YU-VP20

BEST VALUE IN THE WORLD OF CUTTING TOOLS

AHB TOOLING & MACHINERY

COMPLETE METALWORKING SOLUTIONS

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YG

FOR TOUGH STEEL, CAST IRON, STAINLESS STEEL AND EXOTIC MATERIALS:

NOTHING CUTS IT BETTER

V7 PlusA

INDUSTRY-LEADING HIGH-PERFORMANCE CARBIDE END MILLS:

- 4 Flute & 6 Flute
- Square, Chamfer, Radius, Ball Nose
- Standard & Extended Length
- Plain & Weldon Flat Shanks
- Inch & Metric Sizes

NEW

6 Flute Chip Splitter
Size Expansion in 1/2" x 1/2" x 1-1/4" x3"

Over 1,500 Items in Stock.

YG-1 is the undisputed world leader in carbide end mill offerings. And now, with our newly expanded V7 Plus A line, you have even more high-performance choices than ever before. Choose from a full array of 4 Flute and 6 Flute standard-stocked or custom-designed solutions. No matter what your machining challenge, we have a product for you.

How Our Innovative V7 Plus A Design Started a **REVOLUTION** in End Mill Technology

We didn't create the great cutting performance of our V7 Plus A end mills line by just doing what others have done. We engineered our line from the tip of flute to end of shank with performance-enhancing technology in mind. It's what makes the V7 Plus A line the top choice in end mill performance.

For excellent performance in stainless steels, mild steels, low/medium hardness materials and exotic materials to boot, the V7 Plus A's advanced geometry provides:

- Excellent material removal rates and surface finishes
- Unequal indexing for reduced chatter (harmonics) and improved stability
- Advanced coating for superior performance and tool life
- Improved flute geometry for impressive chip formation and evacuation
- Noticeably smooth operation in high-speed machining and peel-milling applications
- Superior slotting and profiling in most ferrous materials for more flexible use
- Excellent performance in high-speed trochoidal milling applications for improved accuracy, reduced vibration and better heat displacement
- Premium-grade carbide substrate for longer tool life

GUIDE TO ICONS

The tool is made of micrograin carbide

CARBIDE

No. of Flutes

4 6

Cutting Conditions

Tolerance of Ball Radius

R ±.0008 in. R ±0.02 mm

Helix Angle

35°/37° 45°

Type of Shank

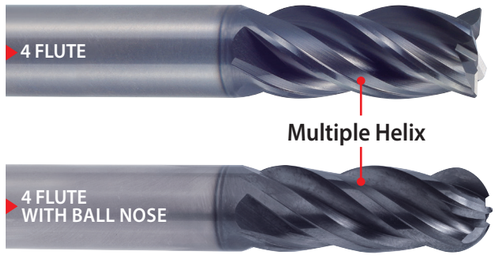
PLAIN Plain shank

FLAT Weldon flat

Tool Ends

Square Chamfer (45°) Radius (R) Ball

V7 Plus A **4 FLUTE** END MILLS



Setting a Higher Standard in 4 Flute Design

You asked for it. Now you can have state-of-the-art performance in an innovative 4 Flute design. First, you'll notice reduced vibration, optimal chip formation and excellent chip evacuation. And best of all, you'll get longer tool life in heavy cutting conditions. Available in ball nose, too.

NEW

V7 Plus A **6 FLUTE CHIP SPLITTER**

Corner Geometries

YG-1's High Performance Corner Geometries Including Corner Radius, applied for Longer Tool Life with Higher Cutting Speed

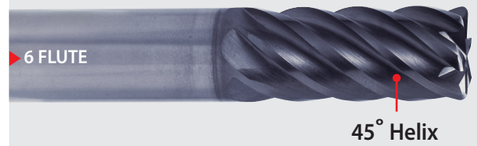
Unequal Index

Exclusively Designed Unique Geometry applied to Reduce Vibration and also to achieve Excellent Surface Finish

Chip Splitters

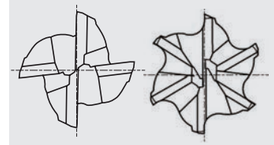
Special Chip Splitter Design Shorter Chip Length at High Axial Machining, improving Chip Removal from both the Component and the Machine

V7 Plus A **6 FLUTE** END MILLS



Better by Every Measure

From its higher stability for lower vibration to its improved performance in high-speed and trochoidal milling applications, the V7 Plus A 6 Flute solid carbide, 45-degree helix, was designed with longer tool life and higher productivity in mind.

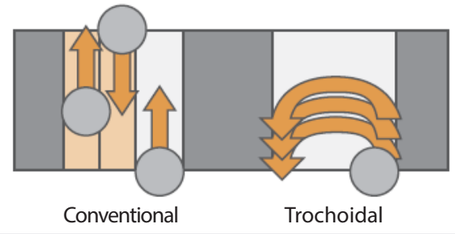


UNEQUAL INDEX WITH HIGH-PERFORMANCE CORNER GEOMETRIES INCLUDING CORNER RADIUS

Trochoidal Milling

With our V7 Plus A 6 Flute's unique cutting geometry, we made it easier to apply a small radial width-of-cut along with higher cutting speeds and excellent feed per tooth. That's why we perform better in trochoidal milling application. Here's why:

- Smaller arc engagement provides lower cutting force and better heat displacement
- More flutes provide deeper depth of cut for more productivity and reduced wear
- Stability-inducing geometry reduces vibration for increased accuracy and longer tool life
- Aggressive feed-per-tooth provides excellent chip evacuation



SELECTION GUIDE

INCH

SOLID CARBIDE

V7 PLUS A END MILLS

High performance carbide end mills
for Steels, Cast Iron and Stainless Steels

Please visit globalyg1.com/mat for material search

◎ : Excellent ○ : Good

Recommended cutting conditions : P 32

SERIES	UGMF68	UGMF76	UGMF70	UGMG53	UGMF69	UGMF77	UGMF71	UGMG54
FLUTE(Shank)	4 (Plain Shank)				4 (Flat Shank)			
HELIX ANGLE	35°/37° (MULTIPLE HELIX)	35°/37° (MULTIPLE HELIX)	35°/37° (MULTIPLE HELIX)	35°/37° (MULTIPLE HELIX)	35°/37° (MULTIPLE HELIX)	35°/37° (MULTIPLE HELIX)	35°/37° (MULTIPLE HELIX)	35°/37° (MULTIPLE HELIX)
CUTTING EDGE SHAPE	SQUARE	CHAMFER	CORNER RADIUS	BALL NOSE	SQUARE	CHAMFER	CORNER RADIUS	BALL NOSE
SIZE MIN	1/8	1/4	1/8	1/8	11/32	3/8	3/8	11/32
SIZE MAX	1	1	1	1	1	1	1	1
PAGE	9				12			
	STANDARD LENGTH				STANDARD LENGTH			
	Y-Coating				Y-Coating			

ISO	VDI 3323	Material Description	Composition / Structure / Heat Treatment		HB	HRc	UGMF68	UGMF76	UGMF70	UGMG53	UGMF69	UGMF77	UGMF71	UGMG54	
P	1	Non-alloy steel	About 0.15% C	Annealed	125		◎	◎	◎	◎	◎	◎	◎	◎	1
	2		About 0.45% C	Annealed	190	13	◎	◎	◎	◎	◎	◎	◎	◎	2
	3		About 0.45% C	Quenched & Tempered	250	25	◎	◎	◎	◎	◎	◎	◎	◎	3
	4		About 0.75% C	Annealed	270	28	◎	◎	◎	◎	◎	◎	◎	◎	4
	5		About 0.75% C	Quenched & Tempered	300	32	◎	◎	◎	◎	◎	◎	◎	◎	5
	6	Low alloy steel		Annealed	180	10	◎	◎	◎	◎	◎	◎	◎	◎	6
	7			Quenched & Tempered	275	29	◎	◎	◎	◎	◎	◎	◎	◎	7
	8			Quenched & Tempered	300	32	◎	◎	◎	◎	◎	◎	◎	◎	8
	9			Quenched & Tempered	350	38	◎	◎	◎	◎	◎	◎	◎	◎	9
	10	High alloyed steel, and tool steel		Annealed	200	15	◎	◎	◎	◎	◎	◎	◎	◎	10
	11			Quenched & Tempered	325	35	◎	◎	◎	◎	◎	◎	◎	◎	11
M	12	Stainless steel	Ferritic / Martensitic	Annealed	200	15	◎	◎	◎	◎	◎	◎	◎	◎	12
	13		Martensitic	Quenched & Tempered	240	23	◎	◎	◎	◎	◎	◎	◎	◎	13
	14		Austenitic		180	10	◎	◎	◎	◎	◎	◎	◎	◎	14
K	15	Grey cast iron	Pearlitic / ferritic		180	10	◎	◎	◎	◎	◎	◎	◎	◎	15
	16		Pearlitic (Martensitic)		260	26	◎	◎	◎	◎	◎	◎	◎	◎	16
	17	Nodular cast iron	Ferritic		160	3	◎	◎	◎	◎	◎	◎	◎	◎	17
	18		Pearlitic		250	25	◎	◎	◎	◎	◎	◎	◎	◎	18
	19	Malleable cast iron	Ferritic		130		◎	◎	◎	◎	◎	◎	◎	◎	19
	20		Pearlitic		230	21	◎	◎	◎	◎	◎	◎	◎	◎	20
N	21	Aluminum-wrought alloy	Not Curable		60										21
	22		Curable	Hardened	100										22
	23	Aluminum-cast, alloyed	≤ 12% Si, Not Curable		75										23
	24		≤ 12% Si, Curable	Hardened	90										24
	25		> 12% Si, Not Curable		130										25
	26	Copper and Copper Alloys (Bronze / Brass)	Cutting Alloys, PB>1%		110										26
	27		CuZn, CuSnZn (Brass)		90										27
	28		CuSn, lead Free copper and electrolytic copper		100										28
	29	Non Metallic Materials	Duroplastic, Fiber Reinforced Plastic												29
	30		Rubber, Wood, etc.												30
S	31	Heat Resistant Super Alloys	Fe Based	Annealed	200	15	○	○	○	○	○	○	○	○	31
	32			Cured	280	30	○	○	○	○	○	○	○	○	32
	33		Ni or Co Based	Annealed	250	25	○	○	○	○	○	○	○	○	33
	34			Cured	350	38	○	○	○	○	○	○	○	○	34
	35			Cast	320	34	○	○	○	○	○	○	○	○	35
	36	Titanium Alloys	Pure Titanium		400 Rm		○	○	○	○	○	○	○	○	36
	37		Alpha + Beta Alloys	Hardened	1050 Rm		○	○	○	○	○	○	○	○	37
H	38	Hardened steel		Hardened	550	55									38
	39			Hardened	630	60									39
	40	Chilled Cast Iron		Cast	400	42									40
	41	Hardened Cast Iron		Hardened	550	55									41

UGMF72	UGMF74	UGMH10	UGMF73	UGMF75	UGMG20	UGMG22	UGMG21	UGMG23	UGMH08	UGMH09	GMH72
4 (Plain Shank)			4 (Flat Shank)		6 (Plain Shank)		6 (Flat Shank)		6 (Plain Shank)		6 (Plain Shank)
35°/37° (MULTIPLE HELIX)	35°/37° (MULTIPLE HELIX)	35°/37° (MULTIPLE HELIX)	35°/37° (MULTIPLE HELIX)	35°/37° (MULTIPLE HELIX)	45°	45°	45°	45°	45°	45°	45°
SQUARE	CORNER RADIUS	BALL NOSE	SQUARE	CORNER RADIUS	SQUARE	CORNER RADIUS	SQUARE	CORNER RADIUS	SQUARE	CORNER RADIUS	CORNER RADIUS
1/8	1/8	1/8	3/8	3/8	1/4	1/4	3/8	3/8	1/4	1/4	3/8
1	1	1	1	1	1	1	1	1	1	1	1
13			15		21		23		24		29
EXTENDED LENGTH			EXTENDED LENGTH		STANDARD LENGTH		STANDARD LENGTH		EXTENDED LENGTH		STANDARD LENGTH
Y-Coating			Y-Coating		Y-Coating		Y-Coating		Y-Coating		Y-Coating

UGMF72	UGMF74	UGMH10	UGMF73	UGMF75	UGMG20	UGMG22	UGMG21	UGMG23	UGMH08	UGMH09	GMH72	
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												41

SELECTION GUIDE

METRIC

SOLID CARBIDE

V7 PLUS A END MILLS

High performance carbide end mills
for Steels, Cast Iron and Stainless Steels

Please visit globalyg1.com/mat for material search

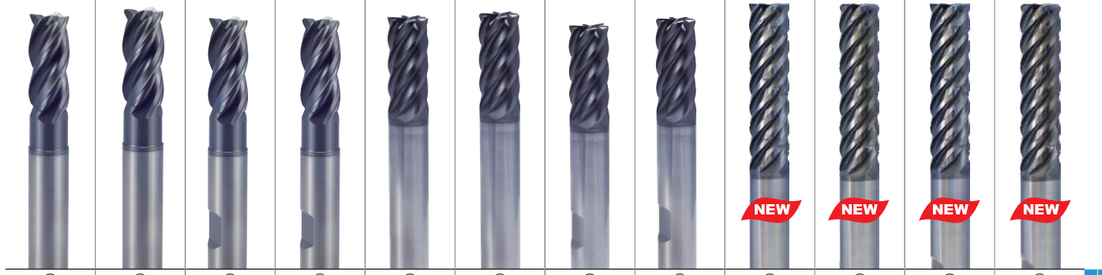
◎ : Excellent ○ : Good

Recommended cutting conditions : P 36

SERIES	GMF52 GMF56	GMF54 GMF58	GMG55	GMF53 GMF57	GMF55 GMF59	GMG56
FLUTE(Shank)	4 (Plain Shank)			4 (Flat Shank)		
HELIX ANGLE	35°/37° (MULTIPLE HELIX)	35°/37° (MULTIPLE HELIX)	35°/37° (MULTIPLE HELIX)	35°/37° (MULTIPLE HELIX)	35°/37° (MULTIPLE HELIX)	35°/37° (MULTIPLE HELIX)
CUTTING EDGE SHAPE	CHAMFER	CORNER RADIUS	BALL NOSE	CHAMFER	CORNER RADIUS	BALL NOSE
SIZE MIN	3.0	3.0	3.0	3.0	3.0	3.0
SIZE MAX	25.0	25.0	25.0	25.0	25.0	25.0
PAGE	16			17		
	STANDARD LENGTH			STANDARD LENGTH		
	Y-Coating			Y-Coating		

ISO	VDI 3323	Material Description	Composition / Structure / Heat Treatment		HB	HRc							
P	1	Non-alloy steel	About 0.15% C	Annealed	125		◎	◎	◎	◎	◎	◎	1
	2		About 0.45% C	Annealed	190	13	◎	◎	◎	◎	◎	◎	2
	3		About 0.45% C	Quenched & Tempered	250	25	◎	◎	◎	◎	◎	◎	3
	4		About 0.75% C	Annealed	270	28	◎	◎	◎	◎	◎	◎	4
	5		About 0.75% C	Quenched & Tempered	300	32	◎	◎	◎	◎	◎	◎	5
	6	Low alloy steel		Annealed	180	10	◎	◎	◎	◎	◎	◎	6
	7			Quenched & Tempered	275	29	◎	◎	◎	◎	◎	◎	7
	8			Quenched & Tempered	300	32	◎	◎	◎	◎	◎	◎	8
	9			Quenched & Tempered	350	38	◎	◎	◎	◎	◎	◎	9
	10	High alloyed steel, and tool steel		Annealed	200	15	◎	◎	◎	◎	◎	◎	10
	11			Quenched & Tempered	325	35	◎	◎	◎	◎	◎	◎	11
M	12	Stainless steel	Ferritic / Martensitic	Annealed	200	15	◎	◎	◎	◎	◎	◎	12
	13		Martensitic	Quenched & Tempered	240	23	◎	◎	◎	◎	◎	◎	13
	14		Austenitic		180	10	◎	◎	◎	◎	◎	◎	14
K	15	Grey cast iron	Pearlitic / ferritic		180	10	◎	◎	◎	◎	◎	◎	15
	16		Pearlitic (Martensitic)		260	26	◎	◎	◎	◎	◎	◎	16
	17	Nodular cast iron	Ferritic		160	3	◎	◎	◎	◎	◎	◎	17
	18		Pearlitic		250	25	◎	◎	◎	◎	◎	◎	18
	19	Malleable cast iron	Ferritic		130		◎	◎	◎	◎	◎	◎	19
	20		Pearlitic		230	21	◎	◎	◎	◎	◎	◎	20
N	21	Aluminum-wrought alloy	Not Curable		60								21
	22		Curable	Hardened	100								22
	23	Aluminum-cast, alloyed	≤ 12% Si, Not Curable		75								23
	24		≤ 12% Si, Curable	Hardened	90								24
	25		> 12% Si, Not Curable		130								25
	26	Copper and Copper Alloys (Bronze / Brass)	Cutting Alloys, PB>1%		110								26
	27		CuZn, CuSnZn (Brass)		90								27
	28		CuSn, lead Free copper and electrolytic copper		100								28
	29	Non Metallic Materials	Duroplastic, Fiber Reinforced Plastic										29
	30		Rubber, Wood, etc.										30
S	31	Heat Resistant Super Alloys	Fe Based	Annealed	200	15	○	○	○	○	○	○	31
	32			Cured	280	30	○	○	○	○	○	○	32
	33		Ni or Co Based	Annealed	250	25	○	○	○	○	○	○	33
	34			Cured	350	38	○	○	○	○	○	○	34
	35			Cast	320	34	○	○	○	○	○	○	35
	36	Titanium Alloys	Pure Titanium		400 Rm		○	○	○	○	○	○	36
	37		Alpha + Beta Alloys	Hardened	1050 Rm		○	○	○	○	○	○	37
H	38	Hardened steel		Hardened	550	55							38
	39			Hardened	630	60							39
	40	Chilled Cast Iron		Cast	400	42							40
	41	Hardened Cast Iron		Hardened	550	55							41

GMF60	GMF62	GMF61	GMF63	GMG12 GMG14	GMG16 GMG18	GMG13 GMG15	GMG17 GMG19	GMH56	GMH58	GMH57	GMH59
4 (Plain Shank)		4 (Flat Shank)		6 (Plain Shank)		6 (Flat Shank)		6 (Plain Shank)		6 (Flat Shank)	
35°/37° (MULTIPLE HELIX)	35°/37° (MULTIPLE HELIX)	35°/37° (MULTIPLE HELIX)	35°/37° (MULTIPLE HELIX)	45°	45°	45°	45°	45°	45°	45°	45°
CHAMFER	CORNER RADIUS	CHAMFER	CORNER RADIUS	SQUARE	CORNER RADIUS	SQUARE	CORNER RADIUS	SQUARE	CORNER RADIUS	SQUARE	CORNER RADIUS
3.0	3.0	3.0	3.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
20.0	20.0	20.0	20.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
18	18	19	19	26		27		26		27	
EXTENDED LENGTH		EXTENDED LENGTH		STANDARD LENGTH		STANDARD LENGTH		STANDARD LENGTH		STANDARD LENGTH	
Y-Coating		Y-Coating		Y-Coating		Y-Coating		Y-Coating		Y-Coating	
								CHIP SPLITTER	CHIP SPLITTER	CHIP SPLITTER	CHIP SPLITTER



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◎	◎	◎	◎	○	○	○	○	○	○	○	○	16
◎	◎	◎	◎	○	○	○	○	○	○	○	○	17
◎	◎	◎	◎	○	○	○	○	○	○	○	○	18
◎	◎	◎	◎	○	○	○	○	○	○	○	○	19
◎	◎	◎	◎	○	○	○	○	○	○	○	○	20
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○	○	○	○	○	○	○	○	○	○	○	○	32
○	○	○	○	○	○	○	○	○	○	○	○	33
○	○	○	○	○	○	○	○	○	○	○	○	34
○	○	○	○	○	○	○	○	○	○	○	○	35
○	○	○	○	○	○	○	○	○	○	○	○	36
○	○	○	○	○	○	○	○	○	○	○	○	37
												38
												39
												40
												41

4 FLUTE

V7 Plus A

Innovative cutting performance that's not just a chip off the old block.

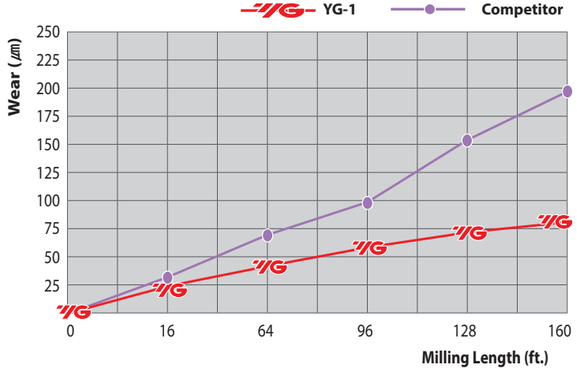
Our highly engineered flute geometry with multiple-helix design eliminates vibration, and our premium substrate and coating ensures longer tool life. Did we mention better cutting performance, too?

HIGH-PERFORMANCE SOLID CARBIDE

4 FLUTE END MILLS

CASE STUDY

4 Flute vs Competitor



	V7 Plus A	Competitor
Wear(㎛)	83.518	203.381
Milling Length (ft.)	160	160
Size (mm)	Ø10 x Ø10 x 22 x 72	
Work Material	- JIS : S45C(HRc30) - DIN : C45 - WR : 1.0503 - AISI: 1405	
Cutting Speed	755 ft/min.	
RPM	7,324 rev./min.	
Feed	57.64 inch/min.	
Feed per tooth	.002 inch/tooth	
Milling Method	Down & Side Cutting	
Milling Depth	Axial : .394 inch, Radial : .118 inch	
Coolant	Wet Cut	
Overhang	1.339 inch	
Machine	Machining Center	

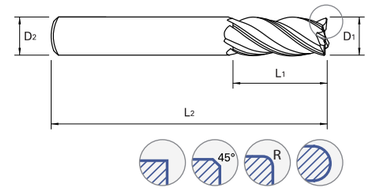
SERIES

Square **UGMF68** Chamfer **UGMF76**
Corner Radius **UGMF70** Ball Nose **UGMG53**

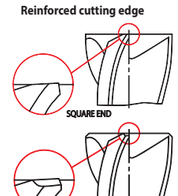
Y-Coated SOLID CARBIDE END MILLS

4 FLUTE STANDARD LENGTH (PLAIN SHANK)

- Special flute geometry and multiple helix eliminate vibrations
- Excellent performance for stainless steels, mild steels, cast iron, low/medium hardness materials and all exotic materials up to HRc40
- Advanced coating for superior performance and tool life



SEE CHAMFER AND BALL KEYS ON PAGE 11



CARBIDE | 4 | 35°/37° | PLAIN | R ±.0008 | C x 45° | P. 32-33

Unit : INCH

OD (D1)	SD (D2)	LOC (L1)	OAL (L2)	Square End	Chamfer	Corner Radius .010	.015	.030	.060	.090	.125	.190	.250	Ball Nose
				EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	EDP No.
1/8	1/8	1/8	1-1/2	UGMF68008		UGMF70008		UGMF70955						UGMG53901
		3/8	1-1/2	UGMF68901		UGMF70901		UGMF70902						UGMG53008
		1/2	2-1/2	UGMF68S915		UGMF70S956		UGMF70S957						UGMG53S902
5/32	3/16	3/16	2	UGMF68010		UGMF70010								UGMG53903
		7/16	2	UGMF68902		UGMF70958								UGMG53010
3/16	3/16	3/16	2	UGMF68012		UGMF70012								UGMG53904
		5/16	2	UGMF68916		UGMF70959		UGMF70960						UGMG53905
		7/16	2	UGMF68903		UGMF70903		UGMF70904						UGMG53012
		5/8	2-1/2	UGMF68S917		UGMF70S961		UGMF70S962						UGMG53S906
7/32	1/4	1/4	2	UGMF68014		UGMF70014								UGMG53907
		7/16	2-1/2	UGMF68904		UGMF70963								UGMG53014
1/4	1/4	3/8	2	UGMF68016	UGMF76016	UGMF70016		UGMF70905	UGMF70906					UGMG53908
		1/2	2-1/2	UGMF68918			UGMF70964	UGMF70965	UGMF70966					UGMG53016
		3/4	2-1/2	UGMF68905	UGMF76902	UGMF70907	UGMF70908	UGMF70909	UGMF70967					UGMG53909
		1	3	UGMF68S919			UGMF70S968	UGMF70S969	UGMF70S970					UGMG53S910
9/32	5/16	5/8	2-1/2	UGMF68018			UGMF70018	UGMF70971	UGMF70972					UGMG53018
		1	3	UGMF68S920			UGMF70S973	UGMF70S974						UGMG53S911
5/16	5/16	7/16	2	UGMF68020				UGMF70020						UGMG53912
		13/16	2-1/2	UGMF68906	UGMF76020	UGMF70910		UGMF70911	UGMF70912					UGMG53020
		1-1/4	3	UGMF68S921			UGMF70S975	UGMF70S976	UGMF70S977					UGMG53S913
11/32	3/8	1/2	2-1/2	UGMF68022				UGMF70022						UGMG53914
		13/16	2-1/2	UGMF68922				UGMF70978						UGMG53022

▶ Length of cut in excess of 3 x D on 37° single-helix requires feed reduction of approximately 50%

NEXT PAGE ▶

Mill Dia. Tolerance (inch)	Shank Dia.Tolerance
0 ~ -.0012	h5 (≥ Ø1/2" : h6)

◎ : Excellent ○ : Good

ISO	P											M			K					
Material Description	Non-alloy steel					Low alloy steel				High alloyed steel, and tool steel		Stainless steel			Grey cast iron		Nodular cast iron		Malleable cast iron	
VDI 3323	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
HRc		13	25	28	32	10	29	32	38	15	35	15	23	10	10	26	3	25		21
HB	125	190	250	270	300	180	275	300	350	200	325	200	240	180	180	260	160	250	130	230
Recommend	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎

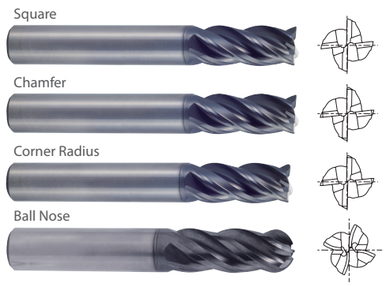
ISO	N										S							H		
Material Description	Aluminum-wrought alloy		Aluminum-cast, alloyed			Copper and Copper Alloys (Bronze / Brass)			Non Metallic Materials		Heat Resistant Super Alloys					Titanium Alloys		Hardened steel	Chilled Cast Iron	Hardened Cast Iron
VDI 3323	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
HRc											15	30	25	38	34			55	60	42	55
HB	60	100	75	90	130	110	90	100			200	280	250	350	320	400 Rm	1050 Rm	550	630	400	550
Recommend											○	○	○	○	○	○	○				

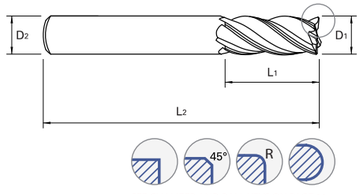
NEW SIZES

Y-Coated SOLID CARBIDE END MILLS
4 FLUTE STANDARD LENGTH (PLAIN SHANK)

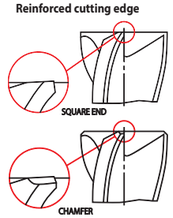
SERIES
Square **UGMF68** Chamfer **UGMF76**
Corner Radius **UGMF70** Ball Nose **UGMG53**

- Special flute geometry and multiple helix eliminate vibrations
- Excellent performance for stainless steels, mild steels, cast iron, low/medium hardness materials and all exotic materials up to HRc40
- Advanced coating for superior performance and tool life





SEE CHAMFER AND BALL KEYS ON PAGE 11



CARBIDE | 4 | 35°/37° | PLAIN | R ±.0008 | C x 45° | P. 32-33

Unit : INCH

* NEW SIZES

OD (D_1)	SD (D_2)	LOC (L_1)	OAL (L_2)	Square End	Chamfer	Corner Radius							Ball Nose
						.010	.015	.030	.060	.090	.125	.190	.250	
				EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	EDP No.
3/8	3/8	1/2	2-1/2	UGMF68024	UGMF76903	UGMF70024		UGMF70913	UGMF70914	UGMF70979				UGMG53915
		7/8	2-1/2	UGMF68907	UGMF76024	UGMF70915		UGMF70916	UGMF70917	UGMF70980				UGMG53024
		1	3	UGMF68923		UGMF70981		UGMF70982	UGMF70983	UGMF70984				UGMG53916
		1-1/4	3	UGMF68S924		UGMF70S985		UGMF70S986	UGMF70S987	UGMF70S988				UGMG53S917
13/32	7/16	1/2	2-3/4	UGMF68026				UGMF70026						UGMG53026
		15/16	2-3/4	UGMF68925				UGMF70989						UGMG53918
7/16	7/16	5/8	2-1/2	UGMF68028			UGMF70028	UGMF70918	UGMF70990	UGMF70991				UGMG53919
		7/8	2-3/4	UGMF68926	UGMF76028		UGMF70992	UGMF70993	UGMF70994	UGMF70995				UGMG53920
		1	2-3/4	UGMF68908		UGMF70919		UGMF70920	UGMF70921					UGMG53028
15/32	1/2	5/8	2-1/2	UGMF68030				UGMF70030						UGMG53030
		1	3	UGMF68927				UGMF70996						UGMG53921
		1-1/4	3-1/2	UGMF68928				UGMF70997						UGMG53922
1/2	1/2	5/8	2-1/2	UGMF68032	UGMF76032	UGMF70032	UGMF70922	UGMF70923	UGMF70924	UGMF70998	UGMF70999			UGMG53923
		1	3	UGMF68909	UGMF76904	UGMF70925	UGMF70801	UGMF70926	UGMF70927	UGMF70802	UGMF70928			UGMG53032
		1 1/4	3	*UGMF68941	*UGMF76913	*UGMF70899	*UGMF70701	*UGMF70702	*UGMF70703	*UGMF70704	*UGMF70705			*UGMG53941
		1-1/4	3-1/2	UGMF68910	UGMF76901	UGMF70929	UGMF70930	UGMF70931	UGMF70932	UGMF70803	UGMF70933			UGMG53924
		1-5/8	4	UGMF68S929	UGMF76S905		UGMF70S804	UGMF70S805	UGMF70S806	UGMF70S807	UGMF70S808			UGMG53S925
		2	4	UGMF68S939			UGMF70S889	UGMF70S890	UGMF70S891	UGMF70S892	UGMF70S893			UGMG53S939
		2-1/2	4-1/2	UGMF68S940	UGMF76S906		UGMF70S894	UGMF70S895	UGMF70S896	UGMF70S897	UGMF70S898			UGMG53S940

▶ Length of cut in excess of 3xD on 37° single-helix requires feed reduction of approximately 50%

NEXT PAGE ▶

Mill Dia. Tolerance (inch)	Shank Dia.Tolerance
0 ~ -.0012	h5 (≥ Ø1/2" : h6)

◎ : Excellent ○ : Good

ISO	P																			
Material Description	Non-alloy steel					Low alloy steel					High alloyed steel, and tool steel		Stainless steel			Grey cast iron		Nodular cast iron		Malleable cast iron	
VDI 3323	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
HRc		13	25	28	32	10	29	32	38	15	35	15	23	10	10	26	3	25		21
HB	125	190	250	270	300	180	275	300	350	200	325	200	240	180	180	260	160	250	130	230
Recommend	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎

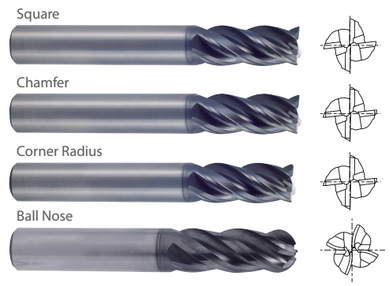
ISO	N										S							H		
Material Description	Aluminum-wrought alloy		Aluminum-cast, alloyed			Copper and Copper Alloys (Bronze / Brass)			Non Metallic Materials		Heat Resistant Super Alloys					Titanium Alloys		Hardened steel		Hardened Cast Iron
VDI 3323	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
HRc											15	30	25	38	34			55	60	42	55
HB	60	100	75	90	130	110	90	100			200	280	250	350	320	400 Rm	1050 Rm	550	630	400	550
Recommend											○	○	○	○	○	○	○				

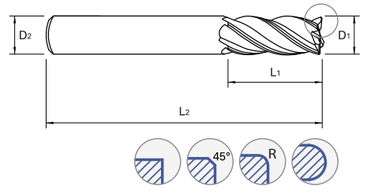
NEW SIZES

Y-Coated SOLID CARBIDE END MILLS
4 FLUTE STANDARD LENGTH (PLAIN SHANK)

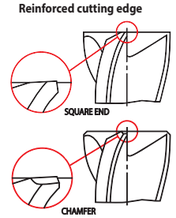
SERIES
Square **UGMF68** Chamfer **UGMF76**
Corner Radius **UGMF70** Ball Nose **UGMG53**

- Special flute geometry and multiple helix eliminate vibrations
- Excellent performance for stainless steels, mild steels, cast iron, low/medium hardness materials and all exotic materials up to HRc40
- Advanced coating for superior performance and tool life





SEE CHAMFER AND BALL KEYS ON PAGE 11



CARBIDE | 4 | 35°/37° | PLAIN | R ±.0008 | C x 45° | P. 32-33

Unit : INCH

OD (D_1)	SD (D_2)	LOC (L_1)	OAL (L_2)	Square End	Chamfer	Corner Radius							Ball Nose
						.010	.015	.030	.060	.090	.125	.190	.250	
				EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	EDP No.
5/8	5/8	3/4	3	UGMF68040		UGMF70040	UGMF70809	UGMF70934	UGMF70935	UGMF70810	UGMF70811			UGMG53926
		1-1/4	3-1/2	UGMF68911	UGMF76040	UGMF70936	UGMF70937	UGMF70938	UGMF70939	UGMF70812	UGMF70940			UGMG53040
		1-5/8	4	UGMF68930	UGMF76907		UGMF70813	UGMF70814	UGMF70815	UGMF70816	UGMF70817			UGMG53927
		2	4	UGMF68S931			UGMF70S818	UGMF70S819	UGMF70S820	UGMF70S821	UGMF70S822			UGMG53S928
3/4	3/4	3-1/4	6	UGMF68S932			UGMF70S823	UGMF70S824	UGMF70S825	UGMF70S826	UGMF70S827			UGMG53S929
		3/4	3	UGMF68048	UGMF76908		UGMF70828	UGMF70048	UGMF70941	UGMF70829	UGMF70830	UGMF70831	UGMF70832	UGMG53930
		1-1/2	4	UGMF68912	UGMF76048		UGMF70942	UGMF70943	UGMF70944	UGMF70833	UGMF70945	UGMF70834	UGMF70835	UGMG53048
		1-7/8	4	UGMF68933			UGMF70836	UGMF70837	UGMF70838	UGMF70839	UGMF70840	UGMF70841	UGMF70842	UGMG53931
		2-1/4	5	UGMF68934	UGMF76909		UGMF70843	UGMF70844	UGMF70845	UGMF70846	UGMF70847	UGMF70848	UGMF70849	UGMG53932
		3-1/4	6	UGMF68S935			UGMF70S850	UGMF70S851	UGMF70S852	UGMF70S853	UGMF70S854	UGMF70S855	UGMF70S856	UGMG53S933
1	1	1	4	UGMF68064	UGMF76910		UGMF70064	UGMF70946	UGMF70947	UGMF70857	UGMF70858	UGMF70859	UGMF70860	UGMG53934
		1-1/2	4	UGMF68913	UGMF76064		UGMF70948	UGMF70949	UGMF70950	UGMF70861	UGMF70951	UGMF70862	UGMF70863	UGMG53064
		2	5	UGMF68914	UGMF76911		UGMF70952	UGMF70953	UGMF70954	UGMF70864	UGMF70865	UGMF70866	UGMF70867	UGMG53935
		2-5/8	5	UGMF68936	UGMF76912		UGMF70868	UGMF70869	UGMF70870	UGMF70871	UGMF70872	UGMF70873	UGMF70874	UGMG53936
		3	6	UGMF68937			UGMF70875	UGMF70876	UGMF70877	UGMF70878	UGMF70879	UGMF70880	UGMF70881	UGMG53937
		4-1/4	7	UGMF68S938			UGMF70S882	UGMF70S883	UGMF70S884	UGMF70S885	UGMF70S886	UGMF70S887	UGMF70S888	UGMG53S938

▶ Length of cut in excess of 3xD on 37° single-helix requires feed reduction of approximately 50%

Mill Dia. Tolerance (inch)	Shank Dia.Tolerance
0 ~ -.0012	h5 (≥ Ø1/2" : h6)

CHAMFER KEY	
Mill Diameter	Chamfer Size
1/4	.007
5/16	.007
3/8	.011
7/16	.013
1/2	.013
5/8	.015
3/4	.019
1	.019

BALL NOSE KEY			
Mill Diameter	Radius of Ball	Mill Diameter	Radius of Ball
1/8	1/16	11/32	11/64
5/32	5/64	3/8	3/16
3/16	3/32	7/16	7/32
7/32	7/64	1/2	1/4
1/4	1/8	5/8	5/16
9/32	9/64	3/4	3/8
5/16	5/32	1	1/2

◎ : Excellent ○ : Good

ISO	P																			
Material Description	Non-alloy steel					Low alloy steel					High alloyed steel, and tool steel		Stainless steel			Grey cast iron		Nodular cast iron		Malleable cast iron	
VDI 3323	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
HRc		13	25	28	32	10	29	32	38	15	35	15	23	10	10	26	3	25		21
HB	125	190	250	270	300	180	275	300	350	200	325	200	240	180	180	260	160	250	130	230
Recommend	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎

ISO	N										S							H		
Material Description	Aluminum-wrought alloy		Aluminum-cast, alloyed			Copper and Copper Alloys (Bronze / Brass)			Non Metallic Materials		Heat Resistant Super Alloys					Titanium Alloys		Hardened steel		Hardened Cast Iron
VDI 3323	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
HRc											15	30	25	38	34			55	60	42	55
HB	60	100	75	90	130	110	90	100			200	280	250	350	320	400 Rm	1050 Rm	550	630	400	550
Recommend											○	○	○	○	○	○	○				

NEW SIZES

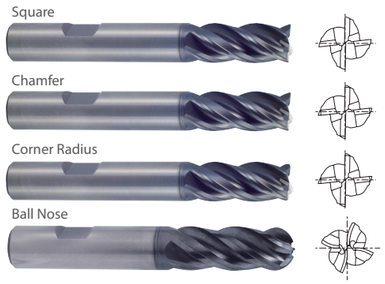
SERIES

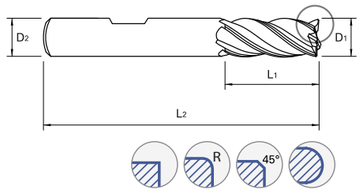
Square **UGMF69** Chamfer **UGMF77**

Corner Radius **UGMF71** Ball Nose **UGMG54**

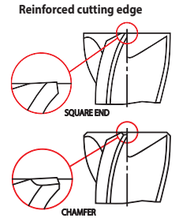
Y-Coated SOLID CARBIDE END MILLS
4 FLUTE STANDARD LENGTH (FLAT SHANK)

- Special flute geometry and multiple helix eliminate vibrations
- Excellent performance for stainless steels, mild steels, cast iron, low/medium hardness materials and all exotic materials up to HRc40
- Advanced coating for superior performance and tool life





SEE CHAMFER AND BALL KEYS ON PAGE 11



CARBIDE | 4 | 35°/37° | FLAT | R ±.0008 | C x 45° | P. 32-33

Unit : INCH

* NEW SIZES

OD (D_1)	SD (D_2)	LOC (L_1)	OAL (L_2)	Square End	Chamfer	Corner Radius						Ball Nose
						.010	.015	.030	.060	.090	.125	
				EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	EDP No.
11/32	3/8	1/2	2-1/2	UGMF69022								
		13/16	2-1/2									UGMG54022
3/8	3/8	1/2	2-1/2	UGMF69024	UGMF77902	UGMF71024		UGMF71913	UGMF71914			
		7/8	2-1/2	UGMF69907	UGMF77024	UGMF71915		UGMF71916	UGMF71917			UGMG54024
7/16	7/16	5/8	2-1/2	UGMF69028			UGMF71028	UGMF71918				
		1	2-3/4	UGMF69908		UGMF71919		UGMF71920	UGMF71921			UGMG54028
1/2	1/2	5/8	2-1/2	UGMF69032	UGMF77032	UGMF71032	UGMF71922	UGMF71923	UGMF71924			
		1	3	UGMF69909	UGMF77903	UGMF71925		UGMF71926	UGMF70927		UGMF71928	UGMG54032
		1 1/4	3	*UGMF69917	*UGMF77908	*UGMF71985	*UGMF71986	*UGMF71987	*UGMF71988	*UGMF71989	*UGMF71990	*UGMG54903
		1-1/4	3-1/2	UGMF69910	UGMF77901	UGMF71929	UGMF71930	UGMF71931	UGMF71932		UGMF71933	
		2	4	UGMF69S915			UGMF71S955	UGMF71S956	UGMF71S957	UGMF71S958	UGMF71S959	UGMG54S901
		2-1/2	4-1/2	UGMF69S916			UGMF71S960	UGMF71S961	UGMF71S962	UGMF71S963	UGMF71S964	UGMG54S902
5/8	5/8	3/4	3	UGMF69040	UGMF77904	UGMF71040		UGMF71934	UGMF71935			
		1-1/4	3-1/2	UGMF69911	UGMF77040	UGMF71936	UGMF71937	UGMF71938	UGMF71939		UGMF71940	UGMG54040
3/4	3/4	3/4	3	UGMF69048	UGMF77905			UGMF71048	UGMF71941			
		1-1/2	4	UGMF69912	UGMF77048		UGMF71942	UGMF71943	UGMF71944		UGMF71945	UGMG54048
1	1	1	4	UGMF69064	UGMF77906		UGMF71064	UGMF71946	UGMF71947			
		1-1/2	4	UGMF69913	UGMF77064		UGMF71948	UGMF71949	UGMF71950		UGMF71951	UGMG54064
		2	5	UGMF69914	UGMF77907		UGMF71952	UGMF71953	UGMF71954			

▶ Length of cut in excess of 3 x D on 37° single-helix requires feed reduction of approximately 50%

Mill Dia. Tolerance (inch)	Shank Dia.Tolerance
0 ~ -.0012	h5 (≥ Ø1/2" : h6)

◎ : Excellent ○ : Good

ISO	P											M			K					
Material Description	Non-alloy steel					Low alloy steel				High alloyed steel, and tool steel		Stainless steel			Grey cast iron		Nodular cast iron		Malleable cast iron	
VDI 3323	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
HRc		13	25	28	32	10	29	32	38	15	35	15	23	10	10	26	3	25		21
HB	125	190	250	270	300	180	275	300	350	200	325	200	240	180	180	260	160	250	130	230
Recommend	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎

ISO	N										S							H		
Material Description	Aluminum-wrought alloy		Aluminum-cast, alloyed			Copper and Copper Alloys (Bronze / Brass)			Non Metallic Materials		Heat Resistant Super Alloys					Titanium Alloys		Hardened steel	Chilled Cast Iron	Hardened Cast Iron
VDI 3323	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
HRc											15	30	25	38	34			55	60	42	55
HB	60	100	75	90	130	110	90	100			200	280	250	350	320	400 Rm	1050 Rm	550	630	400	550
Recommend											○	○	○	○	○	○	○				

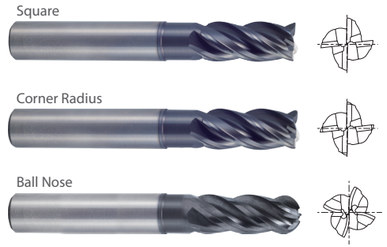
SERIES

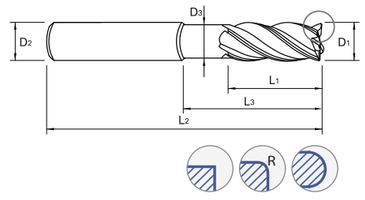
Square **UGMF72** Corner Radius **UGMF74**

Ball Nose **UGMH10**

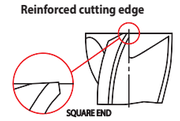
Y-Coated SOLID CARBIDE END MILLS
4 FLUTE EXTENDED LENGTH (PLAIN SHANK)

- Special flute geometry and multiple helix eliminate vibrations
- Excellent performance for stainless steels, mild steels, cast iron, low/medium hardness materials and all exotic materials up to HRc40
- Advanced coating for superior performance and tool life





BALL KEYS ON PAGE 11



CARBIDE | 4 | 35°/37° | PLAIN | R ±.0008 | P. 32-33

Unit : INCH

OD (D_1)	SD (D_2)	LOC (L_1)	LBS (L_3)	OAL (L_2)	Neck Dia (D_3)	Square End	Corner Radius								Ball Nose Mill
							.010	.015	.030	.060	.090	.125	.190	.250	
						EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	EDP No.
1/8	1/8	5/32	3/8	3	.113	UGMF72008	UGMF74008		UGMF74913						UGMH10008
		5/32	1/2	3	.113	UGMF72913	UGMF74914		UGMF74915						UGMH10901
		5/32	5/8	3	.113	UGMF72914	UGMF74916		UGMF74917						UGMH10902
3/16	3/16	7/32	1/2	3	.176	UGMF72012	UGMF74012		UGMF74918						UGMH10012
		7/32	3/4	3	.176	UGMF72915	UGMF74919		UGMF74920						UGMH10903
		7/32	1	3	.176	UGMF72916	UGMF74921		UGMF74922						UGMH10904
1/4	1/4	3/8	3/4	4	.230	UGMF72016			UGMF74016	UGMF74923	UGMF74924				UGMH10016
		3/8	1-1/8	4	.230	UGMF72901	UGMF74901	UGMF74925	UGMF74926						UGMH10905
		3/8	2-1/8	4	.230	UGMF72902	UGMF74902	UGMF74927	UGMF74928						UGMH10906
3/8	3/8	1/2	1-1/8	4	.344	UGMF72024	UGMF74929	UGMF74024	UGMF74930	UGMF74931					UGMH10024
		1/2	2-1/8	4	.344	UGMF72903	UGMF74932	UGMF74903	UGMF74933	UGMF74934					UGMH10907
		1/2	3-1/8	5	.344	UGMF72922	UGMF74815	UGMF74816	UGMF74817	UGMF74818					UGMH10922
		1/2	3-1/8	6	.344	UGMF72904	UGMF74935	UGMF74904	UGMF74936	UGMF74937					UGMH10908
		1/2	4-1/8	6	.344	UGMF72917	UGMF74938	UGMF74939	UGMF74940	UGMF74941					UGMH10909
1/2	1/2	5/8	1-1/2	4	.461	UGMF72032	UGMF74942	UGMF74032	UGMF74943	UGMF74944	UGMF74945				UGMH10032
		5/8	2-1/4	4	.461	UGMF72905	UGMF74946	UGMF74905	UGMF74947	UGMF74948	UGMF74949				UGMH10910
		5/8	3-3/8	5	.461	UGMF72923	UGMF74819	UGMF74820	UGMF74821	UGMF74822	UGMF74823				UGMH10923
		5/8	3-3/8	6	.461	UGMF72906	UGMF74950	UGMF74906	UGMF74951	UGMF74952	UGMF74953				UGMH10911
		5/8	4-1/8	6	.461	UGMF72918	UGMF74954	UGMF74955	UGMF74956	UGMF74957	UGMF74958				UGMH10912

▶ Length of cut in excess of 3 x D on 37° single-helix requires feed reduction of approximately 50%

NEXT PAGE ▶

Mill Dia. Tolerance (inch)	Shank Dia.Tolerance
0 ~ -.0012	h5 (≥ Ø1/2" : h6)

◎ : Excellent ○ : Good

ISO	P											M			K					
Material Description	Non-alloy steel					Low alloy steel				High alloyed steel, and tool steel		Stainless steel			Grey cast iron		Nodular cast iron		Malleable cast iron	
VDI 3323	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
HRc		13	25	28	32	10	29	32	38	15	35	15	23	10	10	26	3	25		21
HB	125	190	250	270	300	180	275	300	350	200	325	200	240	180	180	260	160	250	130	230
Recommend	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎

ISO	N										S							H		
Material Description	Aluminum-wrought alloy		Aluminum-cast, alloyed			Copper and Copper Alloys (Bronze / Brass)			Non Metallic Materials		Heat Resistant Super Alloys					Titanium Alloys		Hardened steel	Chilled Cast Iron	Hardened Cast Iron
VDI 3323	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
HRc											15	30	25	38	34			55	60	42	55
HB	60	100	75	90	130	110	90	100			200	280	250	350	320	400 Rm	1050 Rm	550	630	400	550
Recommend											○	○	○	○	○	○	○				

SERIES
Square UGMF72
Corner Radius UGMF74
Ball Nose UGMH10

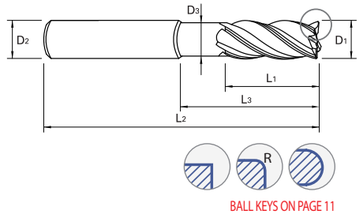
Y-Coated SOLID CARBIDE END MILLS
4 FLUTE EXTENDED LENGTH (PLAIN SHANK)

- Special flute geometry and multiple helix eliminate vibrations
- Excellent performance for stainless steels, mild steels, cast iron, low/medium hardness materials and all exotic materials up to HRc40
- Advanced coating for superior performance and tool life

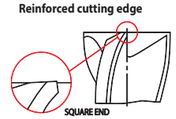
Square

Corner Radius

Ball Nose



BALL KEYS ON PAGE 11



CARBIDE | 4 | 35°/37° | PLAIN | R ±.0008 | P.32-33

Unit : INCH

OD (D1)	SD (D2)	LOC (L1)	LBS (L3)	OAL (L2)	Neck Dia (D3)	Square End	Corner Radius								Ball Nose Mill
							.010	.015	.030	.060	.090	.125	.190	.250	
						EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	EDP No.
5/8	5/8	3/4	1-5/8	4	.586	UGMF72040			UGMF74040	UGMF74959	UGMF74960	UGMF74961			UGMH10040
		3/4	2-3/8	5	.586	UGMF72924			UGMF74824	UGMF74825	UGMF74826	UGMF74827			UGMH10924
		3/4	3-3/8	5	.586	UGMF72925			UGMF74828	UGMF74829	UGMF74830	UGMF74831			UGMH10925
		3/4	3-3/8	6	.586	UGMF72907			UGMF74907	UGMF74962	UGMF74963	UGMF74964			UGMH10913
		3/4	3-3/8	6	.586	UGMF72908			UGMF74908	UGMF74965	UGMF74966	UGMF74967			UGMH10914
		3/4	4-1/8	6	.586	UGMF72919			UGMF74968	UGMF74969	UGMF74970	UGMF74971			UGMH10915
3/4	3/4	1	2	4	.711	UGMF72048			UGMF74048	UGMF74972	UGMF74973	UGMF74974	UGMF74975	UGMF74976	UGMH10048
		1	3	5	.711	UGMF72926			UGMF74832	UGMF74833	UGMF74834	UGMF74835	UGMF74836	UGMF74837	UGMH10926
		1	2-1/2	6	.711	UGMF72920			UGMF74977	UGMF74978	UGMF74979	UGMF74980	UGMF74981	UGMF74982	UGMH10916
		1	3	6	.711	UGMF72909			UGMF74909	UGMF74983	UGMF74984	UGMF74985	UGMF74986	UGMF74987	UGMH10917
		1	4	6	.711	UGMF72910			UGMF74910	UGMF74988	UGMF74989	UGMF74990	UGMF74991	UGMF74992	UGMH10918
1	1	1-1/8	2	4	.961	UGMF72064			UGMF74064	UGMF74993	UGMF74994	UGMF74995	UGMF74996	UGMF74997	UGMH10064
		1-1/8	2-5/8	5	.961	UGMF72927			UGMF74838	UGMF74839	UGMF74840	UGMF74841	UGMF74842	UGMF74843	UGMH10927
		1-1/8	3	5	.961	UGMF72928			UGMF74844	UGMF74845	UGMF74846	UGMF74847	UGMF74848	UGMF74849	UGMH10928
		1-1/8	2-5/8	6	.961	UGMF72921			UGMF74998	UGMF74999	UGMF74801	UGMF74802	UGMF74803	UGMF74804	UGMH10919
		1-1/8	3	6	.961	UGMF72911			UGMF74911	UGMF74805	UGMF74806	UGMF74807	UGMF74808	UGMF74809	UGMH10920
		1-1/8	4	6	.961	UGMF72912			UGMF74912	UGMF74810	UGMF74811	UGMF74812	UGMF74813	UGMF74814	UGMH10921

▶ Length of cut in excess of 3xD on 37° single-helix requires feed reduction of approximately 50%

Mill Dia. Tolerance (inch)	Shank Dia.Tolerance
0 ~ -.0012	h5 (≥ Ø1/2" : h6)

◎ : Excellent ○ : Good

ISO	P											M			K					
Material Description	Non-alloy steel					Low alloy steel				High alloyed steel, and tool steel		Stainless steel			Grey cast iron		Nodular cast iron		Malleable cast iron	
VDI 3323	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
HRc		13	25	28	32	10	29	32	38	15	35	15	23	10	10	26	3	25		21
HB	125	190	250	270	300	180	275	300	350	200	325	200	240	180	180	260	160	250	130	230
Recommend	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎

ISO	N										S							H		
Material Description	Aluminum-wrought alloy		Aluminum-cast, alloyed			Copper and Copper Alloys (Bronze / Brass)			Non Metallic Materials		Heat Resistant Super Alloys					Titanium Alloys		Hardened steel	Chilled Cast Iron	Hardened Cast Iron
VDI 3323	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
HRc											15	30	25	38	34			55	60	42	55
HB	60	100	75	90	130	110	90	100			200	280	250	350	320	400 Rm	1050 Rm	550	630	400	550
Recommend											○	○	○	○	○	○	○				

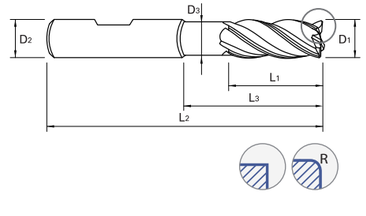
SERIES
Square UGMF73
Corner Radius UGMF75

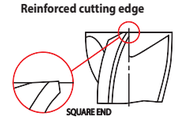
Y-Coated SOLID CARBIDE END MILLS
4 FLUTE EXTENDED LENGTH (FLAT SHANK)

- Special flute geometry and multiple helix eliminate vibrations
- Excellent performance for stainless steels, mild steels, cast iron, low/medium hardness materials and all exotic materials up to HRc40
- Advanced coating for superior performance and tool life

Square

Corner Radius





CARBIDE | 4 | 35°/37° | FLAT

Unit : INCH

OD (D1)	SD (D2)	LOC (L1)	LBS (L3)	OAL (L2)	Neck Dia (D3)	Square End	Corner Radius
							.030
						EDP No.	EDP No.
3/8	3/8	1/2	1-1/8	4	.344	UGMF73024	UGMF75024
		1/2	2-1/8	4	.344	UGMF73903	UGMF75903
		1/2	3-1/8	5	.344	UGMF73913	UGMF75913
		1/2	3-1/8	6	.344	UGMF73904	UGMF75904
1/2	1/2	5/8	1-1/2	4	.461	UGMF73032	UGMF75032
		5/8	2-1/4	4	.461	UGMF73905	UGMF75905
		5/8	3-3/8	5	.461	UGMF73914	UGMF75914
		5/8	3-3/8	6	.461	UGMF73906	UGMF75906
5/8	5/8	3/4	1-5/8	4	.586	UGMF73040	UGMF75040
		3/4	2-3/8	5	.586	UGMF73915	UGMF75915
		3/4	3-3/8	5	.586	UGMF73916	UGMF75916
		3/4	2-3/8	6	.586	UGMF73907	UGMF75907
		3/4	3-3/8	6	.586	UGMF73908	UGMF75908
3/4	3/4	1	2	4	.711	UGMF73048	UGMF75048
		1	3	5	.711	UGMF73917	UGMF75917
		1	3	6	.711	UGMF73909	UGMF75909
		1	4	6	.711	UGMF73910	UGMF75910
1	1	1-1/8	2	4	.961	UGMF73064	UGMF75064
		1-1/8	2-5/8	5	.961	UGMF73918	UGMF75918
		1-1/8	3	5	.961	UGMF73919	UGMF75919
		1-1/8	3	6	.961	UGMF73911	UGMF75911
		1-1/8	4	6	.961	UGMF73912	UGMF75912

▶ Length of cut in excess of 3xD on 37° single-helix requires feed reduction of approximately 50%

Mill Dia. Tolerance (inch)	Shank Dia.Tolerance
0 ~ -.0012	h5 (≥ Ø1/2" : h6)

◎ : Excellent ○ : Good

ISO	P											M			K					
Material Description	Non-alloy steel					Low alloy steel				High alloyed steel, and tool steel		Stainless steel			Grey cast iron		Nodular cast iron		Malleable cast iron	
VDI 3323	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
HRc		13	25	28	32	10	29	32	38	15	35	15	23	10	10	26	3	25		21
HB	125	190	250	270	300	180	275	300	350	200	325	200	240	180	180	260	160	250	130	230
Recommend	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎

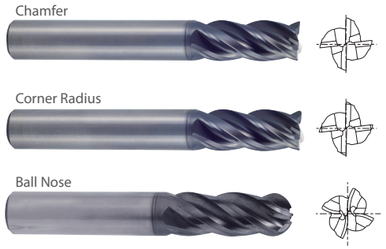
ISO	N										S							H		
Material Description	Aluminum-wrought alloy		Aluminum-cast, alloyed			Copper and Copper Alloys (Bronze / Brass)			Non Metallic Materials		Heat Resistant Super Alloys					Titanium Alloys		Hardened steel	Chilled Cast Iron	Hardened Cast Iron
VDI 3323	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
HRc											15	30	25	38	34			55	60	42	55
HB	60	100	75	90	130	110	90	100			200	280	250	350	320	400 Rm	1050 Rm	550	630	400	550
Recommend											○	○	○	○	○	○	○				

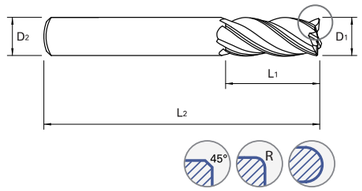
SERIES

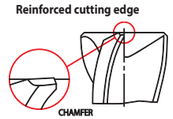
Chamfer **GMF52, GMF56**
Corner Radius **GMF54, GMF58**
Ball Nose **GMG55**

Y-Coated SOLID CARBIDE END MILLS
4 FLUTE STANDARD LENGTH (PLAIN SHANK)

- Special flute geometry and multiple helix eliminate vibrations
- Excellent performance for stainless steels, mild steels, cast iron, low/medium hardness materials and all exotic materials up to HRc40
- Advanced coating for superior performance and tool life







CARBIDE | 4 | 35°/37° | PLAIN | R ±0.02 mm | C x 45° | P. 36 - 37

Unit : METRIC

OD (D_1)		SD (D_2)	LOC (L_1)	OAL (L_2)	Chamfer	Corner Radius					Ball Nose
						0.30	0.50	1.00	2.00	3.00	
Metric	Inch				EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	EDP No.
3.0	.1181	6	7	54	GMF52030	GMF54030	GMF54901				
		6	8	57	GMF56030	GMF58030	GMF58901				GMG55030
4.0	.1575	6	8	54	GMF52040	GMF54040	GMF54902				
		6	11	57	GMF56040	GMF58040	GMF58902				GMG55040
5.0	.1969	6	10	54	GMF52050	GMF54050	GMF54903				
		6	13	57	GMF56050	GMF58050	GMF58903				GMG55050
6.0	.2362	6	10	54	GMF52060	GMF54060	GMF54904	GMF54905			
		6	13	57	GMF56060	GMF58060	GMF58904	GMF58905			GMG55060
8.0	.3150	8	12	58	GMF52080		GMF54080	GMF54906			
		8	19	63	GMF56080		GMF58080	GMF58906			GMG55080
10.0	.3937	10	14	66	GMF52100		GMF54100	GMF54907			
		10	22	72	GMF56100		GMF58100	GMF58907			GMG55100
12.0	.4724	12	16	73	GMF52120		GMF54120	GMF54908	GMF54909		
		12	26	83	GMF56120		GMF58120	GMF58908	GMF58909		GMG55120
14.0	.5512	14	18	75	GMF52140		GMF54140				
		14	26	83	GMF56140		GMF58140				
16.0	.6299	16	22	82	GMF52160			GMF54160	GMF54912	GMF54913	
		16	32	92	GMF56160			GMF58160	GMF58912	GMF58913	GMG55160
18.0	.7087	18	24	84	GMF52180			GMF54180			
		18	32	92	GMF56180			GMF58180			
20.0	.7874	20	26	92	GMF52200			GMF54200	GMF54916	GMF54917	
		20	38	104	GMF56200			GMF58200	GMF58916	GMF58917	GMG55200
25.0	.9843	25	38	104	GMF56250			GMF58250			GMG55250

CHAMFER KEY

Mill Diameter		Chamfer Size (mm)
Metric	Inch	
3.0	.1181	0.10
4.0	.1575	0.15
5.0	.1969	0.15
6.0	.2362	0.20
8.0	.3150	0.20
10.0	.3937	0.30
12.0	.4724	0.35
14.0	.5512	0.40
16.0	.6299	0.40
18.0	.7087	0.50
20.0	.7874	0.50
25.0	.9843	0.50

BALL NOSE KEY

Mill Diameter		Radius of Ball
Metric	Inch	
3.0	.1181	1.5
4.0	.1575	2.0
5.0	.1969	2.5
6.0	.2362	3.0
8.0	.3150	4.0
10.0	.3937	5.0
12.0	.4724	6.0
16.0	.6299	8.0
20.0	.7874	10.0
25.0	.9843	12.5

Mill Dia. Tolerance (mm)		Shank Dia. Tolerance
Up to Ø12	0 ~ -0.02	h5 (≥ Ø12 : h6)
Over Ø12	0 ~ -0.03	

◎ : Excellent ○ : Good

ISO	P											M			K					
Material Description	Non-alloy steel					Low alloy steel				High alloyed steel, and tool steel		Stainless steel			Grey cast iron		Nodular cast iron		Malleable cast iron	
VDI 3323	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
HRc		13	25	28	32	10	29	32	38	15	35	15	23	10	10	26	3	25		21
HB	125	190	250	270	300	180	275	300	350	200	325	200	240	180	180	260	160	250	130	230
Recommend	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎

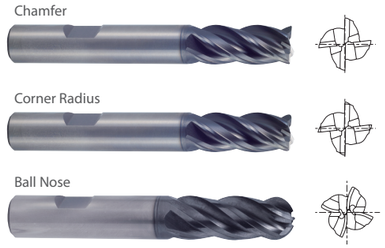
ISO	N										S							H		
Material Description	Aluminum-wrought alloy		Aluminum-cast, alloyed			Copper and Copper Alloys (Bronze / Brass)			Non Metallic Materials		Heat Resistant Super Alloys					Titanium Alloys		Hardened steel		Chilled Cast Iron	Hardened Cast Iron
VDI 3323	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
HRc											15	30	25	38	34			55	60	42	55
HB	60	100	75	90	130	110	90	100			200	280	250	350	320	400 Rm	1050 Rm	550	630	400	550
Recommend											○	○	○	○	○	○	○				

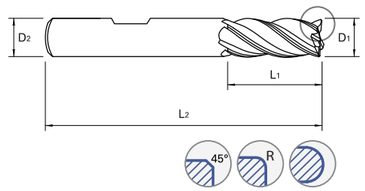
SERIES

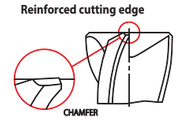
Chamfer **GMF53, GMF57**
Corner Radius **GMF55, GMF59**
Ball Nose **GMG56**

Y-Coated SOLID CARBIDE END MILLS
4 FLUTE STANDARD LENGTH (FLAT SHANK)

- Special flute geometry and multiple helix eliminate vibrations
- Excellent performance for stainless steels, mild steels, cast iron, low/medium hardness materials and all exotic materials up to HRc40
- Advanced coating for superior performance and tool life







CARBIDE | 4 | 35°/37° | FLAT | R ±0.02 mm | C x 45° | P. 36 - 37

Unit : METRIC

OD (D_1)		SD (D_2)	LOC (L_1)	OAL (L_2)	Chamfer	Corner Radius					Ball Nose
						0.30	0.50	1.00	2.00	3.00	
Metric	Inch				EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	EDP No.
3.0	.1181	6	7	54	GMF53030	GMF55030	GMF55901				
		6	8	57	GMF57030	GMF59030	GMF59901				GMG56030
4.0	.1575	6	8	54	GMF53040	GMF55040	GMF55902				
		6	11	57	GMF57040	GMF59040	GMF59902				GMG56040
5.0	.1969	6	10	54	GMF53050	GMF55050	GMF55903				
		6	13	57	GMF57050	GMF59050	GMF59903				GMG56050
6.0	.2362	6	10	54	GMF53060	GMF55060	GMF55904	GMF55905			
		6	13	57	GMF57060	GMF59060	GMF59904	GMF59905			GMG56060
8.0	.3150	8	12	58	GMF53080		GMF55080	GMF55906			
		8	19	63	GMF57080		GMF59080	GMF59906			GMG56080
10.0	.3937	10	14	66	GMF53100		GMF55100	GMF55907			
		10	22	72	GMF57100		GMF59100	GMF59907			GMG56100
12.0	.4724	12	16	73	GMF53120		GMF55120	GMF55908	GMF55909		
		12	26	83	GMF57120		GMF59120	GMF59908	GMF59909		GMG56120
14.0	.5512	14	18	75	GMF53140		GMF55140				
		14	26	83	GMF57140		GMF59140				
16.0	.6299	16	22	82	GMF53160			GMF55160	GMF55912	GMF55913	
		16	32	92	GMF57160			GMF59160	GMF59912	GMF59913	GMG56160
18.0	.7087	18	24	84	GMF53180			GMF55180			
		18	32	92	GMF57180			GMF59180			
20.0	.7874	20	26	92	GMF53200			GMF55200	GMF55916	GMF55917	
		20	38	104	GMF57200			GMF59200	GMF59916	GMF59917	GMG56200
25.0	.9843	25	38	104	GMF57250			GMF59250			GMG56250

CHAMFER KEY

Mill Diameter		Chamfer Size (mm)
Metric	Inch	
3.0	.1181	0.10
4.0	.1575	0.15
5.0	.1969	0.15
6.0	.2362	0.20
8.0	.3150	0.20
10.0	.3937	0.30
12.0	.4724	0.35
14.0	.5512	0.40
16.0	.6299	0.40
18.0	.7087	0.50
20.0	.7874	0.50
25.0	.9843	0.50

BALL NOSE KEY

Mill Diameter		Radius of Ball
Metric	Inch	
3.0	.1181	1.5
4.0	.1575	2.0
5.0	.1969	2.5
6.0	.2362	3.0
8.0	.3150	4.0
10.0	.3937	5.0
12.0	.4724	6.0
16.0	.6299	8.0
20.0	.7874	10.0
25.0	.9843	12.5

Mill Dia. Tolerance (mm)		Shank Dia. Tolerance
Up to Ø12	0 ~ -0.02	h5 (≥ Ø12 : h6)
Over Ø12	0 ~ -0.03	

◎ : Excellent ○ : Good

ISO	P											M			K					
Material Description	Non-alloy steel					Low alloy steel				High alloyed steel, and tool steel		Stainless steel			Grey cast iron		Nodular cast iron		Malleable cast iron	
VDI 3323	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
HRc		13	25	28	32	10	29	32	38	15	35	15	23	10	10	26	3	25		21
HB	125	190	250	270	300	180	275	300	350	200	325	200	240	180	180	260	160	250	130	230
Recommend	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎

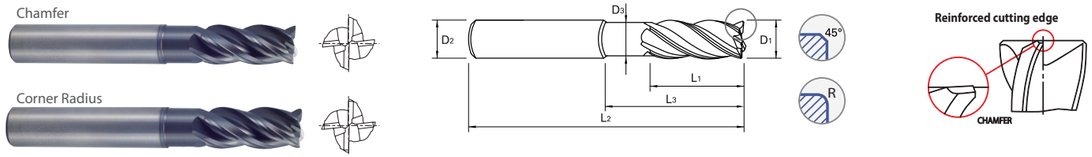
ISO	N										S							H		
Material Description	Aluminum-wrought alloy		Aluminum-cast, alloyed			Copper and Copper Alloys (Bronze / Brass)			Non Metallic Materials		Heat Resistant Super Alloys					Titanium Alloys		Hardened steel		Chilled Cast Iron	Hardened Cast Iron
VDI 3323	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
HRc											15	30	25	38	34			55	60	42	55
HB	60	100	75	90	130	110	90	100			200	280	250	350	320	400 Rm	1050 Rm	550	630	400	550
Recommend											○	○	○	○	○	○	○				

Y-Coated SOLID CARBIDE END MILLS

4 FLUTE EXTENDED LENGTH (PLAIN SHANK)

SERIES
Chamfer **GMF60**
Corner Radius **GMF62**

- Special flute geometry and multiple helix eliminate vibrations
- Excellent performance for stainless steels, mild steels, cast iron, low/medium hardness materials and all exotic materials up to HRc40
- Advanced coating for superior performance and tool life



CARBIDE | 4 | 35°/37° | PLAIN | C x 45° | P. 36

Unit : **METRIC**

OD (D_1) Metric	OD (D_1) Inch	SD (D_2)	LOC (L_1)	LBS (L_3)	OAL (L_2)	Neck Dia (D_3)	Chamfer	Corner Radius 0.30	0.50	1.00	2.00	3.00
							EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	EDP No.
3.0	.1181	6	7	12	54	2.7	GMF60030	GMF62030	GMF62901			
		6	7	17	57	2.7	GMF60901	GMF62902	GMF62903			
		6	8	14	57	2.7	GMF60902					
4.0	.1575	6	8	15	57	3.7	GMF60040	GMF62040	GMF62904			
		6	8	22	63	3.7	GMF60903	GMF62905	GMF62906			
		6	11	16	57	3.7	GMF60904					
5.0	.1969	6	10	17	57	4.7	GMF60050	GMF62050	GMF62907			
		6	10	27	67	4.7	GMF60905	GMF62908	GMF62909			
		6	13	18	57	4.7	GMF60906					
6.0	.2362	6	10	15	57	5.5	GMF60060	GMF62060	GMF62910	GMF62911		
		6	10	20	62	5.5	GMF60907	GMF62912	GMF62913	GMF62914		
		6	10	32	74	5.5	GMF60908	GMF62915	GMF62916	GMF62917		
		6	13	21	57	5.5	GMF60909					
8.0	.3150	8	12	20	63	7.5	GMF60080		GMF62080	GMF62918		
		8	12	30	73	7.5	GMF60910		GMF62919	GMF62920		
		8	12	46	90	7.5	GMF60911		GMF62921	GMF62922		
		8	19	27	63	7.5	GMF60912					
10.0	.3937	10	14	25	72	9.2	GMF60100		GMF62100	GMF62923		
		10	14	35	82	9.2	GMF60913		GMF62924	GMF62925		
		10	14	55	102	9.2	GMF60914		GMF62926	GMF62927		
		10	22	32	72	9.2	GMF60915					
12.0	.4724	12	16	30	83	11.0	GMF60120		GMF62120	GMF62928	GMF62929	
		12	16	40	93	11.0	GMF60916		GMF62930	GMF62931	GMF62932	
		12	16	64	117	11.0	GMF60917		GMF62933	GMF62934	GMF62935	
		12	26	38	83	11.0	GMF60918					
16.0	.6299	16	22	38	92	15.0	GMF60160			GMF62160	GMF62936	GMF62937
		16	22	55	109	15.0	GMF60919			GMF62938	GMF62939	GMF62940
		16	22	87	141	15.0	GMF60920			GMF62941	GMF62942	GMF62943
		16	32	44	92	15.0	GMF60921					
20.0	.7874	20	26	50	104	19.0	GMF60200			GMF62200	GMF62944	GMF62945
		20	26	70	124	19.0	GMF60922			GMF62946	GMF62947	GMF62948
		20	26	110	164	19.0	GMF60923			GMF62949	GMF62950	GMF62951
		20	38	54	104	19.0	GMF60924					

CHAMFER KEY		
Mill Diameter Metric	Mill Diameter Inch	Chamfer Size (mm)
3.0	.1181	0.10
4.0	.1575	0.15
5.0	.1969	0.15
6.0	.2362	0.20
8.0	.3150	0.20
10.0	.3937	0.30
12.0	.4724	0.35
16.0	.6299	0.40
20.0	.7874	0.50

Mill Dia. Tolerance (mm)	Shank Dia. Tolerance
Up to Ø12	0 ~ -0.02
Over Ø12	0 ~ -0.03
	h5 (≥ Ø12 : h6)

◎ : Excellent ○ : Good

ISO	P													M			K					
Material Description	Non-alloy steel					Low alloy steel				High alloyed steel, and tool steel				Stainless steel			Grey cast iron		Nodular cast iron		Malleable cast iron	
VDI 3323	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20		
HRc		13	25	28	32	10	29	32	38	15	35	15	23	10	10	26	3	25		21		
HB	125	190	250	270	300	180	275	300	350	200	325	200	240	180	180	260	160	250	130	230		
Recommend	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎		

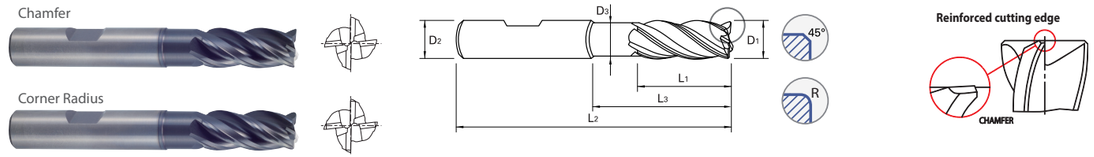
ISO	N										S							H			
Material Description	Aluminum-wrought alloy		Aluminum-cast, alloyed			Copper and Copper Alloys (Bronze / Brass)			Non Metallic Materials		Heat Resistant Super Alloys					Titanium Alloys		Hardened steel		Chilled Cast Iron	Hardened Cast Iron
VDI 3323	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
HRc											15	30	25	38	34			55	60	42	55
HB	60	100	75	90	130	110	90	100			200	280	250	350	320	400 Rm	1050 Rm	550	630	400	550
Recommend											○	○	○	○	○	○	○				

Y-Coated SOLID CARBIDE END MILLS

4 FLUTE EXTENDED LENGTH (FLAT SHANK)

SERIES
Chamfer **GMF61**
Corner Radius **GMF63**

- Special flute geometry and multiple helix eliminate vibrations
- Excellent performance for stainless steels, mild steels, cast iron, low/medium hardness materials and all exotic materials up to HRc40
- Advanced coating for superior performance and tool life



CARBIDE | 4 | 35°/37° | FLAT | C x 45° | P. 36

Unit : **METRIC**

OD (D_1) Metric	OD (D_1) Inch	SD (D_2)	LOC (L_1)	LBS (L_3)	OAL (L_2)	Neck Dia (D_3)	Chamfer 0.10	Corner Radius 0.30	0.50	1.00	2.00	3.00
							EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	EDP No.
3.0	.1181	6	7	12	54	2.7	GMF61030	GMF63030	GMF63901			
		6	7	17	57	2.7	GMF61901	GMF63902	GMF63903			
		6	8	14	57	2.7	GMF61902					
4.0	.1575	6	8	15	57	3.7	GMF61040	GMF63040	GMF63904			
		6	8	22	63	3.7	GMF61903	GMF63905	GMF63906			
		6	11	16	57	3.7	GMF61904					
5.0	.1969	6	10	17	57	4.7	GMF61050	GMF63050	GMF63907			
		6	10	27	67	4.7	GMF61905	GMF63908	GMF63909			
		6	13	18	57	4.7	GMF61906					
6.0	.2362	6	10	15	57	5.5	GMF61060	GMF63060	GMF63910	GMF63911		
		6	10	20	62	5.5	GMF61907	GMF63912	GMF63913	GMF63914		
		6	10	32	74	5.5	GMF61908	GMF63915	GMF63916	GMF63917		
		6	13	21	57	5.5	GMF61909					
8.0	.3150	8	12	20	63	7.5	GMF61080		GMF63080	GMF63918		
		8	12	30	73	7.5	GMF61910		GMF63919	GMF63920		
		8	12	46	90	7.5	GMF61911		GMF63921	GMF63922		
		8	19	27	63	7.5	GMF61912					
10.0	.3937	10	14	25	72	9.2	GMF61100		GMF63100	GMF63923		
		10	14	35	82	9.2	GMF61913		GMF63924	GMF63925		
		10	14	55	102	9.2	GMF61914		GMF63926	GMF63927		
		10	22	32	72	9.2	GMF61915					
12.0	.4724	12	16	30	83	11.0	GMF61120		GMF63120	GMF63928	GMF63929	
		12	16	40	93	11.0	GMF61916		GMF63930	GMF63931	GMF63932	
		12	16	64	117	11.0	GMF61917		GMF63933	GMF63934	GMF63935	
		12	26	38	83	11.0	GMF61918					
16.0	.6299	16	22	38	92	15.0	GMF61160			GMF63160	GMF63936	GMF63937
		16	22	55	109	15.0	GMF61919			GMF63938	GMF63939	GMF63940
		16	22	87	141	15.0	GMF61920			GMF63941	GMF63942	GMF63943
		16	32	44	92	15.0	GMF61921					
20.0	.7874	20	26	50	104	19.0	GMF61200			GMF63200	GMF63944	GMF63945
		20	26	70	124	19.0	GMF61922			GMF63946	GMF63947	GMF63948
		20	26	110	164	19.0	GMF61923			GMF63949	GMF63950	GMF63951
		20	38	54	104	19.0	GMF61924					

CHAMFER KEY		
Mill Diameter Metric	Mill Diameter Inch	Chamfer Size (mm)
3.0	.1181	0.10
4.0	.1575	0.15
5.0	.1969	0.15
6.0	.2362	0.20
8.0	.3150	0.20
10.0	.3937	0.30
12.0	.4724	0.35
16.0	.6299	0.40
20.0	.7874	0.50

Mill Dia. Tolerance (mm)	Shank Dia. Tolerance
Up to Ø12	0 ~ -0.02
Over Ø12	0 ~ -0.03
	h5 (≥ Ø12 : h6)

◎ : Excellent ○ : Good

ISO	P													M			K					
Material Description	Non-alloy steel					Low alloy steel				High alloyed steel, and tool steel				Stainless steel			Grey cast iron		Nodular cast iron		Malleable cast iron	
VDI 3323	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20		
HRc		13	25	28	32	10	29	32	38	15	35	15	23	10	10	26	3	25		21		
HB	125	190	250	270	300	180	275	300	350	200	325	200	240	180	180	260	160	250	130	230		
Recommend	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎		

ISO	N										S							H			
Material Description	Aluminum-wrought alloy		Aluminum-cast, alloyed			Copper and Copper Alloys (Bronze / Brass)			Non Metallic Materials		Heat Resistant Super Alloys					Titanium Alloys		Hardened steel		Chilled Cast Iron	Hardened Cast Iron
VDI 3323	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
HRc											15	30	25	38	34			55	60	42	55
HB	60	100	75	90	130	110	90	100			200	280	250	350	320	400 Rm	1050 Rm	550	630	400	550
Recommend											○	○	○	○	○	○	○				

6 FLUTE

V7 Plus A

Say goodbye to milling tool fatigue and hello to the innovative V7 Plus A 6 Flute tool.

Wake up to better 6 Flute performance.

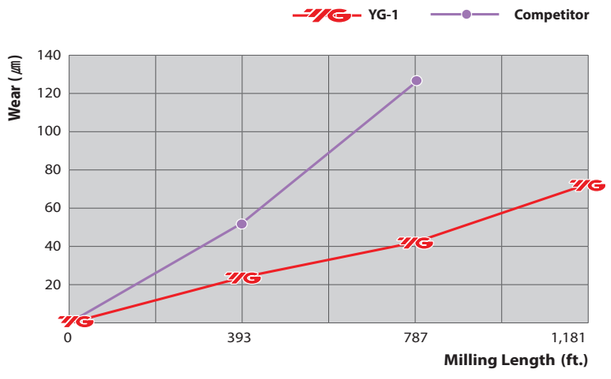
V7 Plus A's revolutionary 6 Flute design lets you handle tougher trochoidal milling at higher speeds with better feed per tooth.

The unique V7 PLUS A geometry reduces vibration, increases accuracy, and provides better heat dissipation for enhanced tool life.

HIGH-PERFORMANCE SOLID CARBIDE
6 FLUTE END MILLS

CASE STUDY

6 Flute vs. Competitor



	V7 Plus A	Competitor
Wear(㎛)	70.855	123.776
Milling Length (ft.)	1,181	787
Size (mm)	Ø12(R1) x Ø12 x 26 x 83	
Work Material	- JIS : S45C(HRc30) - WR : 1.0503 - DIN : C45 - AISI: 1405	
Cutting Speed/RPM	914 ft./min. / 7,392 rev./min.	
Feed/Feed per tooth	295.08 in./min. / .007 in./tooth	
Milling Method	Trochoidal Cutting	
Milling Depth	Axial: .945 in., Radial: .024 in.	
Coolant	Wet Cut	
Overhang	1.417 in.	
Machine	Machining Center	

NEW SIZES

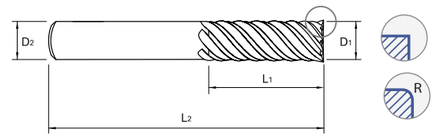
SERIES

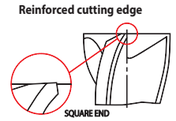
Y-Coated SOLID CARBIDE END MILLS
6 FLUTE STANDARD LENGTH (PLAIN SHANK)

Square **UGMG20**

Corner Radius **UGMG22**

- ▶ The unique geometry of the variable pitch provides the best chatter free tool for high speed and trochoidal milling
- ▶ Excellent performance for Stainless Steels, Mild Steels, Cast Iron, Low/Medium hardness materials under HRc40





CARBIDE | 6 | 45° | PLAIN | P. 36

Unit : INCH

* NEW SIZES

OD (D_1)	SD (D_2)	LOC (L_1)	OAL (L_2)	Square End	Corner Radius							
					.015	.030	.060	.090	.120	.125	.190	.250
				EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	EDP No.
1/4	1/4	1/2	2-1/2	UGMG20914	UGMG22956	UGMG22957	UGMG22958					
		3/4	2-1/2	UGMG20016	UGMG22016	UGMG22959	UGMG22960					
		1-1/8	3	UGMG20901	UGMG22901	UGMG22902	UGMG22961					
		1-1/2	4	UGMG20902	UGMG22903	UGMG22904	UGMG22962					
5/16	5/16	3/4	2-1/2	UGMG20020	UGMG22020							
		1-1/4	3	UGMG20903	UGMG22905	UGMG22906						
		1-5/8	4	UGMG20904	UGMG22907	UGMG22908						
3/8	3/8	5/8	2-1/2	UGMG20915	UGMG22963	UGMG22964	UGMG22965	UGMG22966				
		1	3	UGMG20024	UGMG22024	UGMG22909	UGMG22910	UGMG22967				
		1-1/2	4	UGMG20905	UGMG22911	UGMG22912	UGMG22913	UGMG22968				
		2	4	UGMG20906	UGMG22914	UGMG22915	UGMG22916	UGMG22969				
1/2	1/2	5/8	3	UGMG20916	UGMG22970	UGMG22971	UGMG22972	UGMG22973		UGMG22974		
		1	3	UGMG20917	UGMG22032	UGMG22917	UGMG22918	UGMG22975		UGMG22976		
		1	3-1/4	UGMG20032								
		1-1/4	3	*UGMG20930	*UGMG22880	*UGMG22881	*UGMG22882	*UGMG22883	*UGMG22884	*UGMG22885		
		1-1/4	3-1/2	UGMG20907	UGMG22977	UGMG22919	UGMG22920	UGMG22921	UGMG22922	UGMG22978		
		1-5/8	4	UGMG20918	UGMG22979	UGMG22980	UGMG22981	UGMG22982		UGMG22983		
		2	4	UGMG20908	UGMG22984	UGMG22923	UGMG22924	UGMG22925	UGMG22926	UGMG22985		
		2-5/8	5	UGMG20919	UGMG22986	UGMG22987	UGMG22988	UGMG22989		UGMG22990		
		3	5	UGMG20909	UGMG22991	UGMG22927	UGMG22928	UGMG22929	UGMG22930	UGMG22992		

NEXT PAGE ▶

Mill Dia. Tolerance (mm)	Shank Dia. Tolerance
0~-.0012	h5 (≥ Ø12 : h6)

◎ : Excellent ○ : Good

ISO	P											M			K					
Material Description	Non-alloy steel					Low alloy steel				High alloyed steel, and tool steel		Stainless steel			Grey cast iron		Nodular cast iron		Malleable cast iron	
VDI 3323	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
HRc		13	25	28	32	10	29	32	38	15	35	15	23	10	10	26	3	25		21
HB	125	190	250	270	300	180	275	300	350	200	325	200	240	180	180	260	160	250	130	230
Recommend	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	○	○	○	○	○	○

ISO	N										S							H			
Material Description	Aluminum-wrought alloy		Aluminum-cast, alloyed			Copper and Copper Alloys (Bronze / Brass)			Non Metallic Materials		Heat Resistant Super Alloys					Titanium Alloys		Hardened steel		Chilled Cast Iron	Hardened Cast Iron
VDI 3323	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
HRc											15	30	25	38	34			55	60	42	55
HB	60	100	75	90	130	110	90	100			200	280	250	350	320	400 Rm	1050 Rm	550	630	400	550
Recommend											○	○	○	○	○	○	○				

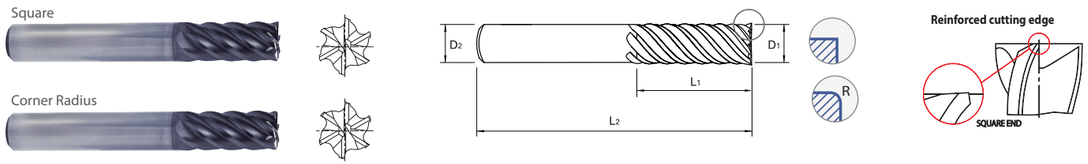
SERIES

Square **UGMG20**

Corner Radius **UGMG22**

Y-Coated SOLID CARBIDE END MILLS
6 FLUTE STANDARD LENGTH (PLAIN SHANK)

- The unique geometry of the variable pitch provides the best chatter free tool for high speed and trochoidal milling
- Excellent performance for Stainless Steels, Mild Steels, Cast Iron, Low/Medium hardness materials under HRc40



CARBIDE | 6 | 45° | PLAIN | P. 36

Unit : INCH

OD (D_1)	SD (D_2)	LOC (L_1)	OAL (L_2)	Square End	Corner Radius							
					.015	.030	.060	.090	.120	.125	.190	.250
				EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	EDP No.
5/8	5/8	3/4	3	UGMG20920	UGMG22993	UGMG22994	UGMG22995	UGMG22996		UGMG22997		
		1-1/4	3-1/2	UGMG20040	UGMG22998	UGMG22040	UGMG22931	UGMG22932	UGMG22933	UGMG22999		
		1-7/8	4	UGMG20921	UGMG22801	UGMG22802	UGMG22803	UGMG22804		UGMG22805		
		2	4	UGMG20910	UGMG22806	UGMG22934	UGMG22935	UGMG22936	UGMG22937	UGMG22807		
		2-5/8	5	UGMG20922	UGMG22808	UGMG22809	UGMG22810	UGMG22811		UGMG22812		
		3	5	UGMG20911	UGMG22813	UGMG22938	UGMG22939	UGMG22940	UGMG22941	UGMG22814		
3/4	3/4	1	3-1/2	UGMG20923	UGMG22815	UGMG22816	UGMG22817	UGMG22818		UGMG22819	UGMG22820	UGMG22821
		1-1/2	4	UGMG20048	UGMG22822	UGMG22048	UGMG22942	UGMG22943	UGMG22944	UGMG22823	UGMG22824	UGMG22825
		1-7/8	5	UGMG20924	UGMG22826	UGMG22827	UGMG22828	UGMG22829		UGMG22830	UGMG22831	UGMG22832
		2-1/4	5	UGMG20925	UGMG22833	UGMG22834	UGMG22835	UGMG22836		UGMG22837	UGMG22838	UGMG22839
		2-3/4	5	UGMG20926	UGMG22840	UGMG22841	UGMG22842	UGMG22843		UGMG22844	UGMG22845	UGMG22846
		3	5-1/2	UGMG20912	UGMG22847	UGMG22945	UGMG22946	UGMG22947	UGMG22948	UGMG22848	UGMG22849	UGMG22850
1	1	1-1/2	4	UGMG20064	UGMG22851	UGMG22064	UGMG22949	UGMG22950	UGMG22951	UGMG22852	UGMG22853	UGMG22854
		2	5	UGMG20927	UGMG22855	UGMG22856	UGMG22857	UGMG22858		UGMG22859	UGMG22860	UGMG22861
		2-5/8	5	UGMG20928	UGMG22862	UGMG22863	UGMG22864	UGMG22865		UGMG22866	UGMG22867	UGMG22868
		3-1/4	6	UGMG20929	UGMG22869	UGMG22870	UGMG22871	UGMG22872		UGMG22873	UGMG22874	UGMG22875
		4	7	UGMG20913	UGMG22876	UGMG22952	UGMG22953	UGMG22954	UGMG22955	UGMG22877	UGMG22878	UGMG22879

Mill Dia. Tolerance (mm)	Shank Dia. Tolerance
0~-.0012	h5 (≥ Ø12 : h6)

◎ : Excellent ○ : Good

ISO	P																			
Material Description	Non-alloy steel					Low alloy steel					High alloyed steel, and tool steel		Stainless steel			Grey cast iron		Nodular cast iron		Malleable cast iron	
VDI 3323	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
HRc		13	25	28	32	10	29	32	38	15	35	15	23	10	10	26	3	25		21
HB	125	190	250	270	300	180	275	300	350	200	325	200	240	180	180	260	160	250	130	230
Recommend	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	○	○	○	○	○	○

ISO	N										S							H		
Material Description	Aluminum-wrought alloy		Aluminum-cast, alloyed			Copper and Copper Alloys (Bronze / Brass)			Non Metallic Materials		Heat Resistant Super Alloys					Titanium Alloys		Hardened steel	Chilled Cast Iron	Hardened Cast Iron
VDI 3323	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
HRc											15	30	25	38	34			55	60	42	55
HB	60	100	75	90	130	110	90	100			200	280	250	350	320	400 Rm	1050 Rm	550	630	400	550
Recommend											○	○	○	○	○	○	○				

NEW SIZES

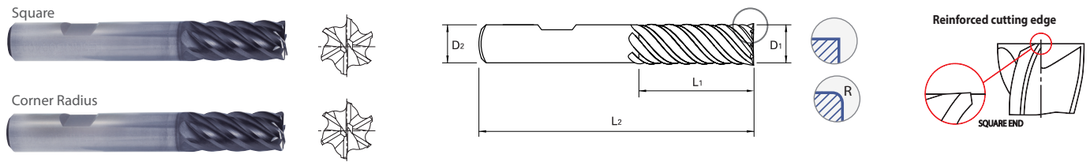
SERIES

Square **UGMG21**

Corner Radius **UGMG23**

Y-Coated SOLID CARBIDE END MILLS
6 FLUTE STANDARD LENGTH (FLAT SHANK)

- The unique geometry of the variable pitch provides the best chatter free tool for high speed and trochoidal milling
- Excellent performance for Stainless Steels, Mild Steels, Cast Iron, Low/Medium hardness materials under HRc40



CARBIDE | 6 | 45° | FLAT | P. 36

Unit : INCH

* NEW SIZES

OD (D_1)	SD (D_2)	LOC (L_1)	OAL (L_2)	Square End	Corner Radius				
					.015	.030	.060	.090	.120
				EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	EDP No.
3/8	3/8	1	3	UGMG21024	UGMG23024	UGMG23909	UGMG23910		
		1-1/2	4	UGMG21905	UGMG23911	UGMG23912	UGMG23913		
		2	4	UGMG21906	UGMG23914	UGMG23915	UGMG23916		
1/2	1/2	1	3	UGMG21914	UGMG23032	UGMG23917	UGMG23918		
		1	3-1/4	UGMG21032					
		1-1/4	3	*UGMG21915	*UGMG23956	*UGMG23957	*UGMG23958	*UGMG23959	*UGMG23960
		1-1/4	3-1/2	UGMG21907		UGMG23919	UGMG23920	UGMG23921	UGMG23922
		2	4	UGMG21908		UGMG23923	UGMG23924	UGMG23925	UGMG23926
		3	5	UGMG21909		UGMG23927	UGMG23928	UGMG23929	UGMG23930
5/8	5/8	1-1/4	3-1/2	UGMG21040		UGMG23040	UGMG23931	UGMG23932	UGMG23933
		2	4	UGMG21910		UGMG23934	UGMG23935	UGMG23936	UGMG23937
		3	5	UGMG21911		UGMG23938	UGMG23939	UGMG23940	UGMG23941
3/4	3/4	1-1/2	4	UGMG21048		UGMG23048	UGMG23942	UGMG23943	UGMG23944
		3	5-1/2	UGMG21912		UGMG23945	UGMG23946	UGMG23947	UGMG23948
1	1	1-1/2	4	UGMG21064		UGMG23064	UGMG23949	UGMG23950	UGMG23951
		4	7	UGMG21913		UGMG23952	UGMG23953	UGMG23954	UGMG23955

Mill Dia. Tolerance (mm)	Shank Dia. Tolerance
0~-.0012	h5 (≥ Ø12 : h6)

◎ : Excellent ○ : Good

ISO	P																			
Material Description	Non-alloy steel					Low alloy steel					High alloyed steel, and tool steel		Stainless steel			Grey cast iron		Nodular cast iron		Malleable cast iron	
VDI 3323	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
HRc		13	25	28	32	10	29	32	38	15	35	15	23	10	10	26	3	25		21
HB	125	190	250	270	300	180	275	300	350	200	325	200	240	180	180	260	160	250	130	230
Recommend	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	○	○	○	○	○	○

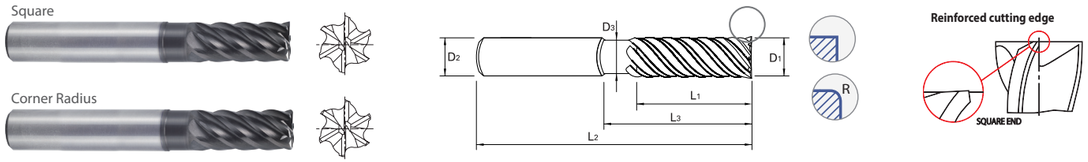
ISO	N										S							H		
Material Description	Aluminum-wrought alloy		Aluminum-cast, alloyed			Copper and Copper Alloys (Bronze / Brass)			Non Metallic Materials		Heat Resistant Super Alloys					Titanium Alloys		Hardened steel	Chilled Cast Iron	Hardened Cast Iron
VDI 3323	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
HRc											15	30	25	38	34			55	60	42	55
HB	60	100	75	90	130	110	90	100			200	280	250	350	320	400 Rm	1050 Rm	550	630	400	550
Recommend											○	○	○	○	○	○	○				

SERIES

Square **UGMH08**
Corner Radius **UGMH09**

Y-Coated SOLID CARBIDE END MILLS
6 FLUTE EXTENDED LENGTH (PLAIN SHANK)

- The unique geometry of the variable pitch provides the best chatter free tool for high speed and trochoidal milling
- Excellent performance for Stainless Steels, Mild Steels, Cast Iron, Low/Medium hardness materials under HRc40



CARBIDE | 6 | 45° | PLAIN | P. 36

Unit : **INCH**

OD (D_1)	SD (D_2)	LOC (L_1)	LBS (L_3)	OAL (L_2)	Neck Dia (D_3)	Square End	Corner Radius					
							.030	.060	.090	.125	.190	.250
						EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	EDP No.
1/4	1/4	3/8	3/4	4	.230	UGMH08016	UGMH09016	UGMH09901				
		3/8	1-1/8	4	.230	UGMH08901	UGMH09902	UGMH09903				
		3/8	2-1/8	4	.230	UGMH08902	UGMH09904	UGMH09905				
3/8	3/8	1/2	1-1/8	4	.344	UGMH08024	UGMH09024	UGMH09906	UGMH09907			
		1/2	2-1/8	4	.344	UGMH08903	UGMH09908	UGMH09909	UGMH09910			
		1/2	3-1/8	5	.344	UGMH08919	UGMH09999	UGMH09801	UGMH09802			
		1/2	3-1/8	6	.344	UGMH08904	UGMH09911	UGMH09912	UGMH09913			
		1/2	4-1/8	6	.344	UGMH08905	UGMH09914	UGMH09915	UGMH09916			
1/2	1/2	5/8	1-1/2	4	.461	UGMH08032	UGMH09032	UGMH09917	UGMH09918	UGMH09919		
		5/8	2-1/4	4	.461	UGMH08906	UGMH09920	UGMH09921	UGMH09922	UGMH09923		
		5/8	3-3/8	5	.461	UGMH08920	UGMH09803	UGMH09804	UGMH09805	UGMH09806		
		5/8	3-3/8	6	.461	UGMH08907	UGMH09924	UGMH09925	UGMH09926	UGMH09927		
		5/8	4-1/8	6	.461	UGMH08908	UGMH09928	UGMH09929	UGMH09930	UGMH09931		
5/8	5/8	3/4	1-5/8	4	.586	UGMH08040	UGMH09040	UGMH09932	UGMH09933	UGMH09934		
		3/4	2-3/8	5	.586	UGMH08921	UGMH09807	UGMH09808	UGMH09809	UGMH09810		
		3/4	3-3/8	5	.586	UGMH08922	UGMH09811	UGMH09812	UGMH09813	UGMH09814		
		3/4	2-3/8	6	.586	UGMH08909	UGMH09935	UGMH09936	UGMH09937	UGMH09938		
		3/4	3-3/8	6	.586	UGMH08910	UGMH09939	UGMH09940	UGMH09941	UGMH09942		
		3/4	4-1/8	6	.586	UGMH08911	UGMH09943	UGMH09944	UGMH09945	UGMH09946		

NEXT PAGE ▶

Mill Dia. Tolerance (mm)	Shank Dia. Tolerance
0~-.0012	h5 (≥ Ø12 : h6)

◎ : Excellent ○ : Good

ISO	P											M			K					
Material Description	Non-alloy steel					Low alloy steel				High alloyed steel, and tool steel		Stainless steel			Grey cast iron		Nodular cast iron		Malleable cast iron	
VDI 3323	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
HRc		13	25	28	32	10	29	32	38	15	35	15	23	10	10	26	3	25		21
HB	125	190	250	270	300	180	275	300	350	200	325	200	240	180	180	260	160	250	130	230
Recommend	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	○	○	○	○	○	○

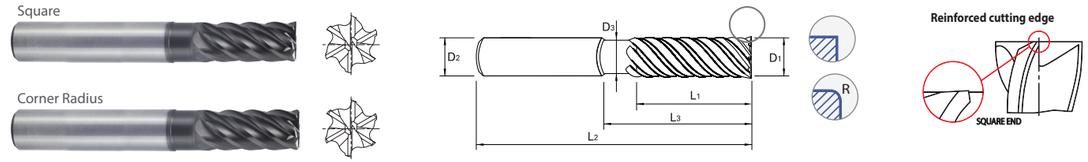
ISO	N										S							H			
Material Description	Aluminum-wrought alloy		Aluminum-cast, alloyed			Copper and Copper Alloys (Bronze / Brass)			Non Metallic Materials		Heat Resistant Super Alloys					Titanium Alloys		Hardened steel		Chilled Cast Iron	Hardened Cast Iron
VDI 3323	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
HRc											15	30	25	38	34			55	60	42	55
HB	60	100	75	90	130	110	90	100			200	280	250	350	320	400 Rm	1050 Rm	550	630	400	550
Recommend											○	○	○	○	○	○	○				

SERIES

Square **UGMH08**
Corner Radius **UGMH09**

Y-Coated SOLID CARBIDE END MILLS
6 FLUTE EXTENDED LENGTH (PLAIN SHANK)

- The unique geometry of the variable pitch provides the best chatter free tool for high speed and trochoidal milling
- Excellent performance for Stainless Steels, Mild Steels, Cast Iron, Low/Medium hardness materials under HRc40



CARBIDE | 6 | 45° | PLAIN | P. 36

Unit : **INCH**

OD (D_1)	SD (D_2)	LOC (L_1)	LBS (L_3)	OAL (L_2)	Neck Dia (D_3)	Square End	Corner Radius					
							.030	.060	.090	.125	.190	.250
						EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	EDP No.
3/4	3/4	1-1/8	2	4	.711	UGMH08048	UGMH09048	UGMH09947	UGMH09948	UGMH09949	UGMH09950	UGMH09951
		1-1/8	2-5/8	5	.711	UGMH08912	UGMH09952	UGMH09953	UGMH09954	UGMH09955	UGMH09956	UGMH09957
		1-1/8	3-1/4	6	.711	UGMH08913	UGMH09958	UGMH09959	UGMH09960	UGMH09961	UGMH09962	UGMH09963
		1-1/8	4-1/4	7	.711	UGMH08914	UGMH09964	UGMH09965	UGMH09966	UGMH09967	UGMH09968	UGMH09969
1	1	1-1/4	2-1/4	4	.961	UGMH08064	UGMH09064	UGMH09970	UGMH09971	UGMH09972	UGMH09973	UGMH09974
		1-1/4	2-5/8	5	.961	UGMH08915	UGMH09975	UGMH09976	UGMH09977	UGMH09978	UGMH09979	UGMH09980
		1-1/4	3-1/4	6	.961	UGMH08916	UGMH09981	UGMH09982	UGMH09983	UGMH09984	UGMH09985	UGMH09986
		1-1/4	4-1/4	7	.961	UGMH08917	UGMH09987	UGMH09988	UGMH09989	UGMH09990	UGMH09991	UGMH09992
		1-1/4	5-1/4	8	.961	UGMH08918	UGMH09993	UGMH09994	UGMH09995	UGMH09996	UGMH09997	UGMH09998

Mill Dia. Tolerance (mm)	Shank Dia. Tolerance
0~-.0012	h5 (≥ Ø12 : h6)

◎ : Excellent ○ : Good

ISO	P											M			K					
Material Description	Non-alloy steel					Low alloy steel				High alloyed steel, and tool steel		Stainless steel			Grey cast iron		Nodular cast iron		Malleable cast iron	
VDI 3323	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
HRc		13	25	28	32	10	29	32	38	15	35	15	23	10	10	26	3	25		21
HB	125	190	250	270	300	180	275	300	350	200	325	200	240	180	180	260	160	250	130	230
Recommend	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	○	○	○	○	○	○

ISO	N										S							H			
Material Description	Aluminum-wrought alloy		Aluminum-cast, alloyed			Copper and Copper Alloys (Bronze / Brass)			Non Metallic Materials		Heat Resistant Super Alloys					Titanium Alloys		Hardened steel		Chilled Cast Iron	Hardened Cast Iron
VDI 3323	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
HRc											15	30	25	38	34			55	60	42	55
HB	60	100	75	90	130	110	90	100			200	280	250	350	320	400 Rm	1050 Rm	550	630	400	550
Recommend											○	○	○	○	○	○	○				

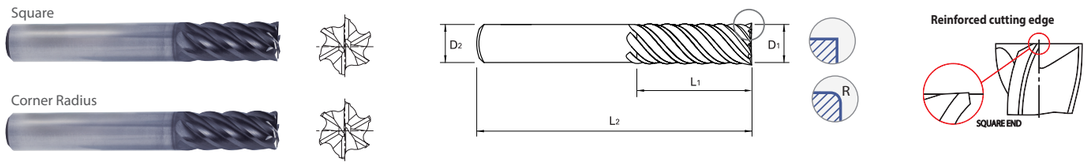
SERIES

Square **GMG12, GMG14**

Corner Radius **GMG16, GMG18**

Y-Coated SOLID CARBIDE END MILLS
6 FLUTE STANDARD LENGTH (PLAIN SHANK)

- The unique geometry of the variable pitch provides the best chatter free tool for high speed and trochoidal milling
- Excellent performance for Stainless Steels, Mild Steels, Cast Iron, Low/Medium hardness materials under HRc40



CARBIDE | 6 | 45° | PLAIN | P. 38

Unit : **METRIC**

OD (D_1)		SD (D_2)	LOC (L_1)	OAL (L_2)	Square End	Corner Radius						
Metric	Inch					0.50	1.00	1.50	2.00	3.00	4.00	5.00
					EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	EDP No.
6.0	0.2362	6	13	57	GMG12060	GMG16060	GMG16901					
		6	24	75	GMG14060	GMG18060	GMG18901					
8.0	0.3150	8	19	63	GMG12080	GMG16080	GMG16902					
		8	32	75	GMG14080	GMG18080	GMG18902		GMG18903			
10.0	0.3937	10	22	72	GMG12100	GMG16100	GMG16903	GMG16904	GMG16905			
		10	40	100	GMG14100	GMG18100	GMG18904	GMG18905	GMG18906			
12.0	0.4724	12	26	83	GMG12120	GMG16120	GMG16906	GMG16907	GMG16908	GMG16909		
		12	48	120	GMG14120	GMG18120	GMG18907	GMG18908	GMG18909	GMG18910		
16.0	0.6299	16	32	92	GMG12160		GMG16160	GMG16910	GMG16911	GMG16912		
		16	64	140	GMG14160		GMG18160	GMG18911	GMG18912	GMG18913		
20.0	0.7874	20	38	104	GMG12200		GMG16200	GMG16913	GMG16914	GMG16915		
		20	80	150	GMG14200		GMG18200	GMG18914	GMG18915	GMG18916	GMG18917	GMG18918
25.0	0.9843	25	44	104	GMG12250		GMG16250	GMG16916	GMG16917	GMG16918		
		25	100	170	GMG14250		GMG18250	GMG18919	GMG18920	GMG18921	GMG18922	GMG18923

Mill Dia. Tolerance (mm)			Shank Dia. Tolerance
Up to 3xD		Over 3xD	
Up to Ø12	0 ~ -0.02	0 ~ -0.03	h5 (≥ Ø12 : h6)
Over Ø12	0 ~ -0.03		

◎ : Excellent ○ : Good

ISO	P											M			K					
Material Description	Non-alloy steel					Low alloy steel				High alloyed steel, and tool steel		Stainless steel			Grey cast iron		Nodular cast iron		Malleable cast iron	
VDI 3323	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
HRc		13	25	28	32	10	29	32	38	15	35	15	23	10	10	26	3	25		21
HB	125	190	250	270	300	180	275	300	350	200	325	200	240	180	180	260	160	250	130	230
Recommend	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	○	○	○	○	○	○

ISO	N										S							H			
Material Description	Aluminum-wrought alloy		Aluminum-cast, alloyed			Copper and Copper Alloys (Bronze / Brass)			Non Metallic Materials		Heat Resistant Super Alloys					Titanium Alloys		Hardened steel		Chilled Cast Iron	Hardened Cast Iron
VDI 3323	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
HRc											15	30	25	38	34			55	60	42	55
HB	60	100	75	90	130	110	90	100			200	280	250	350	320	400 Rm	1050 Rm	550	630	400	550
Recommend											○	○	○	○	○	○	○				

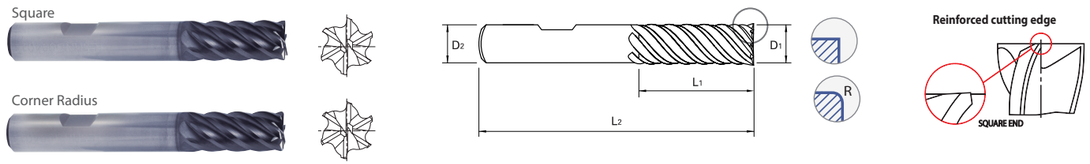
SERIES

Square **GMG13, GMG15**

Corner Radius **GMG17, GMG19**

Y-Coated SOLID CARBIDE END MILLS
6 FLUTE STANDARD LENGTH (FLAT SHANK)

- The unique geometry of the variable pitch provides the best chatter free tool for high speed and trochoidal milling
- Excellent performance for Stainless Steels, Mild Steels, Cast Iron, Low/Medium hardness materials under HRc40



CARBIDE | 6 | 45° | FLAT | P. 38

Unit : **METRIC**

OD (D_1)		SD (D_2)	LOC (L_1)	OAL (L_2)	Square End	Corner Radius						
Metric	Inch					0.50	1.00	1.50	2.00	3.00	4.00	5.00
					EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	EDP No.
6.0	0.2362	6	13	57	GMG13060	GMG17060	GMG17901					
		6	24	75	GMG15060	GMG19060	GMG19901					
8.0	0.3150	8	19	63	GMG13080	GMG17080	GMG17902					
		8	32	75	GMG15080	GMG19080	GMG19902		GMG19903			
10.0	0.3937	10	22	72	GMG13100	GMG17100	GMG17903	GMG17904	GMG17905			
		10	40	100	GMG15100	GMG19100	GMG19904	GMG19905	GMG19906			
12.0	0.4724	12	26	83	GMG13120	GMG17120	GMG17906	GMG17907	GMG17908	GMG17909		
		12	48	120	GMG15120	GMG19120	GMG19907	GMG19908	GMG19909	GMG19910		
16.0	0.6299	16	32	92	GMG13160		GMG17160	GMG17910	GMG17911	GMG17912		
		16	64	140	GMG15160		GMG19160	GMG19911	GMG19912	GMG19913		
20.0	0.7874	20	38	104	GMG13200		GMG17200	GMG17913	GMG17914	GMG17915		
		20	80	150	GMG15200		GMG19200	GMG19914	GMG19915	GMG19916	GMG19917	GMG19918
25.0	0.9843	25	44	104	GMG13250		GMG17250	GMG17916	GMG17917	GMG17918		
		25	100	170	GMG15250		GMG19250	GMG19919	GMG19920	GMG19921	GMG19922	GMG19923

Mill Dia. Tolerance (mm)			Shank Dia. Tolerance
Up to 3xD		Over 3xD	
Up to Ø12	0 ~ -0.02	0 ~ -0.03	h5 (≥ Ø12 : h6)
Over Ø12	0 ~ -0.03		

◎ : Excellent ○ : Good

ISO	P											M			K					
Material Description	Non-alloy steel					Low alloy steel				High alloyed steel, and tool steel		Stainless steel			Grey cast iron		Nodular cast iron		Malleable cast iron	
VDI 3323	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
HRc		13	25	28	32	10	29	32	38	15	35	15	23	10	10	26	3	25		21
HB	125	190	250	270	300	180	275	300	350	200	325	200	240	180	180	260	160	250	130	230
Recommend	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	○	○	○	○	○	○

ISO	N										S							H			
Material Description	Aluminum-wrought alloy		Aluminum-cast, alloyed			Copper and Copper Alloys (Bronze / Brass)			Non Metallic Materials		Heat Resistant Super Alloys					Titanium Alloys		Hardened steel		Chilled Cast Iron	Hardened Cast Iron
VDI 3323	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
HRc											15	30	25	38	34			55	60	42	55
HB	60	100	75	90	130	110	90	100			200	280	250	350	320	400 Rm	1050 Rm	550	630	400	550
Recommend											○	○	○	○	○	○	○				

6 FLUTE CHIP SPLITTER

V7 Plus A

Special Chip Splitter Design
Shorter Chip Length at High Axial Machining, improving Chip Removal from both the Component and the Machine

Do Chips a Complete Makeover

The New V7 Plus Chip Splitter reduces vibrations and realizes outstanding machining performance and surface finish by applying unequal index design which is the strength of V7 Plus.

Furthermore, the optimized chip splitter design shortens the length of the chips into approximately 1/3 than other End Mills that leads to excellent chip evacuation, as well.

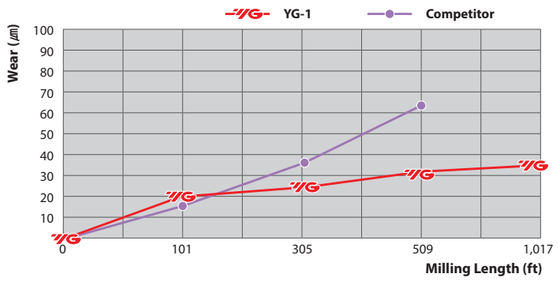
As the V7 Plus Chip Splitter shows a superior performance in high-speed machining and trochoidal milling.

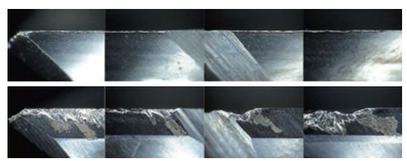
HIGH-PERFORMANCE SOLID CARBIDE

6 FLUTE CHIP SPLITTER

CASE STUDY

6 Flute Chip Splitter vs Competitor





	V7 Plus A	Competitor
Wear(㎛)	32.49	88.26
Milling Length (ft.)	1,017	509
Size (mm)	Ø12 x Ø12 x 48 x 120 with chip Splitter	
Work Material	- JIS : S45C(HRc30) - WR : 1.0503 - DIN : C45 - AISI: 1405	
Cutting Speed/RPM	722 ft/min. / 5,836 rev./min.	
FEED	124 in./min.	
Milling Method	Trochoidal Cutting	
Milling Depth	Axial: 1.417 in., Radial: .024 in	
Coolant	Wet Cut	
Overhang	2.204 in.	
Machine	Machining Center	

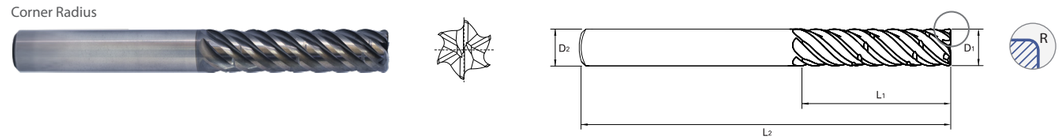
NEW

Y-Coated SOLID CARBIDE END MILLS

6 FLUTE CHIP SPLITTER (PLAIN SHANK)

SERIES
Corner Radius **GMH72**

- Special chip splitter design for better chip removal shortened chip length at high axial machining
- High Performance for Steels, Stainless Steels and Cast Iron



CARBIDE | 6 | 45° | PLAIN | P.35

Unit : INCH

OD (D_1)	SD (D_2)	LOC (L_1)	OAL (L_2)	Corner Radius .015 EDP No.	Corner Radius .030 EDP No.	Corner Radius .060 EDP No.	Corner Radius .125 EDP No.
3/8	3/8	5/8	2_1/2	◇ GMH72901	GMH72902		
3/8	3/8	1"	2_1/2	◇ GMH72903			
3/8	3/8	1_1/8	3"	GMH72024	GMH72904		
1/2	1/2	1_1/4	3"		◇ GMH72905	◇ GMH72906	
1/2	1/2	1_1/2	3_1/2		◇ GMH72907	◇ GMH72908	
1/2	1/2	1_5/8	4"	GMH72032	GMH72909	GMH72910	
1/2	1/2	2"	4"		GMH72911	GMH72912	
5/8	5/8	1_1/4	3_1/2		◇ GMH72913	◇ GMH72914	
5/8	5/8	1_7/8	4"		◇ GMH72915	◇ GMH72916	
5/8	5/8	2"	4"	GMH72040	GMH72917	GMH72918	◇ GMH72919
5/8	5/8	2_3/16	4_1/2		◇ GMH72920	◇ GMH72921	
5/8	5/8	2_5/8	5"		GMH72922	GMH72923	
3/4	3/4	1_1/2	4"		◇ GMH72924	◇ GMH72925	◇ GMH72926
3/4	3/4	1_7/8	4_1/2		GMH72927	GMH72928	
3/4	3/4	2_1/4	5"	GMH72048	GMH72929	GMH72930	GMH72931
3/4	3/4	2_3/4	5"		◇ GMH72932	GMH72933	◇ GMH72934
3/4	3/4	3"	6"		GMH72935	◇ GMH72936	
1"	1"	2"	5"		◇ GMH72937	◇ GMH72938	◇ GMH72939
1"	1"	2_1/2	5_1/2		◇ GMH72942	◇ GMH72943	
1"	1"	3_1/4	6"	GMH72064	GMH72944	GMH72945	GMH72946
1"	1"	3_1/2	6_1/2		◇ GMH72940	◇ GMH72941	
1"	1"	4"	7"			◇ GMH72947	

◇ : Call for Availability

Mill Dia. Tolerance (mm)	Shank Dia. Tolerance
0~-.0012	h5 (≥ Ø12 : h6)

◎ : Excellent ○ : Good

ISO	P											M			K					
Material Description	Non-alloy steel					Low alloy steel				High alloyed steel, and tool steel		Stainless steel			Grey cast iron		Nodular cast iron		Malleable cast iron	
VDI 3323	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
HRc		13	25	28	32	10	29	32	38	15	35	15	23	10	10	26	3	25		21
HB	125	190	250	270	300	180	275	300	350	200	325	200	240	180	180	260	160	250	130	230
Recommend	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	○	○	○	○	○	○

ISO	N										S							H			
Material Description	Aluminum-wrought alloy		Aluminum-cast, alloyed			Copper and Copper Alloys (Bronze / Brass)			Non Metallic Materials		Heat Resistant Super Alloys					Titanium Alloys		Hardened steel		Chilled Cast Iron	Hardened Cast Iron
VDI 3323	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
HRc											15	30	25	38	34			55	60	42	55
HB	60	100	75	90	130	110	90	100			200	280	250	350	320	400 Rm	1050 Rm	550	630	400	550
Recommend											○	○	○	○	○	○	○				

NEW

SERIES

Square **GMH56**

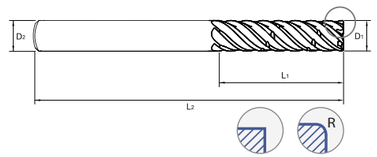
Corner Radius **GMH58**

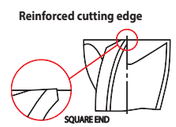
Y-Coated SOLID CARBIDE END MILLS
6 FLUTE CHIP SPLITTER (PLAIN SHANK)

- Special chip splitter design for better chip removal shortened chip length at high axial machining
- High Performance for Steels, Stainless Steels and Cast Iron

Square

Corner Radius





CARBIDE | 6 | 45° | PLAIN | P. 35

Unit : **METRIC**

OD (D_1)		SD (D_2)	LOC (L_1)	OAL (L_2)	Square End	Corner Radius						
						0.50	1.00	1.50	2.00	3.00	4.00	5.00
Metric	Inch				EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	EDP No.
6.0	.2363	6	24	75	GMH56060	GMH58060	GMH58901					
8.0	.3150	8	32	75	GMH56080	GMH58080	GMH58902		GMH58903			
10.0	.3937	10	40	100	GMH56100	GMH58100	GMH58904	GMH58905	GMH58906			
12.0	.4724	12	48	120	GMH56120	GMH58120	GMH58907	GMH58908	GMH58909	GMH58910		
16.0	.6299	16	64	140	GMH56160		GMH58160	GMH58911	GMH58912	GMH58913		
20.0	.7874	20	80	150	GMH56200		GMH58200	GMH58914	GMH58915	GMH58916	GMH58917	GMH58918
25.0	.9843	25	100	170	GMH56250		GMH58250	GMH58919	GMH58920	GMH58921	GMH58922	GMH58923

Mill Dia. Tolerance (mm)	Shank Dia. Tolerance
0 ~ -0.03	h5 (≥ Ø12 : h6)

◎ : Excellent ○ : Good

ISO	P											M			K					
Material Description	Non-alloy steel					Low alloy steel				High alloyed steel, and tool steel		Stainless steel			Grey cast iron		Nodular cast iron		Malleable cast iron	
VDI 3323	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
HRc		13	25	28	32	10	29	32	38	15	35	15	23	10	10	26	3	25		21
HB	125	190	250	270	300	180	275	300	350	200	325	200	240	180	180	260	160	250	130	230
Recommend	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	○	○	○	○	○	○

ISO	N										S							H			
Material Description	Aluminum-wrought alloy		Aluminum-cast, alloyed			Copper and Copper Alloys (Bronze / Brass)			Non Metallic Materials		Heat Resistant Super Alloys					Titanium Alloys		Hardened steel		Chilled Cast Iron	Hardened Cast Iron
VDI 3323	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
HRc											15	30	25	38	34			55	60	42	55
HB	60	100	75	90	130	110	90	100			200	280	250	350	320	400 Rm	1050 Rm	550	630	400	550
Recommend											○	○	○	○	○	○	○				

NEW

SERIES

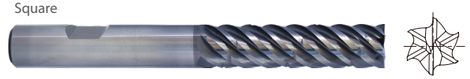
Square **GMH57**

Corner Radius **GMH59**

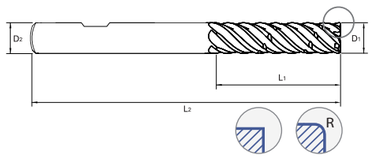
Y-COATED SOLID CARBIDE END MILLS
6 FLUTE CHIP SPLITTER (FLAT SHANK)

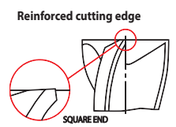
- Special chip splitter design for better chip removal shortened chip length at high axial machining
- High Performance for Steels, Stainless Steels and Cast Iron

Square



Corner Radius





CARBIDE | 6 | 45° | FLAT | P. 35

Unit : **METRIC**

OD (D_1)		SD (D_2)	LOC (L_1)	OAL (L_2)	Square End	Corner Radius						
						0.50	1.00	1.50	2.00	3.00	4.00	5.00
Metric	Inch				EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	EDP No.	EDP No.
6.0	.2363	6	24	75	GMH57060	GMH59060	GMH59901					
8.0	.3150	8	32	75	GMH57080	GMH59080	GMH59902		GMH59903			
10.0	.3937	10	40	100	GMH57100	GMH59100	GMH59904	GMH59905	GMH59906			
12.0	.4724	12	48	120	GMH57120	GMH59120	GMH59907	GMH59908	GMH59909	GMH59910		
16.0	.6299	16	64	140	GMH57160		GMH59160	GMH59911	GMH59912	GMH59913		
20.0	.7874	20	80	150	GMH57200		GMH59200	GMH59914	GMH59915	GMH59916	GMH59917	GMH59918
25.0	.9843	25	100	170	GMH57250		GMH59250	GMH59919	GMH59920	GMH59921	GMH59922	GMH59923

Mill Dia. Tolerance (mm)	Shank Dia. Tolerance
0 ~ -0.03	h5 (≥ Ø12 : h6)

◎ : Excellent ○ : Good

ISO	P											M			K					
Material Description	Non-alloy steel					Low alloy steel				High alloyed steel, and tool steel		Stainless steel			Grey cast iron		Nodular cast iron		Malleable cast iron	
VDI 3323	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
HRc		13	25	28	32	10	29	32	38	15	35	15	23	10	10	26	3	25		21
HB	125	190	250	270	300	180	275	300	350	200	325	200	240	180	180	260	160	250	130	230
Recommend	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	○	○	○	○	○	○

ISO	N										S							H			
Material Description	Aluminum-wrought alloy		Aluminum-cast, alloyed			Copper and Copper Alloys (Bronze / Brass)			Non Metallic Materials		Heat Resistant Super Alloys					Titanium Alloys		Hardened steel		Chilled Cast Iron	Hardened Cast Iron
VDI 3323	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
HRc											15	30	25	38	34			55	60	42	55
HB	60	100	75	90	130	110	90	100			200	280	250	350	320	400 Rm	1050 Rm	550	630	400	550
Recommend											○	○	○	○	○	○	○				

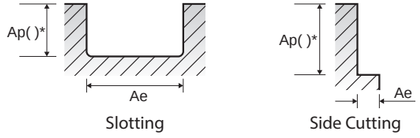
UGMF68, UGMF69, UGMF70, UGMF71, UGMF72 UGMF73, UGMF74, UGMF75, UGMF76, UGMF77 SERIES

4 FLUTE - SIDE & SLOTTING

SFM = ft./min. RPM = rev./min. fz = in./tooth FEED = in./min.

ISO	VDI 3323	Material Description	Ae Side	Ae Slotting	Ap Side	Ap Slotting	Parameter	Diameter (Ø) 1/8	5/32	3/16	7/32	1/4	9/32	5/16	11/32	3/8	7/16	1/2	5/8	3/4	1
P	1-4	Non-alloy steel	0.5D	1.0D	1.5D (1.2D)	1.0D (0.8D)	SFM(Vc)	500	500	500	500	500	500	500	525	550	550	550	550	550	550
							fz	.0002	.0003	.0004	.0005	.0006	.0008	.0011	.0013	.0015	.0017	.0019	.0021	.0026	.0025
							RPM	15249	12200	10166	8714	7625	6778	6100	5834	5616	4811	4210	3368	2806	2105
							FEED	12.01	15.37	17.61	18.53	19.21	22.95	25.94	29.86	33.59	32.20	31.16	28.11	28.73	21.21
	5	Low alloy steel	0.5D	1.0D	1.5D (1.2D)	1.0D (0.8D)	SFM(Vc)	350	350	350	350	350	350	350	370	385	385	385	385	385	385
							fz	.0002	.0003	.0004	.0005	.0006	.0008	.0011	.0013	.0015	.0017	.0018	.0021	.0026	.0025
							RPM	10727	8581	7151	6129	5363	4767	4291	4089	3912	3353	2934	2347	1956	1467
							FEED	8.45	10.81	12.39	13.03	13.51	16.14	18.24	20.93	23.41	22.44	21.71	19.59	20.02	14.78
	6-7		0.5D	1.0D	1.5D (1.2D)	1.0D (0.8D)	SFM(Vc)	500	500	500	500	500	500	500	525	550	550	550	550	550	550
							fz	.0002	.0003	.0004	.0005	.0006	.0008	.0011	.0013	.0015	.0017	.0019	.0021	.0026	.0025
							RPM	15249	12200	10166	8714	7625	6778	6100	5834	5616	4811	4210	3368	2806	2105
							FEED	12.01	15.37	17.61	18.53	19.21	22.95	25.94	29.86	33.59	32.20	31.16	28.11	28.73	21.21
	8-9		0.5D	1.0D	1.5D (1.2D)	1.0D (0.8D)	SFM(Vc)	350	350	350	350	350	350	350	370	385	385	385	385	385	385
							fz	.0002	.0003	.0004	.0005	.0006	.0008	.0011	.0013	.0015	.0017	.0018	.0021	.0026	.0025
							RPM	10727	8581	7151	6129	5363	4767	4291	4089	3912	3353	2934	2347	1956	1467
							FEED	8.45	10.81	12.39	13.03	13.51	16.14	18.24	20.93	23.41	22.44	21.71	19.59	20.02	14.78
	10-11.1	High alloyed steel, and tool steel	0.5D	1.0D	1.5D (1.2D)	1.0D (0.8D)	SFM(Vc)	210	210	210	210	210	210	210	220	230	230	230	230	230	230
							fz	.0001	.0002	.0003	.0004	.0004	.0006	.0007	.0009	.0011	.0012	.0013	.0015	.0018	.0018
							RPM	6418	5134	4278	3667	3209	2852	2567	2445	2343	2008	1757	1406	1171	879
							FEED	3.03	4.85	5.39	5.49	5.56	6.74	7.68	8.86	9.96	9.33	8.86	8.19	8.30	6.23
M	12-13	Stainless steel	0.5D	1.0D	1.5D (1.2D)	1.0D (0.8D)	SFM(Vc)	485	485	485	485	485	485	485	485	485	485	485	485	485	485
							fz	.0002	.0002	.0004	.0004	.0005	.0007	.0009	.0011	.0013	.0014	.0015	.0018	.0022	.0022
							RPM	14852	11882	9901	8487	7426	6601	5941	5401	4951	4243	3713	2970	2475	1857
							FEED	9.36	11.23	14.03	14.7	15.2	18.48	20.58	23.81	26.51	24.39	22.8	21.05	21.44	16.08
	14.1		0.5D	1.0D	1.5D (1.2D)	1.0D (0.8D)	SFM(Vc)	350	350	350	350	350	350	350	350	350	350	350	350	350	350
							fz	.0002	.0003	.0005	.0006	.0007	.0009	.0011	.0015	.0019	.0020	.0022	.0024	.0030	.0030
							RPM	10635	8508	7090	6077	5317	4727	4254	3867	3545	3039	2659	2127	1772	1329
							FEED	8.37	10.72	14.51	14.83	15.07	17.12	18.76	23.14	26.8	24.64	23.03	20.77	21.49	16.12
	14.2		0.5D	1.0D	1.5D (1.2D)	1.0D (0.8D)	SFM(Vc)	310	310	310	310	310	310	310	310	310	310	310	310	310	310
							fz	.0002	.0003	.0005	.0006	.0007	.0009	.0011	.0015	.0019	.0020	.0022	.0024	.0030	.0030
							RPM	9535	7628	6356	5448	4767	4238	3814	3467	3178	2724	2384	1907	1589	1192
							FEED	7.51	9.61	13.01	13.30	13.51	15.35	16.82	20.75	24.02	22.09	20.65	18.62	19.02	14.26
K	15-20	Grey cast iron	0.5D	1.0D	1.5D (1.2D)	1.0D (0.8D)	SFM(Vc)	365	365	365	365	365	365	365	385	405	405	405	405	405	405
							fz	.0002	.0004	.0006	.0007	.0008	.0011	.0013	.0016	.0019	.0021	.0023	.0026	.0032	.0031
							RPM	11216	8972	7477	6409	5608	4985	4486	4290	4115	3527	3087	2469	2058	1543
							FEED	10.60	14.13	16.48	17.16	17.66	21.19	24.02	27.70	31.11	29.44	28.19	25.28	26.25	19.20
S	31-35	Heat Resistant Super Alloys	0.25D	1.0D	1.0D	0.5D	SFM(Vc)	85	85	85	85	85	85	85	85	85	85	85	85	85	85
							fz	.0002	.0003	.0003	.0004	.0005	.0006	.0007	.0010	.0013	.0014	.0015	.0017	.0021	.0020
							RPM	2598	2078	1732	1484	1299	1154	1039	945	866	742	649	520	433	325
							FEED	2.05	2.29	2.18	2.34	2.45	2.82	3.11	3.87	4.5	4.15	3.89	3.52	3.68	2.66
	36-37	Titanium Alloys	0.35D	1.0D	1.0D	0.5D	SFM(Vc)	190	190	190	190	190	190	190	190	190	190	190	190	190	190
							fz	.0002	.0003	.0004	.0005	.0006	.0008	.0010	.0013	.0017	.0018	.0020	.0022	.0027	.0027
							RPM	5806	4645	3871	3318	2903	2581	2323	2111	1935	1659	1452	1161	968	726
							FEED	3.66	5.12	6.71	7.05	7.32	8.33	9.14	11.14	12.80	12.02	11.43	10.06	10.36	7.89

*( ) : Short length & Neck type



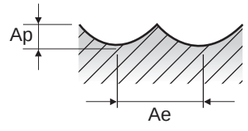
NOTES:
- Feed to be reduced by approximately 50% if L.O.C. (Length Of Cut) is over 3xD
- The above recommendations are based on ideal conditions; for smaller taper machining centers or less rigid conditions please adjust parameters accordingly on diameters greater than 1/2"
- In profile operations, engaging more that 2xD, reduce the radial depth of cut by 50%-60%
- Finish cuts typically require reduced cutting feeds and speeds; also, it is recommended the radial width of cut (AE) should not exceed 2%xD1

UGMG53 UGMG54 UGMH10 SERIES

4 FLUTE BALL NOSE

SFM = ft./min. RPM = rev./min. fz = in./tooth FEED = in./min.

ISO	VDI 3323	Material Description	Ae	Ap	Parameter	Diameter (Ø) 1/8	5/32	3/16	7/32	11/32	3/8	7/16	1/2	5/8	3/4	1
P	1-4	Non-alloy steel	0.5D	1.0D	SFM(Vc)	530	530	530	530	530	530	530	530	530	530	530
					fz	.0010	.0011	.0012	.0016	.0024	.0026	.0028	.0030	.0032	.0035	.0039
					RPM	16227	10818	9986	8114	6491	5409	4057	3245	2950	2705	2028
					FEED	63.89	46.00	47.18	51.11	61.33	55.37	44.72	38.33	37.17	38.33	31.62
	5	Low alloy steel	0.5D	1.0D	SFM(Vc)	370	370	370	370	370	370	370	370	370	370	370
					fz	.0010	.0011	.0012	.0016	.0024	.0026	.0028	.0029	.0031	.0035	.0039
					RPM	11338	7559	6977	5669	4535	3779	2834	2262	2061	1890	1417
					FEED	44.64	32.14	32.96	35.71	42.85	38.69	31.25	26.43	25.65	26.78	22.10
	6-7		0.5D	1.0D	SFM(Vc)	530	530	530	530	530	530	530	530	530	530	530
					fz	.0010	.0011	.0012	.0016	.0024	.0026	.0028	.0030	.0032	.0035	.0039
					RPM	16227	10818	9986	8114	6491	5409	4057	3245	2950	2705	2028
					FEED	63.89	46.00	47.18	51.11	61.33	55.37	44.72	38.33	37.17	38.33	31.62
	8-9		0.5D	1.0D	SFM(Vc)	370	370	370	370	370	370	370	370	370	370	370
					fz	.0010	.0011	.0012	.0016	.0024	.0026	.0028	.0029	.0031	.0035	.0039
					RPM	11338	7559	6977	5669	4535	3779	2834	2262	2061	1890	1417
					FEED	44.64	32.14	32.96	35.71	42.85	38.69	31.25	26.43	25.65	26.78	22.10
	10-11.1	High alloyed steel, and tool steel	0.5D	1.0D	SFM(Vc)	225	225	225	225	225	225	225	225	225	225	225
					fz	.0007	.0007	.0008	.0011	.0017	.0018	.0019	.0020	.0022	.0025	.0028
					RPM	6815	4543	4194	3407	2726	2272	1704	1363	1239	1136	852
					FEED	18.24	13.59	13.87	15.02	18.03	16.10	13.15	11.16	10.93	11.27	9.39
M	12-13	Stainless steel	0.5D	1.0D	SFM(Vc)	255	255	255	255	255	255	255	255	255	255	255
					fz	.0006	.0006	.0010	.0012	.0016	.0018	.0020	.0021	.0023	.0023	.0023
					RPM	7732	5154	4758	3866	3093	2577	1933	1546	1406	1289	966
					FEED	18.26	12.18	18.73	18.26	19.48	18.26	15.22	13.15	13.06	11.77	8.98
	14.1		0.5D	1.0D	SFM(Vc)	280	280	280	280	280	280	280	280	280	280	280
					fz	.0008	.0008	.0010	.0016	.0018	.0020	.0022	.0024	.0025	.0026	.0027
					RPM	8526	5684	5247	4263	3410	2842	2132	1705	1550	1421	1066
					FEED	26.85	17.9	20.66	27.53	24.17	22.38	18.46	16.11	15.62	14.55	11.41
	14.2		0.5D	1.0D	SFM(Vc)	255	255	255	255	255	255	255	255	255	255	255
					fz	.0008	.0008	.0010	.0016	.0018	.0020	.0022	.0024	.0025	.0026	.0027
					RPM	7732	5154	4758	3866	3093	2577	1933	1546	1406	1289	966
					FEED	24.35	16.23	18.73	24.96	21.92	20.29	16.74	14.61	14.17	13.19	10.35
K	15-20	Grey cast iron	0.5D	1.0D	SFM(Vc)	390	390	390	390	390	390	390	390	390	390	390
					fz	.0012	.0013	.0015	.0020	.0029	.0032	.0034	.0037	.0039	.0044	.0049
					RPM	11918	7946	7334	5959	4767	3973	2980	2384	2167	1986	1490
					FEED	58.18	41.29	42.74	46.92	55.56	50.68	40.82	34.91	33.78	35.04	29.09
S	31-35	Heat Resistant Super Alloys	0.2D	0.3D	SFM(Vc)	70	70	70	70	70	70	70	70	70	70	70
					fz	.0006	.0006	.0007	.0011	.0012	.0014	.0015	.0017	.0018	.0018	.0019
					RPM	2109	1406	1298	1054	843	703	527	422	383	351	264
					FEED	4.65	3.1	3.47	4.65	4.12	3.87	3.15	2.79	2.72	2.49	1.99
	36-37	Titanium Alloys	0.5D	0.3D	SFM(Vc)	155	155	155	155	155	155	155	155	155	155	155
					fz	.0007	.0007	.0009	.0015	.0016	.0018	.0019	.0021	.0023	.0023	.0024
					RPM	4706	3137	2896	2353	1882	1569	1177	941	856	784	588
					FEED	13.34	8.89	10.03	13.71	11.86	11.12	9.08	8.00	7.82	7.16	5.65



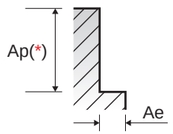
UGMG20, UGMG21, UGMG22 UGMG23, UGMH08, UGMH09 SERIES

6 FLUTE - SIDE CUTTING

SFM = ft./min. fz = in./tooth
RPM = rev./min. FEED = in./min.

ISO	VDI 3323	Material Description	Ae	Ap	Parameter	Diameter (Ø) 1/4	5/16	3/8	1/2	5/8	3/4	1
P	1-4	Non-alloy steel	0.05D	2.0D	SFM(Vc)	985	985	985	985	985	985	985
					fz	.0027	.0046	.0057	.0068	.0080	.0089	.0091
					RPM	15036	12028	10024	7518	6014	5012	3759
					FEED	241.52	329.60	340.96	307.22	286.98	266.38	206.00
	5	Low alloy steel	0.05D	2.0D	SFM(Vc)	665	665	665	665	665	665	665
					fz	.0020	.0033	.0042	.0050	.0059	.0066	.0069
					RPM	10176	8141	6784	5088	4071	3392	2544
					FEED	120.19	163.46	169.88	153.85	143.27	133.82	104.57
	6-7		0.05D	2.0D	Vc	985	985	985	985	985	985	985
					fz	.0027	.0046	.0057	.0068	.0080	.0089	.0091
					RPM	15036	12028	10024	7518	6014	5012	3759
					FEED	241.52	329.60	340.96	307.22	286.98	266.38	206.00
	8-9		0.05D	2.0D	SFM(Vc)	665	665	665	665	665	665	665
					fz	.0020	.0033	.0042	.0050	.0059	.0066	.0069
					RPM	10176	8141	6784	5088	4071	3392	2544
					FEED	120.19	163.46	169.88	153.85	143.27	133.82	104.57
	10-11.1	High alloyed steel, and tool steel	0.05D	2.0D	SFM(Vc)	330	330	330	330	330	330	330
					fz	.0016	.0028	.0035	.0041	.0048	.0054	.0057
					RPM	5012	4009	3341	2506	2005	1671	1253
					FEED	48.54	67.25	69.46	62.15	58.25	54.06	42.62
M	12-13	Stainless steel	0.05D	2.0D	SFM(Vc)	700	700	700	700	700	700	700
					fz	.0019	.0033	.0041	.0049	.0057	.0064	.0066
					RPM	10681	8545	7120	5340	4272	3560	2670
					FEED	123.63	169.55	174.93	157.69	147.34	136.24	105.97
	14.1		0.05D	2.0D	SFM(Vc)	480	480	480	480	480	480	480
					fz	.0016	.0028	.0035	.0041	.0048	.0054	.0056
					RPM	7365	5892	4910	3682	2946	2455	1841
					FEED	71.33	98.82	102.07	91.34	85.6	79.45	62.2
	14.2		0.05D	2.0D	SFM(Vc)	440	440	440	440	440	440	440
					fz	.0016	.0028	.0035	.0041	.0048	.0054	.0056
					RPM	6723	5379	4482	3362	2689	2241	1681
					FEED	65.11	90.21	93.17	83.38	78.14	72.53	56.38
S	31-35	Heat Resistant Super Alloys	0.05D	2.0D	SFM(Vc)	110	110	110	110	110	110	110
					fz	.0013	.0022	.0028	.0032	.0038	.0044	.0045
					RPM	1650	1320	1100	825	660	550	413
					FEED	12.86	17.15	18.19	15.98	15.13	14.55	11.21
	36-37	Titanium Alloys	0.05D	2.0D	SFM(Vc)	380	380	380	380	380	380	380
					fz	.0013	.0022	.0028	.0033	.0038	.0044	.0046
					RPM	5822	4657	3881	2911	2329	1941	1455
					FEED	45.38	60.51	64.18	57.07	53.36	51.80	40.22

(*) : If product's Length of Cut(L.O.C) is below 2D, it must be applied L.O.C x 90%

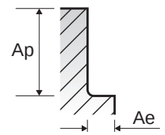


GMH72 SERIES

6 FLUTE CHIP SPLITTER - SIDE CUTTING

SFM = ft./min. fz = in./tooth
RPM = rev./min. FEED = in./min.

ISO	VDI 3323	Material Description	Ae	Ap	Parameter	Diameter (Ø) 3/8	1/2	5/8	3/4	1
P	1-4	Non-alloy steel	0.05D	2.0D	SFM(Vc)	885	885	885	885	885
					fz	.0028	.0034	.0040	.0044	.0046
					RPM	9022	6766	5413	4511	3383
					FEED	153.43	138.25	129.14	119.87	92.70
	5	Low alloy steel	0.05D	2.0D	SFM(Vc)	600	600	600	600	600
					fz	.0021	.0025	.0029	.0033	.0034
					RPM	6106	4579	3664	3053	2290
					FEED	76.45	69.23	64.47	60.22	47.06
	6-7		0.05D	2.0D	SFM(Vc)	885	885	885	885	885
					fz	.0028	.0034	.0040	.0044	.0046
					RPM	9022	6766	5413	4511	3383
					FEED	153.43	138.25	129.14	119.87	92.70
	8-9		0.05D	2.0D	SFM(Vc)	600	600	600	600	600
					fz	.0021	.0025	.0029	.0033	.0034
					RPM	6106	4579	3664	3053	2290
					FEED	76.45	69.23	64.47	60.22	47.06
	10-11.1	High alloyed steel, and tool steel	0.05D	2.0D	SFM(Vc)	295	295	295	295	295
					fz	.0017	.0021	.0024	.0027	.0028
					RPM	3007	2255	1805	1504	1128
					FEED	31.26	27.97	26.21	24.33	19.18
M	12-13	Stainless steel	0.05D	2.0D	SFM(Vc)	630	630	630	630	630
					fz	.0020	.0025	.0029	.0032	.0033
					RPM	6408	4806	3845	3204	2403
					FEED	78.7185	70.9605	66.303	61.308	47.6865
	14.1		0.05D	2.0D	SFM(Vc)	435	435	435	435	435
					fz	.0017	.0021	.0024	.0027	.0028
					RPM	4419	3313.8	2651.4	2209.5	1656.9
					FEED	45.9315	41.103	38.52	35.7525	27.99
	14.2		0.05D	2.0D	SFM(Vc)	395	395	395	395	395
					fz	.0017	.0021	.0024	.0027	.0028
					RPM	4034	3026	2420	2017	1513
					FEED	41.93	37.52	35.16	32.64	25.37
S	31-35	Heat Resistant Super Alloys	0.05D	2.0D	SFM(Vc)	95	95	95	95	95
					fz	.0014	.0016	.0019	.0022	.0023
					RPM	990	742.5	594	495	371.7
					FEED	8.1855	7.191	6.8085	6.5475	5.0445
	36-37	Titanium Alloys	0.05D	2.0D	SFM(Vc)	345	345	345	345	345
					fz	.0014	.0016	.0019	.0022	.0023
					RPM	3493	2620	2096	1747	1310
					FEED	28.88	25.68	24.01	23.31	18.10



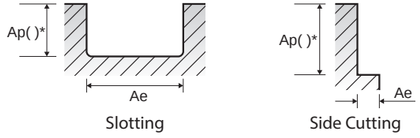
GMF52, GMF53, GMF54, GMF55, GMF56, GMF57 GMF58, GMF59, GMF60, GMF61, GMF62, GMF63 SERIES

4 FLUTE - SIDE & SLOTTING

SFM = ft./min. fz = in./tooth
RPM = rev./min. FEED = in./min.

ISO	VDI 3323	Material Description	Ae Side	Ae Slotting	Ap Side	Ap Slotting	Parameter	Diameter (Ø) 1/8	5/32	3/16	7/32	1/4	9/32	5/16	7/16	1/2	5/8	3/4	1
P	1-4	Non-alloy steel	0.5D	1.0D	1.5D (1.2D)	1.0D (0.8D)	SFM(Vc)	500	500	500	500	500	550	550	550	550	550	550	550
							fz	.0002	.0003	.0004	.0006	.0011	.0015	.0019	.0019	.0021	.0023	.0026	.0025
							RPM	16128	12096	9677	8064	6048	5348	4456	3820	3342	2971	2674	2139
							FEED	12.70	15.24	16.76	20.32	25.72	32.00	32.98	29.47	27.90	27.60	27.37	21.56
	5	Low alloy steel	0.5D	1.0D	1.5D (1.2D)	1.0D (0.8D)	SFM(Vc)	350	350	350	350	350	385	385	385	385	385	385	385
							fz	.0002	.0003	.0004	.0006	.0011	.0015	.0018	.0019	.0021	.0023	.0026	.0025
							RPM	11353	8515	6812	5677	4257	3724	3104	2660	2328	2069	1862	1490
							FEED	8.94	10.71	11.81	14.29	18.11	22.28	22.95	20.51	19.41	19.21	19.06	15.00
	6-7		0.5D	1.0D	1.5D (1.2D)	1.0D (0.8D)	SFM(Vc)	500	500	500	500	500	550	550	550	550	550	550	550
							fz	.0002	.0003	.0004	.0006	.0011	.0015	.0019	.0019	.0021	.0023	.0026	.0025
							RPM	16128	12096	9677	8064	6048	5348	4456	3820	3342	2971	2674	2139
							FEED	12.70	15.24	16.76	20.32	25.72	32.00	32.98	29.47	27.90	27.60	27.37	21.56
	8-9		0.5D	1.0D	1.5D (1.2D)	1.0D (0.8D)	SFM(Vc)	350	350	350	350	350	385	385	385	385	385	385	385
							fz	.0002	.0003	.0004	.0006	.0011	.0015	.0018	.0019	.0021	.0023	.0026	.0025
							RPM	11353	8515	6812	5677	4257	3724	3104	2660	2328	2069	1862	1490
							FEED	8.94	10.71	11.81	14.29	18.11	22.28	22.95	20.51	19.41	19.21	19.06	15.00
	10-11.1	High alloyed steel, and tool steel	0.5D	1.0D	1.5D (1.2D)	1.0D (0.8D)	SFM(Vc)	210	210	210	210	210	230	230	230	230	230	230	230
							fz	.0001	.0002	.0003	.0004	.0008	.0011	.0013	.0013	.0015	.0016	.0018	.0018
							RPM	6791	5093	4074	3395	2546	2228	1857	1592	1393	1238	1114	891
							FEED	3.19	4.80	5.12	5.87	7.64	9.49	9.37	8.50	8.11	7.99	7.91	6.30
M	12-13	Stainless steel	0.5D	1.0D	1.5D (1.2D)	1.0D (0.8D)	SFM(Vc)	485	485	485	485	485	485	485	485	485	485	485	485
							fz	.0002	.0002	.0004	.0005	.0009	.0013	.0015	.0017	.0018	.0020	.0022	.0022
							RPM	15703	11777	9422	7852	5889	4711	3926	3365	2944	2617	2355	1884
							FEED	9.88	11.14	13.35	16.06	20.39	25.24	24.09	22.24	20.87	20.59	20.39	16.34
	14.1		0.5D	1.0D	1.5D (1.2D)	1.0D (0.8D)	SFM(Vc)	350	350	350	350	350	350	350	350	350	350	350	350
							fz	.0002	.0003	.0005	.0007	.0011	.0019	.0022	.0023	.0024	.0028	.0030	.0030
							RPM	11247	8435	6748	5623	4218	3374	2812	2410	2109	1874	1687	1350
							FEED	8.86	10.63	13.82	15.94	18.58	25.51	24.37	22.4	20.59	20.67	20.47	16.38
	14.2		0.5D	1.0D	1.5D (1.2D)	1.0D (0.8D)	SFM(Vc)	310	310	310	310	310	310	310	310	310	310	310	310
							fz	.0002	.0003	.0005	.0007	.0011	.0019	.0022	.0023	.0024	.0027	.0030	.0030
							RPM	10080	7560	6048	5040	3780	3024	2520	2160	1890	1680	1512	1210
							FEED	7.95	9.53	12.36	14.29	16.65	22.87	21.81	20.08	18.46	18.27	18.11	14.49
K	15-20	Grey cast iron	0.5D	1.0D	1.5D (1.2D)	1.0D (0.8D)	SFM(Vc)	365	365	365	365	365	405	405	405	405	405	405	405
							fz	.0002	.0004	.0006	.0008	.0013	.0019	.0023	.0024	.0026	.0029	.0032	.0031
							RPM	11884	8913	7130	5942	4456	3915	3263	2797	2447	2175	1958	1566
							FEED	11.22	14.06	15.71	18.70	23.86	29.61	29.80	26.85	25.04	25.00	24.96	19.49
S	31-35	Heat Resistant Super Alloys	0.25D	1.0D	1.0D	0.5D	SFM(Vc)	85	85	85	85	85	85	85	85	85	85	85	85
							fz	.0002	.0003	.0003	.0005	.0008	.0013	.0015	.0016	.0017	.0019	.0021	.0021
							RPM	2759	2069	1655	1379	1035	828	690	591	517	460	414	331
							FEED	2.17	2.28	2.09	2.6	3.11	4.29	4.13	3.74	3.5	3.46	3.5	2.72
	36-37	Titanium Alloys	0.35D	1.0D	1.0D	0.5D	SFM(Vc)	190	190	190	190	190	190	190	190	190	190	190	190
							fz	.0002	.0003	.0004	.0006	.0010	.0017	.0020	.0021	.0022	.0024	.0027	.0027
							RPM	6154	4615	3692	3077	2308	1846	1538	1319	1154	1026	923	738
							FEED	3.86	5.08	6.38	7.76	9.09	12.20	12.13	11.02	10.00	10.00	9.88	8.03

*( ) : Short length & Neck type



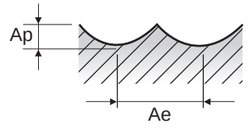
NOTES:
- The above recommendations are based on ideal conditions; for smaller taper machining centers or less rigid conditions please adjust parameters accordingly on diameters greater than 1/2"
- In profile operations, engaging more that 2xD, reduce the radial depth of cut by 50%-60%
- Finish cuts typically require reduced cutting feeds and speeds; also, it is recommended the radial width of cut (AE) should not exceed 2%xD1

GMG55, GMG56 SERIES

4 FLUTE BALL NOSE

SFM = ft./min. fz = in./tooth
RPM = rev./min. FEED = in./min.

ISO	VDI 3323	Material Description	Ae	Ap	Parameter	Diameter (Ø) 3.0	4.0	5.0	6.0	8.0	10.0	12.0	16.0	18.0	20.0	25.0
P	1-4	Non-alloy steel	0.5D	1.0D	SFM(Vc)	530	530	530	530	530	530	530	530	530	530	530
					fz	.0010	.0011	.0012	.0016	.0024	.0026	.0028	.0030	.0032	.0035	.0039
					RPM	17189	12892	10313	8594	6446	5157	4297	3223	2865	2578	2063
					FEED	67.68	54.80	48.74	54.13	60.91	52.80	47.36	38.07	36.10	36.54	32.17
	5	Low alloy steel	0.5D	1.0D	SFM(Vc)	370	370	370	370	370	370	370	370	370	370	370
					fz	.0010	.0011	.0012	.0016	.0024	.0026	.0028	.0029	.0031	.0035	.0039
					RPM	11990	8992	7194	5995	4496	3597	2997	2248	1998	1798	1439
					FEED	47.20	38.23	33.98	37.76	42.48	36.81	33.03	26.18	24.84	25.47	22.44
	6-7		0.5D	1.0D	SFM(Vc)	530	530	530	530	530	530	530	530	530	530	530
					fz	.0010	.0011	.0012	.0016	.0024	.0026	.0028	.0030	.0032	.0035	.0039
					RPM	17189	12892	10313	8594	6446	5157	4297	3223	2865	2578	2063
					FEED	67.68	54.80	48.74	54.13	60.91	52.80	47.36	38.07	36.10	36.54	32.17
	8-9		0.5D	1.0D	SFM(Vc)	370	370	370	370	370	370	370	370	370	370	370
					fz	.0010	.0011	.0012	.0016	.0024	.0026	.0028	.0029	.0031	.0035	.0039
					RPM	11990	8992	7194	5995	4496	3597	2997	2248	1998	1798	1439
					FEED	47.20	38.23	33.98	37.76	42.48	36.81	33.03	26.18	24.84	25.47	22.44
	10-11.1	High alloyed steel, and tool steel	0.5D	1.0D	SFM(Vc)	225	225	225	225	225	225	225	225	225	225	225
					fz	.0007	.0007	.0008	.0011	.0017	.0018	.0019	.0020	.0022	.0025	.0028
					RPM	7215	5411	4329	3608	2706	2165	1804	1353	1203	1082	866
					FEED	19.33	16.18	14.33	15.91	17.91	15.35	13.94	11.06	10.59	10.75	9.53
M	12-13	Stainless steel	0.5D	1.0D	SFM(Vc)	255	255	255	255	255	255	255	255	255	255	255
					fz	.0006	.0006	.0010	.0012	.0016	.0018	.0020	.0021	.0023	.0023	.0023
					RPM	8170	6127	4902	4085	3064	2451	2042	1532	1362	1225	980
					FEED	19.29	14.49	19.29	19.29	19.29	17.36	16.06	13.03	12.64	11.18	9.09
	14.1		0.5D	1.0D	SFM(Vc)	280	280	280	280	280	280	280	280	280	280	280
					fz	.0008	.0008	.0010	.0016	.0018	.0020	.0022	.0024	.0025	.0026	.0027
					RPM	9019	6764	5411	4509	3382	2706	2255	1691	1503	1353	1082
					FEED	28.43	21.3	21.3	29.13	23.98	21.3	19.53	15.98	15.16	13.86	11.57
	14.2		0.5D	1.0D	SFM(Vc)	255	255	255	255	255	255	255	255	255	255	255
					fz	.0008	.0008	.0010	.0016	.0018	.0020	.0022	.0024	.0025	.0026	.0027
					RPM	8170	6127	4902	4085	3064	2451	2042	1532	1362	1225	980
					FEED	25.75	19.29	19.29	26.38	21.69	19.29	17.68	14.49	13.74	12.56	10.51
K	15-20	Grey cast iron	0.5D	1.0D	SFM(Vc)	390	390	390	390	390	390	390	390	390	390	390
					fz	.0012	.0013	.0015	.0020	.0029	.0032	.0034	.0037	.0039	.0044	.0049
					RPM	12626	9470	7576	6313	4735	3788	3157	2367	2104	1894	1515
					FEED	61.65	49.21	44.13	49.72	55.20	48.31	43.23	34.69	32.80	33.39	29.61
S	31-35	Heat Resistant Super Alloys	0.2D	0.3D	SFM(Vc)	70	70	70	70	70	70	70	70	70	70	70
					fz	.0006	.0006	.0007	.0011	.0012	.0014	.0015	.0017	.0018	.0018	.0019
					RPM	2228	1671	1337	1114	836	668	557	418	371	334	267
					FEED	4.92	3.7	3.58	4.92	4.09	3.7	3.35	2.76	2.64	2.36	2.01
	36-37	Titanium Alloys	0.5D	0.3D	SFM(Vc)	155	155	155	155	155	155	155	155	155	155	155
					fz	.0007	.0007	.0009	.0015	.0016	.0018	.0019	.0021	.0023	.0023	.0024
					RPM	4987	3740	2992	2493	1870	1496	1247	935	831	748	598
					FEED	14.13	10.59	10.35	14.53	11.77	10.59	9.61	7.95	7.60	6.85	5.75



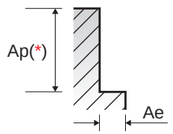
GMG12, GMG13, GMG14, GMG15 GMG16, GMG17, GMG18, GMG19 SERIES

6 FLUTE - SIDE CUTTING

SFM = ft./min. fz = in./tooth
RPM = rev./min. FEED = in./min.

ISO	VDI 3323	Material Description	Ae	Ap	Parameter	Diameter (Ø) 6.0	8.0	10.0	12.0	16.0	20.0	25.0
P	1-4	Non-alloy steel	0.05D	2.0D	SFM(Vc)	985	985	985	985	985	985	985
					fz	.0027	.0046	.0057	.0068	.0080	.0089	.0091
					RPM	15915	11937	9549	7958	5968	4775	3820
					FEED	255.67	327.09	324.84	325.20	284.80	253.78	209.33
	5	Low alloy steel	0.05D	2.0D	SFM(Vc)	665	665	665	665	665	665	665
					fz	.0020	.0033	.0042	.0050	.0059	.0066	.0068
					RPM	10769	8077	6462	5385	4039	3231	2585
					FEED	127.20	162.17	161.81	162.80	142.13	127.44	106.22
	6-7		0.05D	2.0D	Vc	985	985	985	985	985	985	985
					fz	.0027	.0046	.0057	.0068	.0080	.0089	.0091
					RPM	15036	12028	10024	7518	6014	5012	3759
					FEED	241.52	329.60	340.96	307.22	286.98	266.38	206.00
	8-9		0.05D	2.0D	SFM(Vc)	665	665	665	665	665	665	665
					fz	.0020	.0033	.0042	.0050	.0059	.0066	.0068
					RPM	10769	8077	6462	5385	4039	3231	2585
					FEED	127.20	162.17	161.81	162.80	142.13	127.44	106.22
	10-11.1	High alloyed steel, and tool steel	0.05D	2.0D	SFM(Vc)	330	330	330	330	330	330	330
					fz	.0016	.0028	.0035	.0041	.0048	.0054	.0057
					RPM	5305	3979	3183	2653	1989	1592	1273
					FEED	51.38	66.73	66.18	65.79	57.80	51.50	43.31
M	12-13	Stainless steel	0.05D	2.0D	SFM(Vc)	700	700	700	700	700	700	700
					fz	.0019	.0033	.0041	.0049	.0057	.0064	.0066
					RPM	11300	8475	6780	5650	4238	3390	2712
					FEED	130.79	168.15	166.57	166.85	146.14	129.72	107.64
	14.1		0.05D	2.0D	SFM(Vc)	480	480	480	480	480	480	480
					fz	.0016	.0028	.0035	.0041	.0048	.0054	.0056
					RPM	7799	5849	4679	3899	2924	2340	1872
					FEED	75.51	98.11	97.28	96.73	84.96	75.71	63.23
	14.2		0.05D	2.0D	SFM(Vc)	440	440	440	440	440	440	440
					fz	.0016	.0028	.0035	.0041	.0048	.0054	.0056
					RPM	7109	5332	4265	3554	2666	2133	1706
					FEED	68.86	89.41	88.66	88.15	77.44	69.02	57.24
S	31-35	Heat Resistant Super Alloys	0.05D	2.0D	SFM(Vc)	110	110	110	110	110	110	110
					fz	.0013	.0022	.0028	.0032	.0038	.0044	.0045
					RPM	1751	1313	1050	875	657	525	420
					FEED	13.66	17.05	17.36	16.97	15.04	13.9	11.42
	36-37	Titanium Alloys	0.05D	2.0D	SFM(Vc)	380	380	380	380	380	380	380
					fz	.0013	.0022	.0028	.0033	.0038	.0045	.0046
					RPM	6154	4615	3692	3077	2308	1846	1477
					FEED	47.95	59.96	61.06	60.31	52.87	49.29	40.83

(*) : If product's Length of Cut(L.O.C) is below 2D, it must be applied L.O.C x 90%

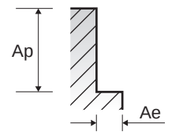


GMH56, GMH58, GMH57, GMH59 SERIES

6 FLUTE CHIP SPLITTER - SIDE CUTTING

SFM = ft./min. fz = in./tooth
RPM = rev./min. FEED = in./min.

ISO	VDI 3323	Material Description	Ae	Ap	Parameter	Diameter (Ø) 6.0	8.0	10.0	12.0	16.0	20.0	25.0
P	1-4	Non-alloy steel	0.05D	3.0D	SFM(Vc)	885	885	885	885	885	885	885
					fz	.0013	.0023	.0028	.0034	.0040	.0044	.0046
					RPM	14324	10743	8594	7162	5371	4297	3438
					FEED	115.04	147.19	146.17	146.34	128.15	114.20	94.20
	5	Low alloy steel	0.05D	3.0D	SFM(Vc)	600	600	600	600	600	600	600
					fz	.0010	.0017	.0021	.0025	.0029	.0033	.0034
					RPM	9693	7269	5816	4846	3635	2908	2326
					FEED	57.24	72.98	72.81	73.27	63.97	57.35	47.81
	6-7		0.05D	3.0D	SFM(Vc)	885	885	885	885	885	885	885
					fz	.0013	.0023	.0028	.0034	.0040	.0044	.0046
					RPM	14324	10743	8594	7162	5371	4297	3438
					FEED	115.04	147.19	146.17	146.34	128.15	114.20	94.20
	8-9		0.05D	3.0D	SFM(Vc)	600	600	600	600	600	600	600
					fz	.0010	.0017	.0021	.0025	.0029	.0033	.0034
					RPM	9693	7269	5816	4846	3635	2908	2326
					FEED	57.24	72.98	72.81	73.27	63.97	57.35	47.81
	10-11.1	High alloyed steel, and tool steel	0.05D	3.0D	SFM(Vc)	295	295	295	295	295	295	295
					fz	.0008	.0014	.0017	.0021	.0024	.0027	.0028
					RPM	4775	3581	2865	2387	1790	1432	1146
					FEED	23.12	30.03	29.78	29.61	26.01	23.18	19.49
M	12-13	Stainless steel	0.05D	3.0D	SFM(Vc)	630	630	630	630	630	630	630
					fz	.0010	.0017	.0020	.0025	.0029	.0032	.0033
					RPM	10170	7628	6102	5085	3814	3051	2441
					FEED	58.86	75.67	74.95	75.07	65.76	58.38	48.43
	14.1		0.05D	3.0D	SFM(Vc)	435	435	435	435	435	435	435
					fz	.0008	.0014	.0017	.0021	.0024	.0027	.0028
					RPM	7019	5264	4211	3509	2632	2106	1684
					FEED	33.99	44.14	43.77	43.52	38.24	34.07	28.45
	14.2		0.05D	3.0D	SFM(Vc)	395	395	395	395	395	395	395
					fz	.0008	.0014	.0017	.0021	.0024	.0027	.0028
					RPM	6398	4799	3839	3199	2399	1919	1536
					FEED	30.98	40.24	39.90	39.67	34.86	31.06	25.75
S	31-35	Heat Resistant Super Alloys	0.05D	3.0D	SFM(Vc)	95	95	95	95	95	95	95
					fz	.0006	.0011	.0014	.0016	.0019	.0022	.0023
					RPM	1576	1182	945	788	591	473	378
					FEED	6.14	7.68	7.82	7.63	6.77	6.25	5.14
	36-37	Titanium Alloys	0.05D	3.0D	SFM(Vc)	345	345	345	345	345	345	345
					fz	.0006	.0011	.0014	.0016	.0019	.0022	.0023
					RPM	5539	4154	3323	2769	2077	1662	1329
					FEED	21.59	26.98	27.47	27.15	23.80	22.18	18.37



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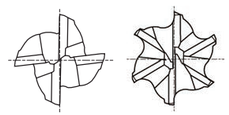
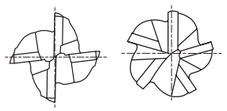
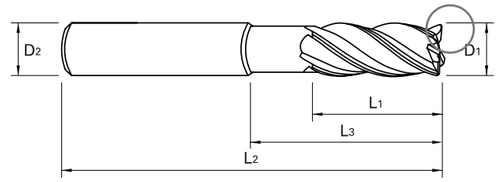
V7 PLUS A VARIABLE INDEX END MILLS



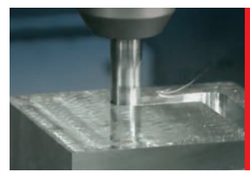
TitaNox Power VARIABLE INDEX END MILLS



UNEQUAL INDEX WITH HIGH-PERFORMANCE CORNER GEOMETRIES INCLUDING CORNER RADIUS



Corner Radius				
D_1	D_2	L_1	L_2	L_3
OD	SD	LOC	LBS	OAL



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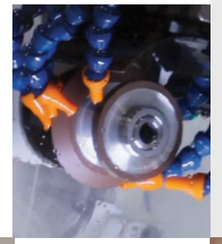

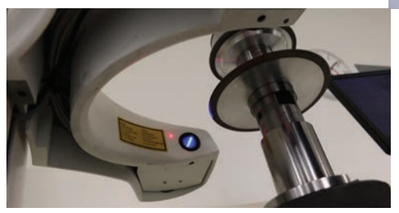

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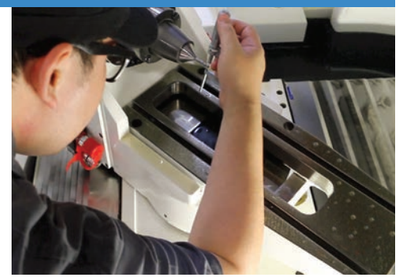

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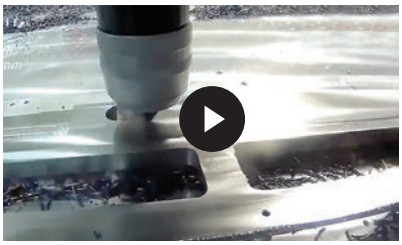

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