00	20.00	W	18.90	2.4	2	0.18
MF EWX D25-3-060-W25-05	25.00	15.50	2.00	3	60.0	63.0	120.00	25.00	W	23.60	3.0	2	0.33
MF EWX D32-4-080-W32-05	32.00	22.50	2.00	4	80.0	83.0	145.00	32.00	W	30.60	1.9	2	0.70
MF EWX D32-3-080-C32-07	32.00	19.70	2.70	3	80.0	83.0	165.00	32.00	C	30.70	3.0	2	0.80
MF EWX D32-3-080-W32-07	32.00	19.70	2.70	3	80.0	83.0	145.00	32.00	W	30.70	3.0	2	0.70
MF EWX D40-4-090-C32-07	40.00	27.70	2.70	4	90.0	92.0	190.00	32.00	C	36.80	2.0	1	1.16

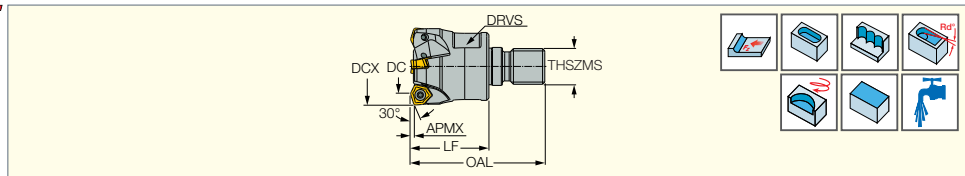
<sup>(1)</sup> C-Cylindrical, W-Weldon

**Spare Parts**

Designation				
MF EWX D16-2-040-W20-04	SR M2.5X6-T7-60	T-7/51		
MF EWX D20-3-050-C20-04	SR M2.5X6-T7-60	T-7/51		
MF EWX D20-3-050-W20-04	SR M2.5X6-T7-60	T-7/51		
MF EWX D25-3-060-W25-05	SR 10508600	T-9/51		
MF EWX D32-4-080-W32-05	SR 10508600	T-9/51		
MF EWX D32-3-080-C32-07	SR 34-535-SN		BLD T15/S7	SW6-T-SH
MF EWX D32-3-080-W32-07	SR 34-535-SN		BLD T15/S7	SW6-T-SH
MF EWX D40-4-090-C32-07	SR 34-535-SN		BLD T15/S7	SW6-T-SH

**MF EWX-M**

Moderate Feed Endmills with FLEXFIT  
Threaded Connection Carrying Double-  
Sided Inserts with 6 Cutting Edges



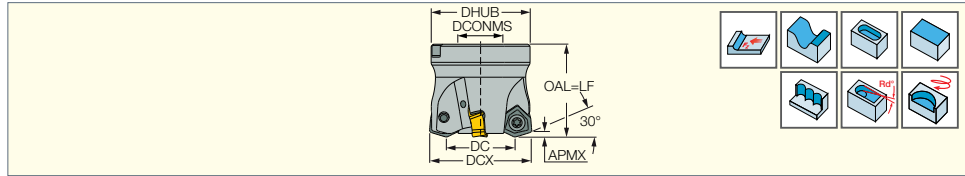
Designation	DCX	DC	APMX	CICT	LF	OAL	THSZMS	DRVS <sup>(1)</sup>	RMPX	kg
MF EWX D20-3-M10-04	20.00	13.00	1.50	3	28.00	48.00	M10	14.0	2.4	0.05
MF EWX D25-4-M12-04	25.00	18.00	1.50	4	32.00	54.00	M12	17.0	1.7	0.09
MF EWX D25-3-M12-05	25.00	15.50	2.00	3	30.00	52.00	M12	17.0	3.0	0.07
MF EWX D32-4-M16-05	32.00	22.50	2.00	4	35.00	60.00	M16	24.0	1.9	0.16
MF EWX D32-3-M16-07	32.00	19.70	2.70	3	35.00	60.00	M16	24.0	3.0	0.15

<sup>(1)</sup> Clamping wrench size

**Spare Parts**

Designation				
MF EWX D20-3-M10-04	SR M2.5X6-T7-60	T-7/51		
MF EWX D25-4-M12-04	SR M2.5X6-T7-60	T-7/51		
MF EWX D25-3-M12-05	SR 10508600	T-9/51		
MF EWX D32-4-M16-05	SR 10508600	T-9/51		
MF EWX D32-3-M16-07	SR 34-535-SN		BLD T15/S7	SW6-T-SH

**MF FWX**  
Moderate Feed Face Mills  
Carrying Double-Sided Inserts  
with 6 Cutting Edges



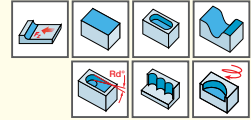
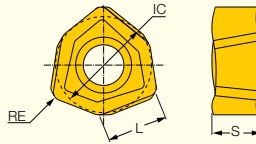
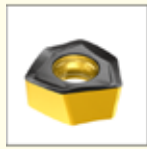
Designation	DC	DCX	APMX	CICT	OAL	DHUB	DCONMS	Arbor <sup>(1)</sup>	RMPX		
MF FWX D040-05-16-05	30.60	40.00	2.00	5	35.00	38.00	16.00	A	1.4	Y	0.17
MF FWX D050-06-22-05	40.50	50.00	2.00	6	40.00	48.00	22.00	A	1.0	Y	0.30
MF FWX D052-06-22-05	42.50	52.00	2.00	6	40.00	48.00	22.00	A	1.0	Y	0.32
MF FWX D063-08-22-05	53.50	63.00	2.00	8	40.00	48.00	22.00	A	0.8	Y	0.41
MF FWX D040-04-16-07	27.70	40.00	2.70	4	35.00	38.00	16.00	A	2.0	Y	0.17
MF FWX D050-05-22-07	37.70	50.00	2.70	5	40.00	48.00	22.00	A	1.4	Y	0.31
MF FWX D052-05-22-07	39.70	52.00	2.70	5	40.00	48.00	22.00	A	1.3	Y	0.32
MF FWX D063-06-22-07	50.70	63.00	2.70	6	40.00	48.00	22.00	A	1.0	Y	0.42
MF FWX D080-07-32-07	67.70	80.00	2.70	7	55.00	76.00	32.00	A	0.8	Y	1.21
MF FWX D100-08-32-07	87.70	100.00	2.70	8	50.00	78.00	32.00	B	0.6	Y	1.46
MF FWX D050-04-22-08	34.70	50.00	3.50	4	45.00	48.00	22.00	A	2.5	Y	0.32
MF FWX D063-05-27-08	47.70	63.00	3.50	5	50.00	61.00	27.00	A	1.7	Y	0.63
MF FWX D066-05-27-08	50.70	66.00	3.50	5	50.00	61.00	27.00	A	1.7	Y	0.64
MF FWX D080-06-32-08	64.70	80.00	3.50	6	55.00	76.00	32.00	A	1.2	Y	1.13
MF FWX D100-07-32-08	84.70	100.00	3.50	7	50.00	78.00	32.00	B	0.9	Y	1.37
MF FWX D125-09-40-08	109.70	125.00	3.50	9	55.00	90.00	40.00	B	0.7	Y	2.36
MF FWX D160-11-40-08	144.70	160.00	3.50	11	55.00	95.00	40.00	C	0.5	N	3.63

**Spare Parts**

Designation					
MF FWX D040-05-16-05	SR 10508600	T-9/51			SR M8X25DIN912
MF FWX D050-06-22-05	SR 10508600	T-9/51			SR M10X25 DIN912
MF FWX D052-06-22-05	SR 10508600	T-9/51			SR M10X25 DIN912
MF FWX D063-08-22-05	SR 10508600	T-9/51			SR M10X25 DIN912
MF FWX D040-04-16-07	SR 34-535-SN		BLD T15/S7	SW6-T-SH	SR M8X25-D11.5
MF FWX D050-05-22-07	SR 34-535-SN		BLD T15/S7	SW6-T-SH	SR M10X25 DIN912
MF FWX D052-05-22-07	SR 34-535-SN		BLD T15/S7	SW6-T-SH	SR M10X25 DIN912
MF FWX D063-06-22-07	SR 34-535-SN		BLD T15/S7	SW6-T-SH	SR M10X25 DIN912
MF FWX D080-07-32-07	SR 34-535-SN		BLD T15/S7	SW6-T-SH	SR M16X30 DIN912
MF FWX D100-08-32-07	SR 34-535-SN		BLD T15/M7	SW6-T-SH	
MF FWX D050-04-22-08	SR 14-591/H		BLD T20/S7	SW6-T	SR M10X25 DIN912
MF FWX D063-05-27-08	SR 14-591/H		BLD T20/S7	SW6-T	SR M12X30DIN912
MF FWX D066-05-27-08	SR 14-591/H		BLD T20/S7	SW6-T	SR M12X30DIN912
MF FWX D080-06-32-08	SR 14-591/H		BLD T20/S7	SW6-T	SR M16X30 DIN912
MF FWX D100-07-32-08	SR 14-591/H		BLD T20/M7	SW6-T	
MF FWX D125-09-40-08	SR 14-591/H		BLD T20/L7	SW6-T	
MF FWX D160-11-40-08	SR 14-591/H		BLD T20/L7	SW6-T	

**H600 WXCU**

Double-Sided Inserts with 6 Cutting Edges for Fast Feed Machining



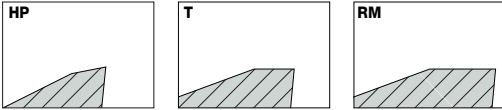
Designation	Dimensions				Tough ↔ Hard						
	IC	L	S	RE <sup>(4)</sup>	IC882	IC330	IC830	IC5820	IC380	IC808	IC810
H600 WXCU 040310HP <sup>(1)</sup>	6.25	4.13	3.10	0.96		•	•				
H600 WXCU 040310T <sup>(2)</sup>	6.25	4.13	3.10	0.96			•			•	
H600 WXCU 05T312HP <sup>(1)</sup>	8.33	5.50	4.20	1.20	•	•		•			
H600 WXCU 05T312T <sup>(2)</sup>	8.33	5.50	4.20	1.20			•			•	•
H600 WXCU 070515HP <sup>(1)</sup>	11.14	7.16	5.90	1.50	•	•	•	•	•		
H600 WXCU 070515T <sup>(2)</sup>	11.14	7.16	5.90	1.50			•			•	•
H600 WXCU 080612HP <sup>(1)</sup>	13.65	8.80	6.80	1.20	•	•	•		•	•	
H600 WXCU 080612T <sup>(2)</sup>	13.65	8.80	6.80	1.20			•			•	•
H600 WXCU 080616RM <sup>(3)</sup>	13.65	8.80	6.80	1.60			•			•	

<sup>(1)</sup> For stainless steel and high temperature alloys

<sup>(2)</sup> For alloy steel and cast iron, "I" mark on top rake face for identification

<sup>(3)</sup> For interrupted cut and hard materials

<sup>(4)</sup> For insert radius for programming see table below



Inserts	Cutting Recommendations for FF Tools		Radius for Programming on FF Tools	Cutting Recommendations for MF Tools		Radius for Programming on MF Tools
	ap (mm)	fz (mm/t)		ap (mm)	fz (mm/t)	
H600 WXCU 040310HP	0.5-0.8	0.34-0.68	1.9	0.5-1.5	0.2-0.4	2.6
H600 WXCU 040310T	0.5-0.8	0.68-1.03	1.9	0.5-1.5	0.4-0.6	2.6
H600 WXCU 05T312HP	0.7-1.0	0.34-0.68	2.3	0.8-2.0	0.2-0.4	3.3
H600 WXCU 05T312T	0.7-1.0	0.68-1.03	2.3	0.8-2.0	0.4-0.6	3.3
H600 WXCU 070515HP	1.0-1.5	0.34-0.86	3.1	1-2.7	0.2-0.5	4.1
H600 WXCU 070515T	1.0-1.5	0.68-1.37	3.1	1-2.7	0.4-0.8	4.1
H600 WXCU 080612HP	1.5-2.0	0.34-0.86	3.3	1.8-3.5	0.2-0.5	4.8
H600 WXCU 080612T	1.5-2.0	0.68-1.37	3.3	1.8-3.5	0.4-0.8	4.8
H600 WXCU 080616RM	1.5-2.0	0.68-1.37	3.7	1.8-3.5	0.4-0.8	5.2

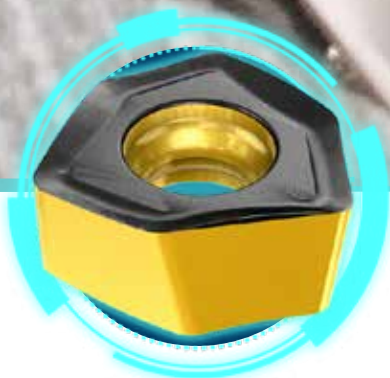


Inserts	Cutting Recommendations for FF Tools in plunging		Radius for Programming on FF Tools	Cutting Recommendations for MF Tools in plunging		Radius for Programming on MF Tools
	ae (mm)	fz (mm/t)		ae (mm)	fz (mm/t)	
H600 WXCU 040310HP	3.7	0.04-0.08	1.9	3.5	0.04-0.08	2.6
H600 WXCU 040310T	3.7	0.04-0.10	1.9	3.5	0.04-0.10	2.6
H600 WXCU 05T312HP	5	0.04-0.08	2.3	4.75	0.04-0.08	3.3
H600 WXCU 05T312T	5	0.04-0.10	2.3	4.75	0.04-0.10	3.3
H600 WXCU 070515HP	6.5	0.04-0.10	3.1	6.15	0.04-0.10	4.1
H600 WXCU 070515T	6.5	0.04-0.12	3.1	6.15	0.04-0.12	4.1
H600 WXCU 080612HP	8	0.04-0.10	3.3	7.65	0.04-0.10	4.8
H600 WXCU 080612T	8	0.04-0.12	3.3	7.65	0.04-0.12	4.8
H600 WXCU 080616RM	8	0.04-0.12	3.7	7.65	0.04-0.12	5.2

HELI DO 3152265  
MF FWX D063-05-27-08-V2

# HELI 6 FEED

UPFEED LINE



### Application Range of Carbide Grades for Indexable lines

<b>P</b>	P05	P10	P15	P20	P25	P30	P35	P40	P45	P50
				IC830						
				IC808						
				IC5500						
				IC845						
				IC810						
	IC5400									
			IC330							
<b>M</b>	M05	M10	M15	M20	M25	M30	M35	M40		
				IC840						
							IC330			
				IC830						
				IC882						
				IC5820						
			IC808							
<b>K</b>	K05	K10	K15	K20	K25	K30	K35	K40		
				IC810						
				IC808						
<b>S</b>	S05	S10	S15	S20	S25	S30				
				IC840						
				IC808						
				IC882						
				IC380						
				IC330						
				IC5820						
			IC830							
<b>H</b>	H05	H10	H15	H20	H25	H30				
				IC808						
				IC380						

Hardness ← → Toughness

**ICXX** The marked area features the most suitable grade  
**ICXX** The white area relates to a complementary grade

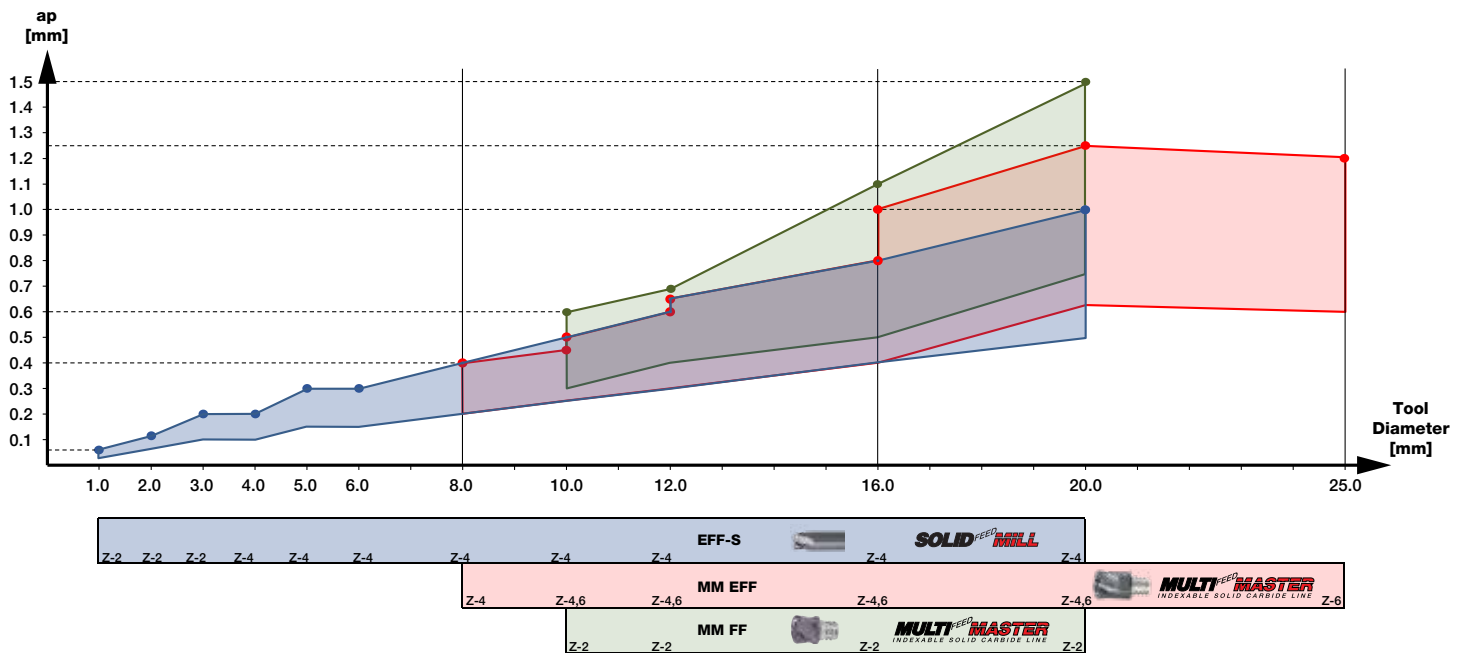


## Recommended Cutting Speed Range for Indexable Fast Feed Mill Cutters

ISO	Material		Condition	Material No.	Grade											
					IC330	IC380	IC882	IC845	IC840	IC830	IC5820	IC5400	IC5500	IC808	IC810	
<b>P</b>	Non alloy steel and cast steel (less than 5% all elements)	< 0.25 %C	Annealed	1	140-200			<b>130-220</b>		150-200		150-250	<b>150-210</b>	<b>150-220</b>	150-220	
		>= 0.25 %C	Annealed	2	130-190			<b>120-200</b>		140-190		140-240	<b>140-210</b>	<b>150-220</b>	140-220	
		< 0.55 %C	Quenched and tempered	3	130-190			<b>120-190</b>		140-190		140-230	<b>140-200</b>	<b>150-210</b>	140-210	
		>= 0.55 %C	Annealed	4	120-180			<b>120-180</b>		130-180		140-220	<b>130-200</b>	<b>140-210</b>	130-210	
		>= 0.55% C	Quenched and tempered	5	120-170			<b>110-180</b>		130-170		140-220	<b>130-190</b>	<b>140-210</b>	130-210	
	Low alloy steel and cast steel (less than 5% all elements)	Annealed		6	120-160			<b>110-170</b>		120-160		140-210	<b>130-180</b>	<b>140-200</b>	130-200	
		Quenched and tempered		7	110-150			<b>100-160</b>		120-140		130-200	<b>120-170</b>	<b>130-190</b>	120-190	
				8	100-140			<b>100-150</b>		110-140		130-190	<b>110-160</b>	<b>130-180</b>	120-180	
	9	90-150			<b>90-150</b>		100-130		130-180	<b>110-160</b>	<b>130-180</b>	120-180				
	High alloy steel, cast steel and tool steel	Annealed		10	80-130			<b>80-140</b>		90-120		120-180	<b>110-150</b>	<b>120-170</b>	120-170	
		Quenched and tempered		11	80-120			<b>80-130</b>		90-110		120-170	<b>100-140</b>	<b>120-160</b>	110-160	
	Stainless steel and cast steel	Ferritic/martensitic		12	100-140			<b>110-160</b>		90-160		120-170	<b>90-160</b>	<b>110-170</b>	110-170	
		Martensitic		13	90-130			<b>100-150</b>		80-150		110-160	<b>80-150</b>	<b>100-160</b>	100-150	
<b>M</b>	Stainless steel and cast steel		Austenitic	14	<b>80-120</b>		70-140		<b>80-150</b>	<b>80-140</b>	100-160			100-160		
<b>K</b>	Gray cast iron		Ferritic/pearlitic	15										140-200	<b>150-220</b>	
			Pearlitic/martensitic	16											130-190	<b>140-210</b>
	Ductile cast iron (nodular)		Ferritic	17										110-180	<b>120-200</b>	
			Pearlitic	18										100-170	<b>110-180</b>	
	Malleable cast iron		Ferritic	19										140-190	<b>140-210</b>	
			Pearlitic	20										110-170	<b>110-200</b>	
<b>S</b>	High temp. alloys	Fe based	Annealed	31	35-50	40-50	<b>35-50</b>		<b>30-45</b>	25-50	40-50			<b>40-50</b>		
			Cured	32	30-40	35-45	<b>30-40</b>		<b>20-35</b>	20-40	30-40			<b>30-40</b>		
		Ni or Co bases	Annealed	33	25-35	30-45	<b>25-35</b>		<b>20-30</b>	20-40	30-40				<b>25-40</b>	
			Cured	34	20-25	25-35	<b>20-25</b>		<b>20-25</b>	20-35	25-35				<b>25-35</b>	
			Cast	35	25-30	30-35	<b>25-30</b>		<b>25-30</b>	20-40	30-35				<b>30-40</b>	
	Titanium and Ti alloys			36	40-70	50-80	<b>45-70</b>		<b>40-60</b>	25-50	40-80				<b>45-90</b>	
			Alpha+beta alloys cured	37	30-60	30-60	<b>30-55</b>		<b>20-50</b>	30-45	25-60				<b>25-60</b>	
<b>H</b>	Hardened steel		Hardened	38		45-55								<b>45-65</b>		
			Hardened	39		40-50								<b>40-60</b>		
	Chilled cast iron		Cast	40		70-90								<b>70-85</b>		
	Cast iron		Hardened	41		45-55								<b>45-65</b>		

- For machining in unstable conditions (long overhang, poor toolholing etc.) the recommended cutting data should be reduced by 20-30%
- Recommended cutting speeds, which relate to the most suitable grades, are emphasized by **bold**

# Solid Carbide and Multi-Master Chart



## Fast Feed Family Selector for Solid Carbide Endmills (SCEM) and Multi-Master Heads (MM)

Range of diameters (mm)	Family	Description	AP (mm)	Range of fz (mm/t)	Applications							Material Groups				
					1	2	3	4	5	6	7	P	M	K	S	H
Ø1-20	SOLID FEED MILL	EFF-S	0.06-1.00	0.20-0.70	●	○	●	●	●	●	●	●	○	●	●	●
Ø8-25	MULTI-MASTER	MM-EFF	0.40-1.25	0.12-1.00	●	●	●	●		●	●	●	●	●	●	○
Ø10-20	MULTI-MASTER	MM FF	0.60-1.50	0.30-1.50	●	●	●	●		●	●	●	○	●	○	○

- - Most suitable
- - Suitable
- - May be used





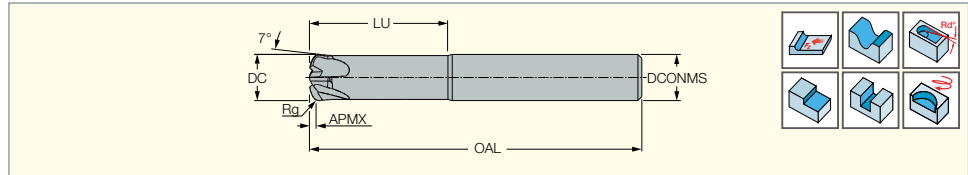
**MULTI<sup>FEED</sup> MASTER**



# SOLID FEED MILL

## EFF-S

4 Flute Solid Carbide Endmills with Relieved Necks for Fast Feed High Productivity



Designation	Dimensions									Tough ↔ Hard		Recommended Machining Data  f <sub>z</sub> (mm/t)
	DC	DCONMS	OAL	NOF	LU	Rg <sup>(1)</sup>	PRFRAD	APMX	IC903	IC902		
<b>EFF-S2 01-04/03C6RP.15M50</b>	1.00	6.00	50.00	2	3.0	0.15	0.1	0.06		●	0.02-0.05	
<b>EFF-S2 02-07/06C6RP0.3M50</b>	2.00	6.00	50.00	2	6.0	0.30	0.2	0.12		●	0.10-0.14	
<b>EFF-S2 03-1/09C06RP0.5M50</b>	3.00	6.00	50.00	2	9.0	0.50	0.4	0.20		●	0.10-0.20	
<b>EFF-S4-04 020/14C06M57</b>	4.00	6.00	57.00	4	12.0	0.70	0.5	0.20		●	0.10-0.25	
<b>EFF-S4-05 022/17C06M57</b>	5.00	6.00	57.00	4	15.0	0.90	0.6	0.30		●	0.10-0.30	
<b>EFF-S4-06 030/20C06R1.0M</b>	6.00	6.00	57.00	4	20.0	1.23	5.3	0.30	●		0.10-0.30	
<b>EFF-S4-08 035/26C08R1.3M</b>	8.00	8.00	63.00	4	26.0	1.62	7.0	0.40	●		0.10-0.40	
<b>EFF-S4-10 040/30C10R1.6M</b>	10.00	10.00	72.00	4	30.0	2.01	8.8	0.50	●		0.15-0.50	
<b>EFF-S4-12 045/34C12R2.0M</b>	12.00	12.00	83.00	4	34.0	2.47	10.6	0.60	●		0.15-0.50	
<b>EFF-S4-16 055/42C16R2.6M</b>	16.00	16.00	92.00	4	42.0	3.25	14.0	0.80	●		0.20-0.60	
<b>EFF-S4-20 060/46C20R3.2M</b>	20.00	20.00	104.00	4	46.0	4.02	17.7	1.00	●		0.20-0.70	

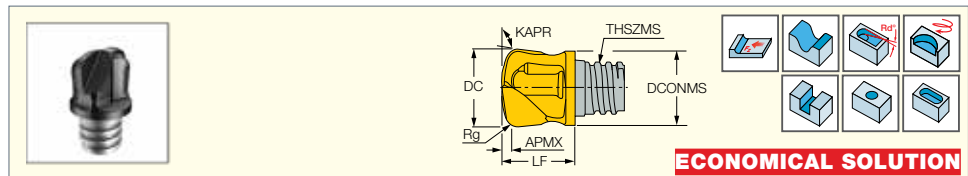
<sup>(1)</sup> Radius for programming

# MULTI FEED MASTER

## SOLID FEED MILL

### MM FF

Interchangeable 2 Flute FEEDMILL Solid Carbide Heads for Milling at Very Fast Feeds and Small D.O.C.



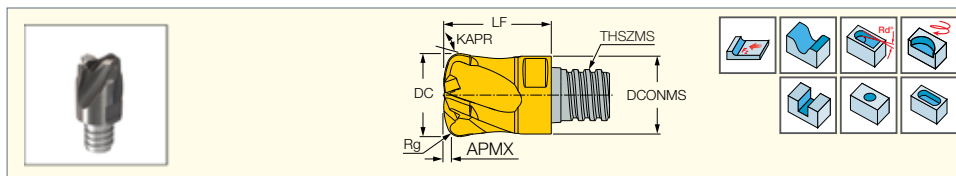
Designation	Dimensions										Tough ↔ Hard		Recommended Machining Data  f <sub>z</sub> (mm/t)
	DC	NOF	APMX	Rg <sup>(1)</sup>	THSZMS	DCONMS	LF	KAPR	RMPX	IC908	IC903		
<b>MM FF100R1.5-L12-2T06</b>	10.00	2	0.60	2.00	T06	9.60	12.50	97.0	7.0	●		0.30-0.60	
<b>MM FF120R2.0-2T08</b>	12.00	2	0.68	2.50	T08	11.50	11.10	97.0	7.0	●	●	0.50-1.00	
<b>MM FF500R08-L59-2T08</b>	12.70	2	0.68	2.50	T08	11.50	15.00	95.0	7.0	●		0.50-1.00	
<b>MM FF160R2.0-2T10</b>	16.00	2	1.10	3.00	T10	15.20	13.50	97.0	7.0	●		0.55-1.10	
<b>MM FF200R2.0-2T12</b>	20.00	2	1.50	3.40	T12	18.45	17.40	95.0	7.0	●		0.75-1.50	

• Do not apply lubricant to the threaded connection.

<sup>(1)</sup> Radius for programming

**MM EFF**

4, 6 Flute Solid Carbide Heads for Milling at Very Fast Feeds and Small D.O.C.



Designation	Dimensions										Tough ↔ Hard		Recommended Machining Data  f <sub>z</sub> (mm/t)
	DC	NOF	APMX	THSZMS	DCONMS	LF	RMPX	KAPR	Rg <sup>(3)</sup>	IC908	IC903		
MM EFF080T3R1.62-4T05	8.00	4	0.40	T05	7.50	10.00	5.0	97.0	1.62	N		●	0.12-0.48
MM EFF100T4R2.01-4T06	10.00	4	0.50	T06	9.50	13.00	5.0	97.0	2.01	N		●	0.16-0.57
MM EFF100T2R1.0-6T06H <sup>(1)</sup>	10.00	6	0.45	T06	9.50	10.00	3.0	97.0	1.00	Y		●	0.16-0.47
MM EFF120T4R1.8-4T08H <sup>(1)</sup>	12.00	4	0.60	T08	11.50	16.50	5.0	97.0	1.80	Y	●	●	0.16-0.67
MM EFF120T4R2.47-4T08	12.00	4	0.60	T08	11.50	16.50	5.0	97.0	2.47	N		●	0.16-0.67
MM EFF120T2R1.2-6T08H <sup>(1)</sup>	12.00	6	0.65	T08	11.50	12.50	3.0	97.0	1.20	Y		●	0.16-0.54
MM EFF127T4R2.59-4T08	12.70	4	0.60	T08	12.20	16.50	5.0	97.0	2.59	N		●	0.16-0.67
MM EFF160T5R2.2-4T10H <sup>(1)</sup>	16.00	4	0.80	T10	15.40	20.50	5.0	97.0	2.20	Y	●	●	0.20-0.75
MM EFF160T5R3.25-4T10	16.00	4	0.80	T10	15.40	20.50	5.0	97.0	3.25	N		●	0.20-0.75
MM EFF160T4R2.0-6T10H <sup>(1)</sup>	16.00	6	1.05	T10	15.40	16.00	3.0	97.0	2.00	Y		●	0.20-0.65
MM EFF200T6R4.02-4T12	20.00	4	1.00	T12	18.45	25.50	5.0	97.0	4.02	N		●	0.20-0.90
MM EFF200T5R2.2-6T12H <sup>(1)</sup>	20.00	6	1.25	T12	18.45	20.00	3.0	97.0	2.20	Y		●	0.20-0.80
MM EFF250A7R3.1-6T15 <sup>(2)</sup>	25.00	6	1.20	T15	23.90	25.00	5.0	97.0	3.10	N		●	0.25-1.00
MM EFF254A7R3.1-6T15 <sup>(2)</sup>	25.40	6	1.20	T15	23.90	25.00	5.0	97.0	3.10	N		●	0.25-1.00

• Do not apply lubricant to the threaded connection.

<sup>(1)</sup> With a central coolant hole

<sup>(2)</sup> Cannot be used for plunging application

<sup>(3)</sup> Radius for programming

**Machining Recommendations**

VDI 3323	Material Group <sup>(1)</sup>	Vc (m/min)	fz (mm/t) vs. Tool Diameter (mm)							
			ap	ae	8	10	12	16	20	25
<b>P</b>	1	180	0.045xD	0.7xD	0.48	0.57	0.67	0.75	0.90	1.00
	2	160	0.045xD	0.7xD	0.48	0.57	0.67	0.75	0.90	1.00
	3	160	0.045xD	0.7xD	0.48	0.57	0.67	0.75	0.90	1.00
	4	160	0.045xD	0.7xD	0.48	0.57	0.67	0.75	0.90	1.00
	5	150	0.045xD	0.7xD	0.43	0.50	0.57	0.65	0.75	0.87
	6	150	0.045xD	0.7xD	0.33	0.40	0.48	0.57	0.67	0.78
	7	140	0.045xD	0.7xD	0.33	0.40	0.48	0.57	0.67	0.78
	8	140	0.045xD	0.7xD	0.30	0.35	0.43	0.52	0.60	0.70
	9	140	0.045xD	0.7xD	0.30	0.35	0.43	0.52	0.60	0.70
	10	130	0.04xD	0.6xD	0.28	0.33	0.38	0.48	0.57	0.67
	11	120	0.04xD	0.6xD	0.25	0.30	0.35	0.43	0.52	0.62
	12, 13	120	0.04xD	0.6xD	0.30	0.35	0.43	0.52	0.60	0.70
<b>K</b>	15-16	180	Apmax	0.7xD	0.45	0.52	0.60	0.70	0.80	0.90
	17-18	160	Apmax	0.7xD	0.38	0.45	0.52	0.60	0.70	0.80
<b>H</b>	38.1 <sup>(2)</sup>	100	0.035xD	0.45xD	0.20	0.25	0.33	0.40	0.48	0.55
	38.2 <sup>(3)</sup>	80	0.03xD	0.3xD	0.16	0.22	0.30	0.38	0.45	0.52
	39 <sup>(4)</sup>	60	0.02xD	0.25xD	0.12	0.16	0.16	0.20	0.20	0.25

<sup>(1)</sup> ISCAR material group in accordance with VDI 3323 standard

<sup>(2)</sup> 45-49 HRc

<sup>(3)</sup> 50-55 HRc

<sup>(4)</sup> 56-63 HRc

**ap** - Depth of cut

**ae** - Width of cut

### Application Range of Carbide Grades for Solid Carbide Endmills and Multi-Master heads

<b>P</b>	P05	P10	P15	P20	P25	P30	P35	P40	P45	P50
	IC903									
	IC902									
<b>M</b>	M05	M10	M15	M20	M25	M30	M35	M40		
	IC902									
	IC903									
<b>K</b>	K05	K10	K15	K20	K25	K30	K35	K40		
	IC903									
	IC902									
<b>S</b>	S05	S10	S15	S20	S25	S30				
	IC902									
	IC903									
<b>H</b>	H05	H10	H15	H20	H25	H30				
	IC902									
	IC903									

Hardness ← → Toughness



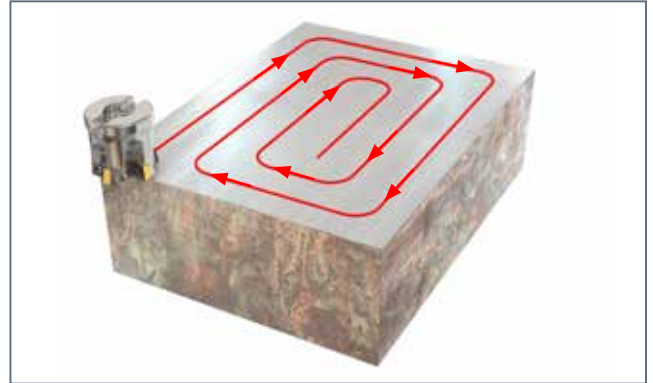
## Recommended Cutting Speed Range for Fast Feed Solid & Multi-Master Endmills

ISO	Material		Condition	Material No.	Grade			
					IC902	IC903	IC908	
P	Non alloy steel and cast steel (less than 5% all elements)	< 0.25 %C	Annealed	1	250-300	250-270	260-280	
		>= 0.25 %C	Annealed	2	200-250	200-230	200-230	
		< 0.55 %C	Quenched and tempered	3	160-240	160-220	160-220	
		>= 0.55 %C	Annealed	4	160-240	160-220	160-220	
		>= 0.55%C	Quenched and tempered	5	140-200	140-180	140-180	
	Low alloy steel and cast steel (less than 5% all elements)			Annealed	6	160-240	160-220	160-220
				Quenched and tempered	7	120-200	120-180	120-18
					8	130-200	130-200	130-180
					9	140-200	130-180	140-180
	High alloy steel, cast steel and tool steel			Annealed	10	130-200	130-180	130-180
				Quenched and tempered	11	70-130	70-120	70-120
	Stainless steel and cast steel			Ferritic/martensitic	12	80-175	80-160	80-160
				Martensitic	13	60-165	60-150	60-150
M	Stainless steel and cast steel		Austenitic180	14	60-130	60-120	60-120	
K	Gray cast iron		Ferritic/pearlitic	15	80-275	80-250	80-260	
			Pearlitic/martensitic	16	130-265	130-240	130-240	
	Ductile cast iron (nodular)		Ferritic	17	150-300	150-270	150-280	
			Pearlitic	18	90-300	90-270	90-280	
	Malleable cast iron		Ferritic	19	150-300	150-270	150-280	
			Pearlitic	20	140-265	140-240	140-240	
S	High temp. alloys	Fe based	Annealed	31	20-45	20-40	20-40	
			Cured	32	20-35	20-30	20-40	
		Ni or Co bases	Annealed	33	20-35	20-30	20-30	
			Cured	34	20-35	20-30	20-30	
	Titanium and Ti alloys		Cast	35	30-90	30-80	30-70	
					36	30-90	30-80	30-70
			Alpha+beta alloys cured		37	30-90	30-80	30-70
H	Hardened steel		Hardened	38	30-65	30-60	30-50	
			Hardened	39	30-45	30-40	30-40	
	Chilled cast iron		Cast	40	70-100	70-90	60-80	
	Cast iron		Hardened	41	30-65	30-60	30-50	

# Recommendations for Machining Methods

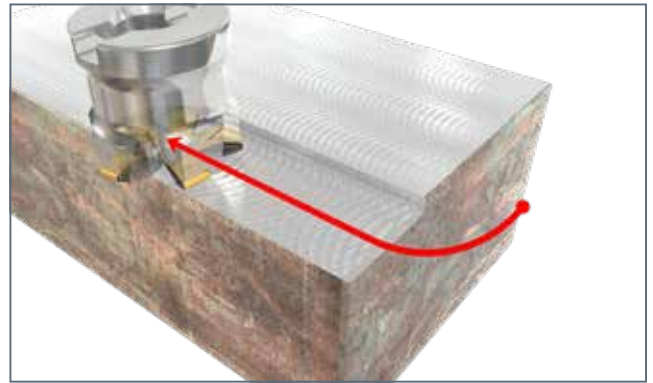
## Face Milling Including Milling Next to Square Shoulder

- It is recommended that a width of cut be no more than diameter DC in order to prevent tooth overloading, because of excess machining allowance in cusps produced on the further passes after stepdown
- Down (climb) milling is preferable



## Cutting into material

In milling, an approach cut by arc ("rolling in") is preferable. When a milling cutter enters a machined material by arc, chip thickness (and therefore, loading the cutting edge) grows to a maximum value progressively and then gradually diminishes to zero. It significantly contributes to machining stability, improves tool life, and reduces vibrations.

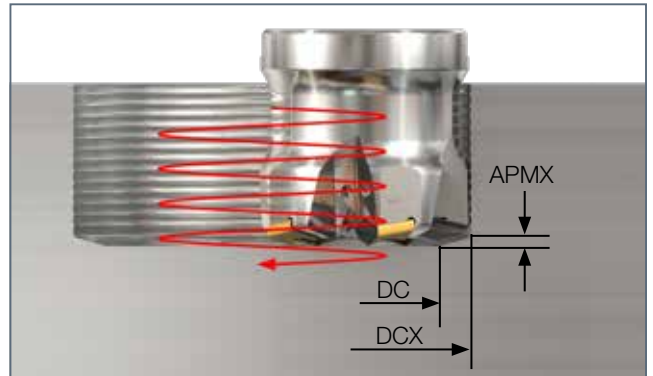


## Milling Hole of Diameter D by Helical Interpolation

Maximum and minimum hole diameters  $D_{max}$  and  $D_{min}$  correspondingly:

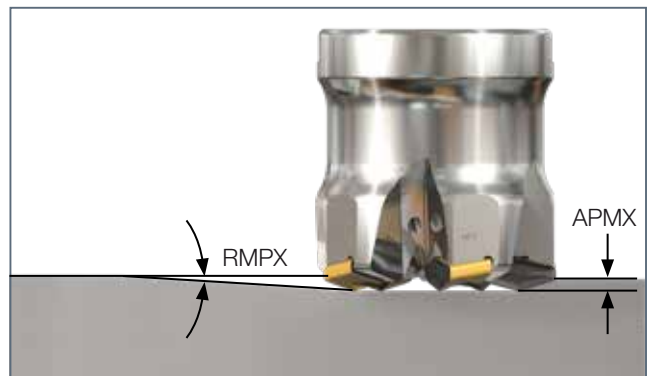
$$D_{max} = 2 \times DCX - 1, D_{min} = DCX + DC$$

- Down (climb) milling is recommended, however if chip evacuation is problematic, up (conventional) milling may give better results
- Helical pitch should not exceed maximum depth of cut APMX
- Helix angle should not exceed maximum ramping angle RMPX
- It is recommended to reduce feed per tooth  $f_z$  by 30-40%



## Milling by Ramping Down

- Depth of ramping per pass should not exceed maximum depth of cut APMX
- Ramping angle shall not exceed maximum ramping angle RMPX
- Down (climb) milling is preferable
- It is recommended to reduce feed per tooth  $f_z$  by 30-40%



### Pocket Milling

- In pocket milling, machining from center to outside contour is preferable
- In ramping down by line or helix, depth of ramping per pass should not exceed maximum depth of cut APMX and ramping angle should not exceed maximum ramping angle RMPX
- In ramping down passes, it is recommended to reduce feed per tooth fz by 30-40%

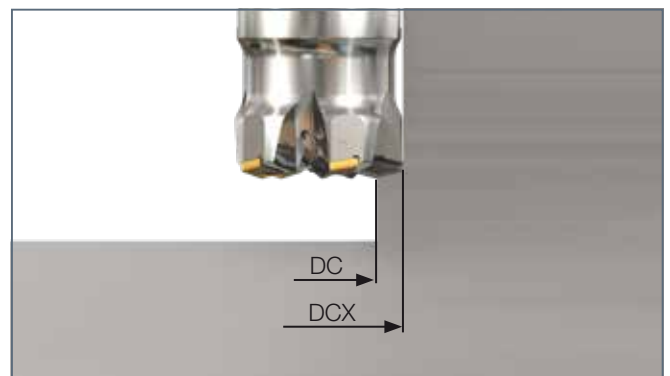
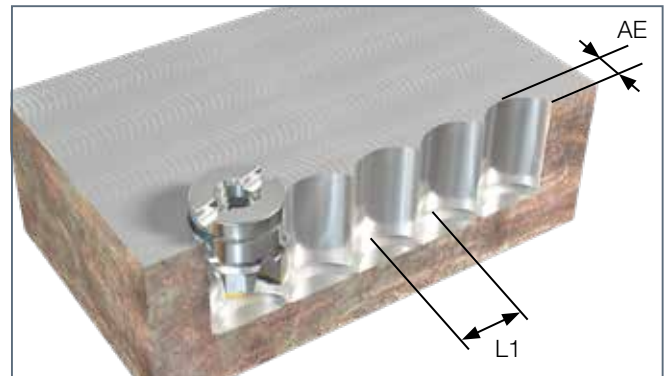


### Side Plunge Milling

- The relationship between L1 max and ae is given by the following formulas:  

$$ae_{max} = (DCX - DC)/2$$

$$L1_{max} = 2 \times \sqrt{DCX \times ae - ae^2}$$
- Plunge milling is an effective and economical method for machining deep cavities, walls, slots and shapes
- Plunge milling can provide a good solution for unstable and low-power milling machine tools



# FAST FEED MILLING

