Leading Through Innovation

SOLID CARBIDE

X-POWER PRO END MILLS

X-POWER PRO VHM - FRÄSER

- For Pre-Hardened Steels up to HRc55
- Für vorgehärtete Stähle bis HRc55

SELECTION GUIDE

MILLING TOOLS

SOLID CARBIDE X-POWER PRO END MILLS

for Pre-Hardened Steels up to HRc55, Mold & Die, Dry & Wet Cutting

Please visit globalyg1.com/mat for material search

◎ : Excellent ○ : Good

Recommended cutting conditions : p. C394

SERIES	GM876	GM813	GM886	GM902	GM815	GM818	GM8A1	GM839	GM819	GM810	GM883	GM895	GM811	GM817	GM812	GM834	GM814
FLUTE	2	2	2	2	4	2	2	4	4	2	2	3	4	4	6&8	6	3&4
HELIX ANGLE	30°	30°	30°	30°	30°	30°	30°	30°	30°	30°	30°	38°	30°	30°	45°	45°	20°
CUTTING EDGE SHAPE	BALL NOSE	BALL NOSE	BALL NOSE	BALL NOSE	BALL NOSE	CORNER RADIUS	CORNER RADIUS	CORNER RADIUS	CORNER RADIUS	SQUARE	SQUARE	SQUARE	SQUARE	SQUARE	SQUARE	SQUARE	ROUGHING
SIZE MIN	R0.5	R0.5	R0.25	R0.5	R1.0	D4.0	D1.0	D3.0	D3.0	D0.5	D0.4	D1.0	D2.0	D2.0	D6.0	D6.0	D6.0
SIZE MAX	R8.0	R10.0	R3.0	R4.0	R8.0	D12.0	D6.0	D12.0	D20.0	D20.0	D6.0	D16.0	D25.0	D20.0	D20.0	D25.0	D20.0
PAGE	C372	C373	C374	C376	C377	C378	C379	C381	C382	C383	C385	C388	C389	C390	C391	C392	C393
	SHORT LENGTH	LONG LENGTH	RIB PROCESSING	TAPER NECK	LONG LENGTH	LONG LENGTH	RIB PROCESSING	STUB LENGTH	LONG LENGTH	SHORT LENGTH	RIB PROCESSING	SHORT LENGTH	SHORT LENGTH	LONG LENGTH	LONG LENGTH	EXTRA LONG LENGTH	LONG LENGTH
	Y-Coating	Y-Coating	Y-Coating	Y-Coating	Y-Coating	Y-Coating	Y-Coating	Y-Coating	Y-Coating	Y-Coating	Y-Coating	Y-Coating	Y-Coating	Y-Coating	Y-Coating	Y-Coating	Y-Coating

ISO	VDI 3323	Material Description	Composition / Structure / Heat Treatment		HB	HRc	GM876	GM813	GM886	GM902
P	1	Non-alloy steel	About 0.15% C	Annealed	125		○	○	○	○
	2		About 0.45% C	Annealed	190	13	○	○	○	○
	3		About 0.45% C	Quenched & Tempered	250	25	○	○	○	○
	4		About 0.75% C	Annealed	270	28	◎	◎	◎	○
	5		About 0.75% C	Quenched & Tempered	300	32	◎	◎	◎	○
	6	Low alloy steel		Annealed	180	10	○	○	○	○
	7			Quenched & Tempered	275	29	◎	◎	◎	○
	8			Quenched & Tempered	300	32	◎	◎	◎	◎
	9			Quenched & Tempered	350	38	◎	◎	◎	◎
	10	High alloyed steel, and tool steel		Annealed	200	15	○	○	○	○
	11			Quenched & Tempered	325	35	◎	◎	◎	◎
M	12	Stainless steel	Ferritic / Martensitic	Annealed	200	15				
	13		Martensitic	Quenched & Tempered	240	23				
	14		Austenitic		180	10				
K	15	Grey cast iron	Pearlitic / ferritic		180	10	○	○	○	
	16		Pearlitic (Martensitic)		260	26	○	○	○	
	17	Nodular cast iron	Ferritic		160	3	○	○	○	
	18		Pearlitic		250	25	○	○	○	
	19	Malleable cast iron	Ferritic		130		○	○	○	
	20		Pearlitic		230	21	○	○	○	
N	21	Aluminum-wrought alloy	Not Curable		60					
	22		Curable	Hardened	100					
	23	Aluminum-cast, alloyed	≤ 12% Si, Not Curable		75					
	24		≤ 12% Si, Curable	Hardened	90					
	25		> 12% Si, Not Curable		130					
	26	Copper and Copper Alloys (Bronze / Brass)	Cutting Alloys, PB>1%		110					
	27		CuZn, CuSnZn (Brass)		90					
	28		CuSn, lead-free copper and electrolytic copper		100					
	29	Non Metallic Materials	Duroplastic, Fiber Reinforced Plastic							
	30		Rubber, Wood, etc.							
S	31	Heat Resistant Super Alloys	Fe Based	Annealed	200	15				
	32			Cured	280	30				
	33		Ni or Co Based	Annealed	250	25				
	34			Cured	350	38				
	35			Cast	320	34				
	36	Titanium Alloys	Pure Titanium		400 Rm					
	37		Alpha + Beta Alloys	Hardened	1050 Rm					
H	38	Hardened steel		Hardened	550	55	○	○	○	○
	39			Hardened	630	60	○			
	40	Chilled Cast Iron		Cast	400	42	◎	◎	◎	◎
	41	Hardened Cast Iron		Hardened	550	55	○	○	○	○

ISO	VDI 3323	GM815	GM818	GM8A1	GM839	GM819	GM810	GM883	GM895	GM811	GM817	GM812	GM834	GM814
P	1	○	○	○	○	○	○	○	○	○	○	○	○	○
	2	○	○	○	○	○	○	○	○	○	○	○	○	○
	3	○	○	○	○	○	○	○	○	○	○	○	○	○
	4	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎
	5	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎
	6	○	○	○	○	○	○	○	○	○	○	○	○	○
	7	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎
	8	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎
	9	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎
	10	○	○	○	○	○	○	○	○	○	○	○	○	○
	11	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎
M	12					○	○		○	○				○
	13					○	○		○	○				○
	14					○	○		○	○				○
K	15	○	○	○	○	○	○	○	○	○	○	○	○	○
	16	○	○	○	○	○	○	○	○	○	○	○	○	○
	17	○	○	○	○	○	○	○	○	○	○	○	○	○
	18	○	○	○	○	○	○	○	○	○	○	○	○	○
	19	○	○	○	○	○	○	○	○	○	○	○	○	○
	20	○	○	○	○	○	○	○	○	○	○	○	○	○
N	21													
	22													
	23													
	24													
	25													
	26													
	27													
	28													
	29													
	30													
S	31													
	32													
	33													
	34													
	35													
	36													
	37													
H	38	○	○	○	○	○	○	○	○	○	○	○	○	○
	39	○												
	40	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎
	41	○	○	○	○	○	○	○	○	○	○	○	○	○

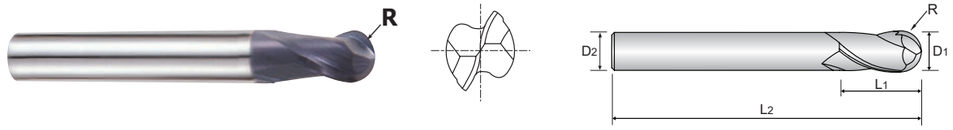
X-POWER PRO END MILLS

PLAIN SHANK **GM876** SERIES

CARBIDE, 2 FLUTE SHORT LENGTH BALL NOSE

VOLLHARTMETALL, 2 SCHNEIDEN KURZ KUGELSTIRN
Fraise carbure, 2 dents, hémisphérique, courte
2 TAGLIENTI, SEMISFERICA, SERIE CORTA

- ▶ Economic type with short overall length.
- ▶ Radius tolerance ±0.02mm & short length of cut.
- ▶ Günstige Variante, kurze Gesamlänge.
- ▶ Radius Toleranz ±0.02mm und kurze Schneidenlänge.



CARBIDE | 2 | 30° | R ±0.02 | PLAIN | Y Coating

p.C394~C395

Unit : mm

EDP No.	Radius of Ball Nose	Mill Diameter	Shank Diameter	Length of Cut	Overall Length
	R(±0.02)	D1	D2	L1	L2
GM876010	R0.5	**1.0**	3	3	38
GM876020	R1.0	**2.0**	6	3	50
GM876030	R1.5	**3.0**	6	4	50
GM876040	R2.0	**4.0**	6	5	54
GM876060	R3.0	**6.0**	6	7	54
GM876080	R4.0	**8.0**	8	9	58
GM876100	R5.0	**10.0**	10	11	66
GM876120	R6.0	**12.0**	12	12	73
GM876160	R8.0	**16.0**	16	16	82

Mill Dia. Tolerance (mm)	Shank Dia. Tolerance
0 ~ - 0.03	h5

◎ : 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																		○	○	◎	○

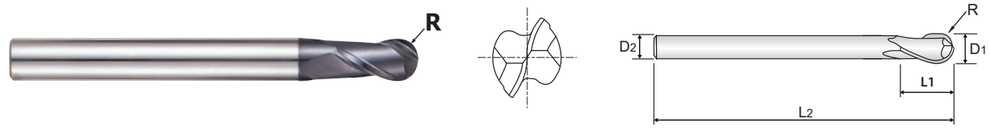
X-POWER PRO END MILLS

PLAIN SHANK **GM813** SERIES

CARBIDE, 2 FLUTE LONG LENGTH BALL NOSE

VOLLHARTMETALL, 2 SCHNEIDEN LANG KUGELSTIRN
Fraise carbure, 2 dents, hémisphérique, longue
2 TAGLIENTI, SEMISFERICA, SERIE LUNGA

- ▶ Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- ▶ For copy - milling machines.
- ▶ Zur Bearbeitung von Werkzeugstählen, Legierten Stählen, Stahlguß und gehärteten Stählen.
- ▶ Für Kopierfräsmaschinen.



CARBIDE | 2 | 30° | R ±0.02 | PLAIN | Y Coating

p.C394~C395

Unit : mm

EDP No.	Radius of Ball Nose	Mill Diameter	Shank Diameter	Length of Cut	Overall Length
	R(±0.02)	D1	D2	L1	L2
GM813010	R0.5	**1.0**	4	2.5	50
GM813020	R1.0	**2.0**	6	5	50
GM813030	R1.5	**3.0**	6	8	60
GM813040	R2.0	**4.0**	6	8	70
GM813050	R2.5	**5.0**	6	10	80
GM813060	R3.0	**6.0**	6	12	90
GM813080	R4.0	**8.0**	8	14	100
GM813100	R5.0	**10.0**	10	18	100
GM813120	R6.0	**12.0**	12	22	110
GM813160	R8.0	**16.0**	16	30	140
GM813200	R10.0	**20.0**	20	38	160

Mill Dia. Tolerance (mm)	Shank Dia. Tolerance
0 ~ - 0.03	h5

◎ : 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	○	○	○	◎	◎	○	◎	◎	◎	○	◎				○	○	○	○	○	○

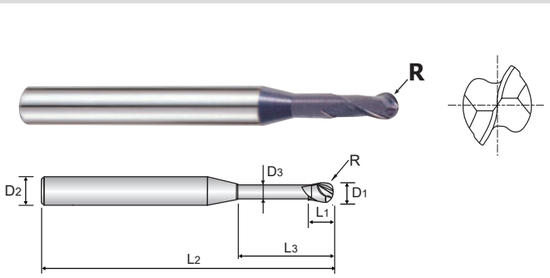
ISO	N										S							H		
Material Description	Aluminum-wrought alloy		Aluminum-cast, alloyed			Copper and Copper Alloys (Bronze / Brass)			Non Metallic Materials		Heat Resistant Super Alloys					Titanium Alloys		Hardened steel	Chilled Cast Iron	Hardened Cast Iron
VDI 3323	21	22	23	24	25	26	27	28	29	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																		○	○	◎	○

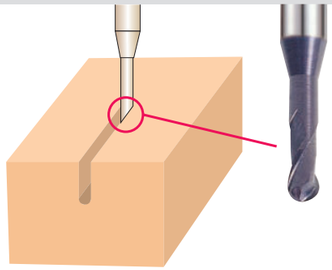
X-POWER PRO END MILLS

PLAIN SHANK **GM886 SERIES**

CARBIDE, 2 FLUTE BALL NOSE for RIB PROCESSING

VOLLHARTMETALL, 2 SCHNEIDEN KUGELSTIRN für SCHMALE RIPPEN
Fraise carbure, 2 dents, hémisphérique pour usinage de rainure
2 TAGLIENTI, SEMISFERICA PER NERVATURE





CARBIDE | 2 | 30° | R ±0.01 | PLAIN | Y Coating | p.C396~C397

Unit : mm

EDP No.	Radius of Ball Nose	Mill Diameter	Shank Diameter	Length of Cut	Length Below Shank	Overall Length	Neck Diameter
	R(±0.01)	D1	D2	L1	L3	L2	D3
GM886005	R0.25	**0.5**	4	0.7	2	45	0.45
GM886962	R0.25	**0.5**	4	0.7	4	45	0.45
GM886957	R0.3	**0.6**	4	0.9	2	45	0.55
GM886915	R0.3	**0.6**	4	0.9	4	45	0.55
GM886916	R0.3	**0.6**	4	0.9	6	45	0.55
GM886919	R0.4	**0.8**	4	1.2	4	45	0.75
GM886008	R0.4	**0.8**	4	1.2	6	45	0.75
GM886921	R0.5	**1.0**	4	1.5	4	45	0.95
GM886923	R0.5	**1.0**	4	1.5	5	45	0.95
GM886010	R0.5	**1.0**	4	1.5	6	45	0.95
GM886902	R0.5	**1.0**	4	1.5	8	45	0.95
GM886903	R0.5	**1.0**	4	1.5	10	45	0.95
GM886904	R0.5	**1.0**	4	1.5	12	45	0.95
GM886927	R0.5	**1.0**	4	1.5	16	50	0.95
GM886012	R0.6	**1.2**	4	1.8	8	45	1.15
GM886930	R0.75	**1.5**	4	2.3	6	45	1.45
GM886015	R0.75	**1.5**	4	2.3	8	45	1.45
GM886931	R0.75	**1.5**	4	2.3	10	45	1.45
GM886906	R0.75	**1.5**	4	2.3	12	45	1.45
GM886940	R1.0	**2.0**	4	3	6	45	1.95
GM886020	R1.0	**2.0**	4	3	8	45	1.95
GM886941	R1.0	**2.0**	4	3	10	45	1.95
GM886942	R1.0	**2.0**	4	3	12	50	1.95
GM886909	R1.0	**2.0**	4	3	16	50	1.95

▶ NEXT PAGE

Mill Dia. Tolerance (mm)	Shank Dia. Tolerance
0 ~ - 0.02	h5

◎ : 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	○	○	○	◎	◎	○	◎	◎	◎	○	◎				○	○	○	○	○	○

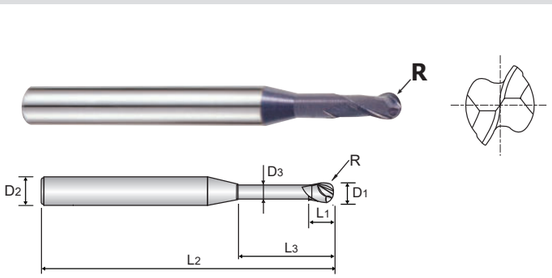
ISO	N										S							H		
Material Description	Aluminum-wrought alloy		Aluminum-cast, alloyed			Copper and Copper Alloys (Bronze / Brass)			Non Metallic Materials		Heat Resistant Super Alloys					Titanium Alloys		Hardened steel		Chilled Cast Iron	Hardened Cast Iron
VDI 3323	21	22	23	24	25	26	27	28	29	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																		○		◎	○

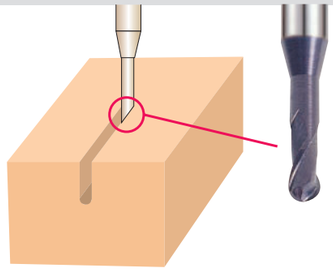
X-POWER PRO END MILLS

PLAIN SHANK GM886 SERIES

CARBIDE, 2 FLUTE BALL NOSE for RIB PROCESSING

VOLLHARTMETALL, 2 SCHNEIDEN KUGELSTIRN für SCHMALE RIPPEN
Fraise carbure, 2 dents, hémisphérique pour usinage de rainure
2 TAGLIENTI, SEMISFERICA PER NERVATURE





CARBIDE | 2 | 30° | R ±0.01 | PLAIN | Y Coating | p.C396~C397

Unit : mm

EDP No.	Radius of Ball Nose	Mill Diameter	Shank Diameter	Length of Cut	Length Below Shank	Overall Length	Neck Diameter
	R(±0.01)	D1	D2	L1	L3	L2	D3
GM886910	R1.0	**2.0**	4	3	20	55	1.95
GM886945	R1.0	**2.0**	4	3	25	60	1.95
GM886967	R1.0	**2.0**	4	3	30	70	1.95
GM886947	R1.5	**3.0**	6	4.5	10	50	2.85
GM886948	R1.5	**3.0**	6	4.5	12	50	2.85
GM886030	R1.5	**3.0**	6	4.5	16	55	2.85
GM886911	R1.5	**3.0**	6	4.5	20	60	2.85
GM886968	R1.5	**3.0**	6	4.5	25	65	2.85
GM886040	R2.0	**4.0**	6	6	16	60	3.85
GM886912	R2.0	**4.0**	6	6	20	65	3.85
GM886913	R2.0	**4.0**	6	6	25	70	3.85
GM886971	R2.0	**4.0**	6	6	30	70	3.85
GM886972	R2.0	**4.0**	6	6	35	80	3.85
GM886050	R2.5	**5.0**	6	7.5	16	60	4.85
GM886060	R3.0	**6.0**	6	9	20	80	5.85
GM886954	R3.0	**6.0**	6	9	30	90	5.85

Mill Dia. Tolerance (mm)	Shank Dia. Tolerance
0 ~ - 0.02	h5

◎ : 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																		○		◎	○

X-POWER PRO END MILLS

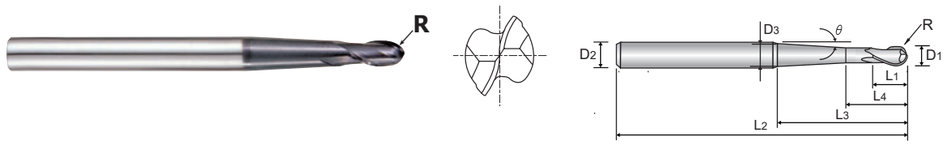
PLAIN SHANK **GM902 SERIES**

CARBIDE, 2 FLUTE BALL NOSE with TAPER NECK

VOLLHARTMETALL, 2 SCHNEIDEN KUGELSTIRN mit KONISCH ABGESETZTEM SCHAFTTEIL
Fraise carbure, 2 dents, hémisphérique avec entrée conique
2 TAGLIENTI, SEMISFERICA, SCARICO CONICO

▶ High efficiency milling in deep slotting due to long projection of the end mills.

▶Effizientes Tiefnutenfräsen von tiefliegenden Bereichen möglich.



CARBIDE | 2 | 30° | R ±0.01 | PLAIN | Y Coating | p.C398~C399

Unit : mm

EDP No.	Radius of Ball Nose	Mill Diameter	Shank Diameter	Length of Cut	Under Neck Parallel Length	Length Below Shank	Overall Length	Neck Diameter	Taper Neck Angle
	R(±0.01)	D1	D2	L1	L4	L3	L2	D3	θ
GM902010	R0.5	**1.0**	6	2	4	23	60	2	1° 30´
GM902901	R0.5	**1.0**	6	2	4	23	60	4.3	5°
GM902902	R0.5	**1.0**	6	2	4	42	80	5	3°
GM902020	R1.0	**2.0**	6	4	6	23	60	2.9	1° 30´
GM902903	R1.0	**2.0**	6	4	6	23	60	5	5°
GM902904	R1.0	**2.0**	6	4	6	41	80	5.7	3°
GM902030	R1.5	**3.0**	6	6	8	32	70	5.6	3°
GM902905	R1.5	**3.0**	6	6	8	52	90	5.3	1° 30´
GM902040	R2.0	**4.0**	6	8	10	28	70	5.9	3°
GM902906	R2.0	**4.0**	6	8	10	49	90	6	1° 30´
GM902060	R3.0	**6.0**	8	12	15	34	90	8	3°
GM902908	R3.0	**6.0**	8	12	15	53	110	8	1° 30´
GM902080	R4.0	**8.0**	10	14	17	36	100	10	3°
GM902909	R4.0	**8.0**	10	14	17	55	120	10	1° 30´

Mill Dia. Tolerance (mm)	Shank Dia. Tolerance
0 ~ - 0.03	h5

◎ : 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																		○		◎	○

X-POWER PRO END MILLS

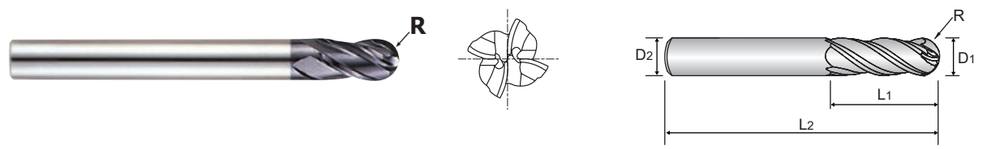
PLAIN SHANK **GM815 SERIES**

CARBIDE, 4 FLUTE LONG LENGTH BALL NOSE

VOLLHARTMETALL, 4 SCHNEIDEN LANG KUGELSTIRN
Fraise carbure, 4 dents, hémisphérique, longue
4 TAGLIENTI, SEMISFERICA, SERIE LUNGA

▶ Designed to machine tool steels, alloy steels, mold steels and other high hardened materials.
▶ For copy - milling machines.
▶ 4 Flute design - higher feed than GM813 series

▶ Zur Bearbeitung von Werkzeugstählen, Legierten Stählen, Stahlguß und gehärteten Stählen.
▶ Für Kopierfräsmaschinen.
▶ 4 Schneiden - Höherer Vorschub als bei GM813 serien.



CARBIDE | 4 | 30° | R ±0.02 | PLAIN | Y Coating | p.C400~C401

Unit : mm

EDP No.	Radius of Ball Nose	Mill Diameter	Shank Diameter	Length of Cut	Overall Length
	R(±0.02)	D1	D2	L1	L2
GM815020	R1.0	**2.0**	6	5	50
GM815030	R1.5	**3.0**	6	8	60
GM815040	R2.0	**4.0**	6	8	70
GM815050	R2.5	**5.0**	6	10	80
GM815060	R3.0	**6.0**	6	12	90
GM815080	R4.0	**8.0**	8	14	100
GM815100	R5.0	**10.0**	10	18	100
GM815120	R6.0	**12.0**	12	22	110
GM815160	R8.0	**16.0**	16	30	140

Mill Dia. Tolerance (mm)	Shank Dia. Tolerance
0 ~ - 0.03	h5

◎ : 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																		○	○	◎	○

X-POWER PRO END MILLS

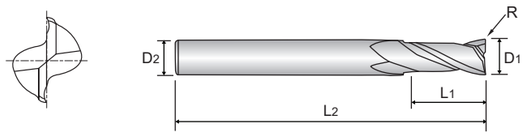
PLAIN SHANK **GM818 SERIES**

CARBIDE, 2 FLUTE LONG LENGTH CORNER RADIUS

VOLLHARTMETALL, 2 SCHNEIDEN LANG ECKENRADIUS
Fraise carbure, 2 dents, torique, longue
2 TAGLIENTI, TORICA, SERIE LUNGA

- Designed to machine tool steels, alloy steels, mold steels and other hardened materials.
- Superior workpiece finishes.
- Increased feed rates.

- Zur Bearbeitung von Werkzeugstählen, Legierten Stählen, Stahlguß und gehärteten Stählen.
- Bessere Werkstückoberflächen.
- Höhere Vorschubwerte.



CARBIDE | 2 | 30° | PLAIN | Y Coating | p.C401

Unit : mm

EDP No.	Corner Radius	Mill Diameter	Shank Diameter	Length of Cut	Overall Length
	R	D1	D2	L1	L2
GM818911	R0.5	4.0	6	15	50
GM818060	R0.5	6.0	6	20	60
GM818901	R1.0	6.0	6	20	60
GM818080	R0.5	8.0	8	25	70
GM818902	R1.0	8.0	8	25	70
GM818100	R0.5	10.0	10	30	90
GM818905	R1.0	10.0	10	30	90
GM818908	R1.0	12.0	12	30	90

Mill Dia. Tolerance (mm)	Shank Dia. Tolerance
0 ~ - 0.03	h5

◎ : 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	○	○	○	◎	◎	○	◎	◎	◎	○	◎				○	○	○	○	○	○

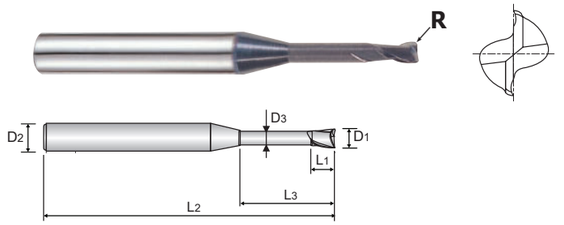
ISO	N										S							H		
Material Description	Aluminum-wrought alloy		Aluminum-cast, alloyed			Copper and Copper Alloys (Bronze / Brass)			Non Metallic Materials		Heat Resistant Super Alloys					Titanium Alloys		Hardened steel		Chilled Cast Iron	Hardened Cast Iron
VDI 3323	21	22	23	24	25	26	27	28	29	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																		○		◎	○

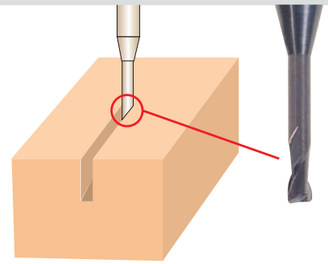
X-POWER PRO END MILLS

PLAIN SHANK **GM8A1 SERIES**

CARBIDE, 2 FLUTE CORNER RADIUS for RIB PROCESSING

VOLLHARTMETALL, 2 SCHNEIDEN ECKENRADIUS für SCHMALE RIPPEN
Fraise carbure, 2 dents, torique pour usinage de rainure
2 TAGLIENTI, TORICA PER NERVATURE





CARBIDE | 2 | 30° | PLAIN | Y Coating | p.C403~C404

Unit : mm

EDP No.	Corner Radius	Mill Diameter	Shank Diameter	Length of Cut	Length Below Shank	Overall Length	Neck Diameter
	R	D1	D2	L1	L3	L2	D3
GM8A1010	R0.1	1.0	4	1.5	6	45	0.95
GM8A1920	R0.1	1.0	4	1.5	8	45	0.95
GM8A1921	R0.1	1.0	4	1.5	10	45	0.95
GM8A1012	R0.2	1.2	4	1.8	6	45	1.15
GM8A1015	R0.2	1.5	4	2.3	6	45	1.45
GM8A1937	R0.2	1.5	4	2.3	8	45	1.45
GM8A1938	R0.2	1.5	4	2.3	10	45	1.45
GM8A1939	R0.2	1.5	4	2.3	12	45	1.45
GM8A1941	R0.2	1.5	4	2.3	16	50	1.45
GM8A1018	R0.2	1.8	4	2.7	6	45	1.75
GM8A1960	R0.2	2.0	4	3	6	45	1.95
GM8A1020	R0.2	2.0	4	3	8	45	1.95
GM8A1962	R0.2	2.0	4	3	12	45	1.95
GM8A1961	R0.2	2.0	4	3	10	45	1.95
GM8A1964	R0.2	2.0	4	3	16	50	1.95
GM8A1966	R0.2	2.0	4	3	20	55	1.95
GM8A1967	R0.2	2.0	4	3	25	60	1.95
GM8A1969	R0.2	2.5	4	3.7	12	45	2.40

▶ NEXT PAGE

Mill Dia. Tolerance (mm)	Shank Dia. Tolerance
0 ~ - 0.03	h5

◎ : 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	○	○	○	◎	◎	○	◎	◎	◎	○	◎				○	○	○	○	○	○

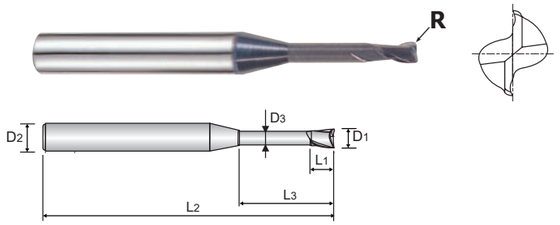
ISO	N										S							H		
Material Description	Aluminum-wrought alloy		Aluminum-cast, alloyed			Copper and Copper Alloys (Bronze / Brass)			Non Metallic Materials		Heat Resistant Super Alloys					Titanium Alloys		Hardened steel		Chilled Cast Iron	Hardened Cast Iron
VDI 3323	21	22	23	24	25	26	27	28	29	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																		○		◎	○

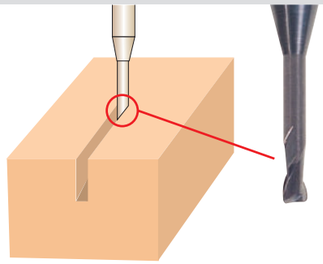
X-POWER PRO END MILLS

PLAIN SHANK **GM8A1** SERIES

CARBIDE, 2 FLUTE CORNER RADIUS for RIB PROCESSING

VOLLHARTMETALL, 2 SCHNEIDEN ECKENRADIUS für SCHMALE RIPPEN
Fraise carbure, 2 dents, torique pour usinage de rainure
2 TAGLIENTI, TORICA PER NERVATURE





CARBIDE | 2 | 30° | PLAIN | Y Coating | p.C403~C404

Unit : mm

EDP No.	Corner Radius	Mill Diameter	Shank Diameter	Length of Cut	Length Below Shank	Overall Length	Neck Diameter
	R	D1	D2	L1	L3	L2	D3
GM8A1981	R0.3	**3.0**	6	4.5	16	55	2.85
GM8A1983	R0.3	**3.0**	6	4.5	20	60	2.85
GM8A1984	R0.3	**3.0**	6	4.5	25	65	2.85
GM8A1976	R0.3	**3.0**	6	4.5	30	70	2.85
GM8A1985	R0.3	**3.0**	6	4.5	40	90	2.85
GM8A1040	R0.3	**4.0**	6	6	12	50	3.85
GM8A1986	R0.3	**4.0**	6	6	16	60	3.85
GM8A1987	R0.3	**4.0**	6	6	20	60	3.85
GM8A1060	R0.5	**6.0**	6	9	20	80	5.85
GM8A1802	R0.5	**6.0**	6	9	40	100	5.85

Mill Dia. Tolerance (mm)	Shank Dia. Tolerance
0 ~ - 0.03	h5

◎ : 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																		○		◎	○

X-POWER PRO END MILLS

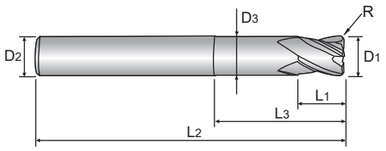
PLAIN SHANK **GM839** SERIES

CARBIDE, 4 FLUTE STUB LENGTH CORNER RADIUS

VOLLHARTMETALL, 4 SCHNEIDEN EXTRA KURZ ECKENRADIUS
Fraise carbure, 4 dents, torique, extra-courte
4 TAGLIENTI, TORICA, TAGLIENTE CORTO, SCARICATA

- ▶ Designed to machine tool steels, alloy steels, mold steels and other hardened materials.
- ▶ Superior workpiece finishes.
- ▶ Increased feed rates.

- ▶ Zur Bearbeitung von Werkzeugstählen, Legierten Stählen, Stahlguß und gehärteten Stählen.
- ▶ Bessere Werkstückoberflächen.
- ▶ Höhere Vorschubwerte.



CARBIDE | 4 | 30° | PLAIN | Y Coating | p.C405

Unit : mm

EDP No.	Corner Radius	Mill Diameter	Shank Diameter	Length of Cut	Length Below Shank	Overall Length	Neck Diameter
	R	D1	D2	L1	L3	L2	D3
GM839030	R0.3	**3.0**	6	4	7	50	2.8
GM839040	R0.4	**4.0**	6	5	9	50	3.7
GM839080	R0.8	**8.0**	8	10	18	60	7.4
GM839100	R1.0	**10.0**	10	12	25	70	9.4
GM839120	R1.2	**12.0**	12	15	30	80	11.4

Mill Dia. Tolerance (mm)	Shank Dia. Tolerance
0 ~ - 0.03	h5

◎ : 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																		○		◎	○

X-POWER PRO END MILLS

PLAIN SHANK **GM819 SERIES**

CARBIDE, 4 FLUTE LONG LENGTH CORNER RADIUS

VOLLHARTMETALL, 4 SCHNEIDEN LANG ECKENRADIUS
Fraise carbure, 4 dents, torique, longue
4 TAGLIENTI, TORICA, SERIE LUNGA

- ▶ Designed to machine tool steels, alloy steels, mold steels and other hardened materials.
- ▶ 4 flute allows for better workpiece finishes.
- ▶ Increased production.

- ▶ Zur Bearbeitung von Werkzeugstählen, Legierten Stählen, Stahlguß und gehärteten Stählen.
- ▶ 4 Schneiden für bessere Oberflächengüte des Werkstücks.
- ▶ Gesteigerte Productivität.

CARBIDE | 4 | 30° | PLAIN | Y Coating | p.C406

Unit : mm

EDP No.	Corner Radius	Mill Diameter	Shank Diameter	Length of Cut	Overall Length
	R	D1	D2	L1	L2
GM819030	R0.3	3.0	6	12	50
GM819911	R0.5	4.0	6	15	50
GM819912	R0.5	5.0	6	20	60
GM819060	R0.5	6.0	6	20	60
GM819901	R1.0	6.0	6	20	60
GM819080	R0.5	8.0	8	25	70
GM819902	R1.0	8.0	8	25	70
GM819904	R2.0	8.0	8	25	70
GM819100	R0.5	10.0	10	30	90
GM819905	R1.0	10.0	10	30	90
GM819906	R1.5	10.0	10	30	90
GM819907	R2.0	10.0	10	30	90
GM819120	R0.5	12.0	12	30	90
GM819908	R1.0	12.0	12	30	90
GM819909	R1.5	12.0	12	30	90
GM819910	R2.0	12.0	12	30	90
GM819160	R0.5	16.0	16	50	110
GM819916	R1.0	16.0	16	50	110
GM819918	R2.0	16.0	16	50	110
GM819921	R2.0	20.0	20	55	110

◎ : 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																		○		◎	○

X-POWER PRO END MILLS

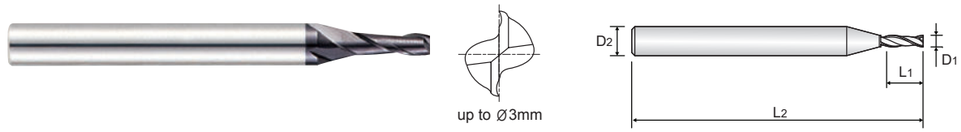
PLAIN SHANK **GM810 SERIES**

CARBIDE, 2 FLUTE MINIATURE

VOLLHARTMETALL, 2 SCHNEIDEN MINI
Fraise carbure, 2 dents, micro-fraise
2 TAGLIENTI, MINI

- ▶ High precision milling in medical, optical, electronics and aerospace industries.
- ▶ Excellent performance on hardened steel

- ▶ Hochpräzises Fräsen für Medizintechnik, Optik, Elektronik und Raumfahrt.
- ▶ Ausgezeichnete Leistung bei der Bearbeitung von gehärtetem Stahl.



CARBIDE | 2 | 30° | PLAIN | Y Coating | p.C407

Unit : mm

EDP No.	Mill Diameter	Shank Diameter	Length of Cut	Overall Length
	D1	D2	L1	L2
GM810005	0.5	3	1	40
GM810006	0.6	3	1.2	40
GM810008	0.8	3	1.6	40
GM810009	0.9	3	2	40
GM810010	1.0	4	2.5	40
GM810901	1.0	6	2.5	40
GM810012	1.2	4	4	40
GM810015	1.5	4	4	40
GM810902	1.5	6	4	40
GM810020	2.0	4	6	40
GM810903	2.0	6	6	40
GM810025	2.5	4	8	40
GM810030	3.0	6	8	45
GM810035	3.5	6	10	45
GM810040	4.0	6	11	45
GM810050	5.0	6	13	50
GM810060	6.0	6	13	50
GM810070	7.0	8	16	60
GM810080	8.0	8	19	60
GM810090	9.0	10	19	70

▶ NEXT PAGE

Mill Dia. Tolerance (mm)	Shank Dia. Tolerance
0 ~ - 0.03	h5

◎ : 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																		○		◎	○

X-POWER PRO END MILLS

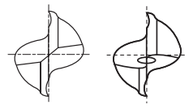
PLAIN SHANK **GM810** SERIES

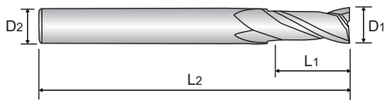
CARBIDE, 2 FLUTE SHORT LENGTH

VOLLHARTMETALL, 2 SCHNEIDEN KURZ
Fraise carbure, 2 dents, courte
2 TAGLIENTI, SERIE CORTA

- ▶ Designed to machine tool steels, alloy steels, mold steels and other hardened materials.
- ▶ Superior workpiece finishes.
- ▶ Increased feed rates.

- ▶ Zur Bearbeitung: Werkzeugstählen, Legierten Stählen, Stahlguß und gehärteten Stählen.
- ▶ Bessere Werkstückoberflächen.
- ▶ Höhere Vorschübe.





CARBIDE | 2 | 30° | PLAIN | Y Coating | p.C407

Unit : mm

EDP No.	Mill Diameter	Shank Diameter	Length of Cut	Overall Length
	D1	D2	L1	L2
GM810100	10.0	10	22	70
GM810110	11.0	12	22	75
GM810120	12.0	12	26	75
GM810140	14.0	14	26	85
GM810160	16.0	16	32	100
GM810180	18.0	18	32	100
GM810200	20.0	20	38	105

Mill Dia. Tolerance (mm)	Shank Dia. Tolerance
0 ~ - 0.03	h5

◎ : 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	○	○	○	◎	◎	○	◎	◎	◎	○	◎	○	○	○	○	○	○	○	○	○

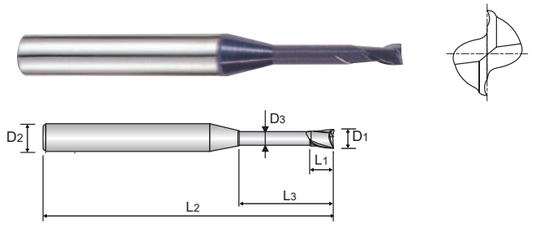
ISO	N										S							H		
Material Description	Aluminum-wrought alloy		Aluminum-cast, alloyed			Copper and Copper Alloys (Bronze / Brass)			Non Metallic Materials		Heat Resistant Super Alloys					Titanium Alloys		Hardened steel		Chilled Cast Iron	Hardened Cast Iron
VDI 3323	21	22	23	24	25	26	27	28	29	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																		○		◎	○

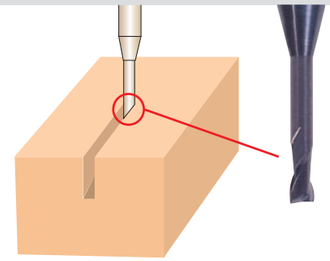
X-POWER PRO END MILLS

PLAIN SHANK **GM883** SERIES

CARBIDE, 2 FLUTE for RIB PROCESSING

VOLLHARTMETALL, 2 SCHNEIDEN für SCHMALE RIPPEN
Fraise carbure, 2 dents pour usinage de rainure
2 TAGLIENTI, SCARICATA PER NERVATURE





CARBIDE | 2 | 30° | PLAIN | Y Coating | p.C408~C409

Unit : mm

EDP No.	Mill Diameter	Shank Diameter	Length of Cut	Length Below Shank	Overall Length	Neck Diameter
	D1	D2	L1	L3	L2	D3
GM883004	0.4	4	0.6	2	45	0.37
GM883005	0.5	4	0.7	2	45	0.45
GM883988	0.5	4	0.7	4	45	0.45
GM883820	0.7	4	1	3	45	0.65
GM883008	0.8	4	1.2	4	45	0.75
GM883908	0.8	4	1.2	6	45	0.75
GM883996	1.0	4	1.5	4	45	0.95
GM883010	1.0	4	1.5	6	45	0.95
GM883912	1.0	4	1.5	8	45	0.95
GM883913	1.0	4	1.5	10	45	0.95
GM883914	1.0	4	1.5	12	45	0.95
GM883997	1.0	4	1.5	16	50	0.95
GM883998	1.0	4	1.5	20	55	0.95
GM883012	1.2	4	1.8	6	45	1.15
GM883015	1.5	4	2.3	6	45	1.45
GM883923	1.5	4	2.3	8	45	1.45
GM883924	1.5	4	2.3	10	45	1.45
GM883925	1.5	4	2.3	12	45	1.45
GM883927	1.5	4	2.3	16	50	1.45
GM883810	1.5	4	2.3	20	55	1.45

▶ NEXT PAGE

Mill Dia. Tolerance (mm)	Shank Dia. Tolerance
0 ~ - 0.015	h5

◎ : 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	○	○	○	◎	◎	○	◎	◎	◎	○	◎				○	○	○	○	○	○

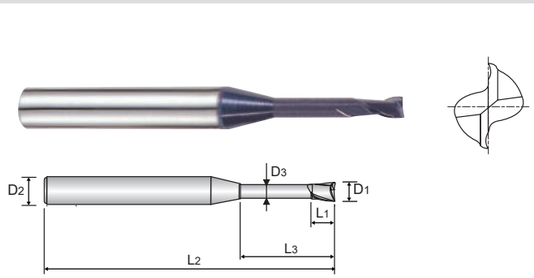
ISO	N										S							H		
Material Description	Aluminum-wrought alloy		Aluminum-cast, alloyed			Copper and Copper Alloys (Bronze / Brass)			Non Metallic Materials		Heat Resistant Super Alloys					Titanium Alloys		Hardened steel		Chilled Cast Iron	Hardened Cast Iron
VDI 3323	21	22	23	24	25	26	27	28	29	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																		○		◎	○

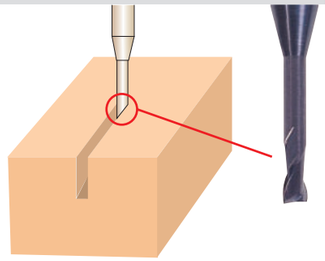
X-POWER PRO END MILLS

PLAIN SHANK **GM883** SERIES

CARBIDE, 2 FLUTE for RIB PROCESSING

- VOLLHARTMETALL, 2 SCHNEIDEN für SCHMALE RIPPEN
- Fraise carbure, 2 dents pour usinage de rainure
- 2 TAGLIENTI, SCARICATA PER NERVATURE





CARBIDE | 2 | 30° | PLAIN | Y Coating | p.C408~C409

Unit : mm

EDP No.	Mill Diameter	Shank Diameter	Length of Cut	Length Below Shank	Overall Length	Neck Diameter
	D1	D2	L1	L3	L2	D3
GM883946	1.8	4	2.7	12	45	1.75
GM883958	2.0	4	3	6	45	1.95
GM883020	2.0	4	3	8	45	1.95
GM883959	2.0	4	3	10	45	1.95
GM883960	2.0	4	3	12	45	1.95
GM883961	2.0	4	3	14	50	1.95
GM883962	2.0	4	3	16	50	1.95
GM883964	2.0	4	3	20	55	1.95
GM883966	2.0	4	3	25	60	1.95
GM883814	2.0	4	3	30	70	1.95
GM883970	2.5	4	3.7	16	55	2.40
GM883975	3.0	6	4.5	10	45	2.85
GM883976	3.0	6	4.5	12	45	2.85
GM883978	3.0	6	4.5	16	55	2.85
GM883979	3.0	6	4.5	18	55	2.85
GM883980	3.0	6	4.5	20	60	2.85
GM883981	3.0	6	4.5	25	65	2.85
GM883832	3.0	6	4.5	30	70	2.85
GM883983	3.0	6	4.5	40	90	2.85

▶ NEXT PAGE

Mill Dia. Tolerance (mm)	Shank Dia. Tolerance
0 ~ - 0.015	h5

◎ : 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																		○		◎	○

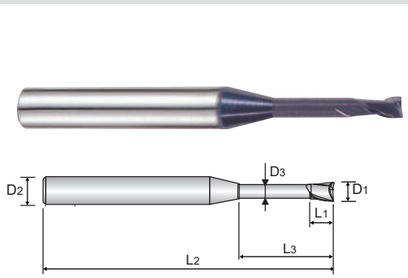
CARBIDE
HSS
CBN END MILLS
i-Xmill END MILLS
i-SMART MODULAR END MILLS
X1-EH END MILLS
X5070 END MILLS
4G MILL END MILLS
X-POWER PRO END MILLS
TitaNox-POWER END MILLS
JET-POWER END MILLS
V7 PLUS END MILLS
ALU-POWER HPC END MILLS
D-POWER GRAPHITE END MILLS
CRX S END MILLS
K-2 END MILLS
ONLY ONE COATED PM60 END MILLS
TANK POWER END MILLS
GENERAL HSS END MILLS
MILLING CUTTERS

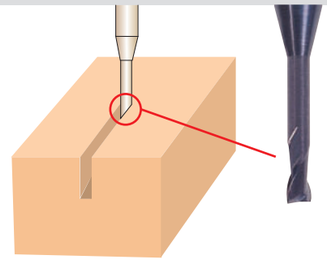
X-POWER PRO END MILLS

PLAIN SHANK **GM883** SERIES

CARBIDE, 2 FLUTE for RIB PROCESSING

- VOLLHARTMETALL, 2 SCHNEIDEN für SCHMALE RIPPEN
- Fraise carbure, 2 dents pour usinage de rainure
- 2 TAGLIENTI, SCARICATA PER NERVATURE





CARBIDE | 2 | 30° | PLAIN | Y Coating | p.C408~C409

Unit : mm

EDP No.	Mill Diameter	Shank Diameter	Length of Cut	Length Below Shank	Overall Length	Neck Diameter
	D1	D2	L1	L3	L2	D3
GM883801	4.0	6	6	16	60	3.85
GM883802	4.0	6	6	20	60	3.85
GM883803	4.0	6	6	25	70	3.85
GM883834	4.0	6	6	30	70	3.85
GM883836	4.0	6	6	40	90	3.85
GM883838	4.0	6	6	50	100	3.85
GM883807	6.0	6	9	30	90	5.85
GM883809	6.0	6	9	50	110	5.85

Mill Dia. Tolerance (mm)	Shank Dia. Tolerance
0 ~ - 0.015	h5

◎ : 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																		○		◎	○

X-POWER PRO END MILLS

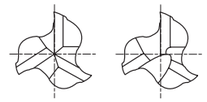
PLAIN SHANK **GM895 SERIES**

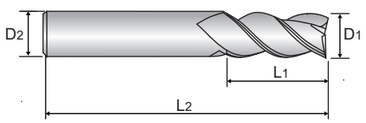
CARBIDE, 3 FLUTE 38° HELIX SHORT LENGTH

VOLLHARTMETALL, 3 SCHNEIDEN 38° RECHTSSPIRALE KURZ
Fraise carbure, 3 dents, hélice 38°, courte
3 TAGLIENTI, ELICA 38°, SERIE CORTA

- Designed to machine tool steels, alloy steels, mold steels and other hardened materials.
- Possesses the advantage of 2 flute and 4 flute end mill.
- Superior workpiece finishes.

- Zur Bearbeitung: Werkzeugstählen, Legierten Stählen, Stahlguß und gehärteten Stählen.
- Besitzt die Vorteile von 2 und 4 Schneiden Fräsern
- Bessere Werkstückoberflächen





CARBIDE | 3 | 38° | PLAIN | Y Coating p.C410-C411

Unit : mm

EDP No.	Mill Diameter	Shank Diameter	Length of Cut	Overall Length
	D_1	D_2	L_1	L_2
GM895010	**1.0**	3	2.5	38
GM895015	**1.5**	4	5	50
GM895025	**2.5**	3	7	38
GM895030	**3.0**	3	10	38
GM895901	**3.0**	6	10	50
GM895040	**4.0**	4	12	50
GM895050	**5.0**	5	14	50
GM895904	**5.0**	6	14	57
GM895060	**6.0**	6	16	57
GM895080	**8.0**	8	20	63
GM895100	**10.0**	10	22	72
GM895120	**12.0**	12	25	73
GM895160	**16.0**	16	32	82

Mill Dia. Tolerance (mm)	Shank Dia. Tolerance
0 ~ - 0.03	h5

◎ : 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																		○		◎	○

X-POWER PRO END MILLS

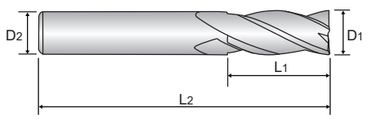
PLAIN SHANK **GM811 SERIES**

CARBIDE, 4 FLUTE SHORT LENGTH

VOLLHARTMETALL, 4 SCHNEIDEN KURZ
Fraise carbure, 4 dents, courte
4 TAGLIENTI, SERIE CORTA

- Designed to machine tool steels, alloy steels, mold steels and other hardened materials.
- 4 flute allows for better workpiece finishes.
- Increased Productivity.

- Zur Bearbeitung: Werkzeugstählen, Legierten Stählen, Stahlguß und gehärteten Stählen.
- 4 Schneiden erzeugen eine bessere Oberfläche des Werkstücks.
- Höhere Produktivität.



CARBIDE | 4 | 30° | PLAIN | Y Coating p.C412

Unit : mm

EDP No.	Mill Diameter	Shank Diameter	Length of Cut	Overall Length
	D_1	D_2	L_1	L_2
GM811901	**2.0**	6	6	40
GM811025	**2.5**	4	8	40
GM811902	**2.5**	6	8	40
GM811030	**3.0**	6	8	45
GM811035	**3.5**	6	10	45
GM811040	**4.0**	6	11	45
GM811045	**4.5**	6	11	45
GM811050	**5.0**	6	13	50
GM811060	**6.0**	6	13	50
GM811080	**8.0**	8	19	60
GM811100	**10.0**	10	22	70
GM811120	**12.0**	12	26	75
GM811140	**14.0**	14	26	85
GM811160	**16.0**	16	32	100
GM811250	**25.0**	25	45	120

Mill Dia. Tolerance (mm)	Shank Dia. Tolerance
0 ~ - 0.03	h5

◎ : 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																		○		◎	○

X-POWER PRO END MILLS

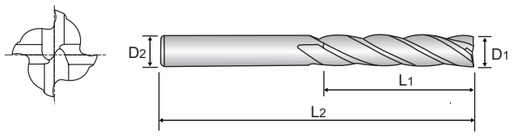
PLAIN SHANK **GM817** SERIES

CARBIDE, 4 FLUTE LONG LENGTH

VOLLHARTMETALL, 4 SCHNEIDEN LANG
Fraise carbure, 4 dents, longue
4 TAGLIENTI, SERIE LUNGA

- Designed to machine tool steels, alloy steels, mold steels and other hardened materials.
- 4 flute allows for better workpiece finishes.
- Increased Productivity.

- Zur Bearbeitung: Werkzeugstählen, Legierten Stählen, Stahlguß und gehärteten Stählen.
- 4 Schneiden erzeugen eine bessere Oberfläche des Werkstücks.
- Höhere Produktivität.



CARBIDE | 4 | 30° | PLAIN | Y Coating | p.C413

Unit : mm

EDP No.	Mill Diameter	Shank Diameter	Length of Cut	Overall Length
	D_1	D_2	L_1	L_2
GM817020	2.0	4	8	40
GM817030	3.0	6	12	50
GM817040	4.0	6	15	50
GM817050	5.0	6	20	60
GM817060	6.0	6	20	60
GM817080	8.0	8	25	70
GM817100	10.0	10	30	90
GM817120	12.0	12	30	90
GM817140	14.0	16	40	110
GM817160	16.0	16	50	110
GM817200	20.0	20	55	110

Mill Dia. Tolerance (mm)	Shank Dia. Tolerance
0 ~ - 0.03	h5

◎ : 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																		○		◎	○

X-POWER PRO END MILLS

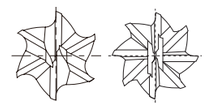
PLAIN SHANK **GM812** SERIES

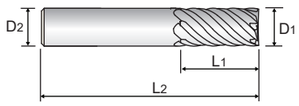
CARBIDE, 6&8 FLUTE 45° HELIX LONG LENGTH

VOLLHARTMETALL, 6&8 SCHNEIDEN 45° RECHTSSPIRALE LANG
Fraise carbure, 6&8 dents, hélice 45°, longue
6&8 TAGLIENTI, ELICA 45°, SERIE

- Designed to machine hardened materials.
- High speed cutting and finish milling with high feed rates.
- Superior workpiece finishes.
- Superior wear resistance.
- Suitable for dry milling.

- Geeignet zum Fräsen von gehärteten Stählen.
- Hochgeschwindigkeitsfräsen und Finishing mit erhöhtem Vorschub.
- Bessere Werkstückoberflächen
- Höhere Verschleißfestigkeit.
- Geeignet zum Trocken-Fräsen.



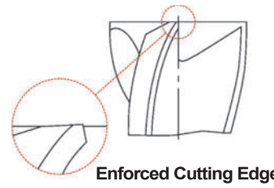


CARBIDE | 6&8 | 45° | PLAIN | Y Coating | p.C414

Unit : mm

EDP No.	Mill Diameter	Shank Diameter	Length of Cut	Overall Length	No. of Flute
	D_1	D_2	L_1	L_2	
GM812060	6.0	6	13	57	6
GM812080	8.0	8	19	63	6
GM812100	10.0	10	22	72	6
GM812120	12.0	12	26	83	6
GM812160	16.0	16	32	92	6
GM812200	20.0	20	38	104	8

Mill Dia. Tolerance (mm)	Shank Dia. Tolerance
0 ~ - 0.03	h5



◎ : 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																		○		◎	○

X-POWER PRO END MILLS

PLAIN SHANK **GM834** SERIES

CARBIDE, 6 FLUTE 45° HELIX EXTRA LONG LENGTH

VOLLHARTMETALL, 6 SCHNEIDEN 45° RECHTSSPIRALE EXTRA LANG
Fraise carbure, 6 dents, hélice 45°, extra-longue
6 TAGLIENTI, ELICA 45°, SERIE EXTRA LUNGA

- Designed to machine hardened materials.
- High speed cutting and finish milling with high feed rates.
- Superior workpiece finishes.
- Superior wear resistance.
- Suitable for dry milling.

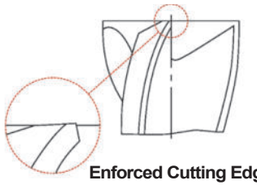
- Geeignet zum Fräsen von gehärteten Stählen.
- Hochgeschwindigkeitsfräsen und Finishing mit erhöhtem Vorschub.
- Bessere Werkstückoberflächen
- Höhere Verschleißfestigkeit.
- Geeignet zum Trocken-Fräsen.

CARBIDE | 6 | 45° | PLAIN | Y Coating p.C415

Unit : mm

EDP No.	Mill Diameter	Shank Diameter	Length of Cut	Overall Length
	D1	D2	L1	L2
GM834060	6.0	6	26	70
GM834080	8.0	8	36	90
GM834100	10.0	10	46	100
GM834120	12.0	12	56	110
GM834160	16.0	16	66	130
GM834200	20.0	20	76	140
GM834250	25.0	25	92	180

Mill Dia. Tolerance (mm)	Shank Dia. Tolerance
0 ~ - 0.03	h5



◎ : 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																		○		◎	○

X-POWER PRO END MILLS

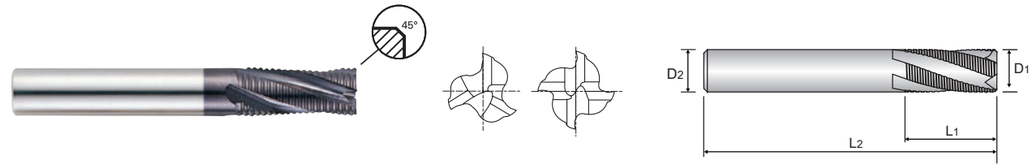
PLAIN SHANK **GM814** SERIES

CARBIDE, 3&4 FLUTE 20° HELIX LONG LENGTH ROUGHING - FINE

VOLLHARTMETALL, 3&4 SCHNEIDEN 20° RECHTSSPIRALE LANG SCHRUPPFRÄSER - FEIN
Fraise carbure, 3&4-dents ébauche, hélice 20°, pas fin, longue
3 - 4 TAGLIENTI, BOMBATO FINE PER SGROSSATURA, ELICA 20° SERIE LUNGA

- Designed to machine tool steels, alloy steels, mold steels and other hardened materials.
- High velocity milling of hardened steels.
- For dry and wet milling.
- Fast chip ejection.

- Zur Bearbeitung von Werkzeugstählen, Legierten Stählen, Stahlguß und gehärteten Stählen.
- Hochgeschwindigkeitsfräsen von gehärteten Stählen.
- Für Trocken - und Nassfräsen.
- Schnelle Spanabfuhr.



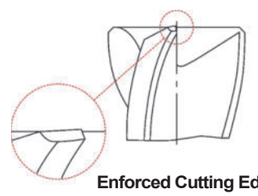
CARBIDE | HR | 3&4 | 20° | PLAIN | C x 45° | Y Coating p.C416

Unit : mm

EDP No.	Mill Diameter	Shank Diameter	Length of Cut	Overall Length	No. of Flute	Chamfer
	D1	D2	L1	L2		
GM814060	6.0	6	16	57	3	0.38
GM814080	8.0	8	16	63	3	0.38
GM814100	10.0	10	22	72	4	0.60
GM814120	12.0	12	26	83	4	0.60
GM814160	16.0	16	32	92	4	0.60
GM814200	20.0	20	38	104	4	0.60

Tolerances according to DIN 7160 & 7161

Tolerance range in µm					
Nominal-Diameter in mm					
	from 1 to 3	over 3 to 6	over 6 to 10	over 10 to 18	over 18 to 30
h10	0 - 40	0 - 48	0 - 58	0 - 70	0 - 84
h5	0 - 4	0 - 5	0 - 6	0 - 8	0 - 9



◎ : 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																		○		◎	○

X-POWER PRO END MILLS

RECOMMENDED CUTTING CONDITIONS
EMPFOHLENE SCHNEIDPARAMETER

GM876, GM813 SERIES — 2 FLUTE BALL NOSE

Vc = m/min.
fz = mm/tooth
RPM = rev./min.
FEED = mm/min
Ap = mm

NORMAL SPEED

ISO	VDI 3323	Material Description	Ae	Parameter	Diameter (Ø) 1.0	1.5	2.0	2.5	3.0	4.0	5.0	6.0	8.0	10.0	12.0	16.0	20.0
P	1-4	Non-alloy steel	0.2D	Vc	55	85	100	125	140	150	160	180	200	225	245	270	290
				fz	0.008	0.011	0.026	0.026	0.026	0.035	0.045	0.06	0.09	0.12	0.15	0.18	0.2
				RPM	17507	18038	15915	15915	14854	11937	10186	9549	7958	7162	6499	5371	4615
				FEED	280	397	828	828	772	836	917	1146	1432	1719	1950	1934	1846
				Ap	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3
	5		0.2D	Vc	45	65	75	95	105	120	130	145	160	180	195	215	230
				fz	0.008	0.011	0.023	0.023	0.023	0.032	0.040	0.060	0.080	0.100	0.120	0.140	0.160
				RPM	14324	13793	11937	12096	11141	9549	8276	7692	6366	5730	5173	4277	3661
				FEED	229	303	549	556	512	611	662	923	1019	1146	1241	1198	1171
				Ap	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3
	6-7	Low alloy steel	0.2D	Vc	55	85	100	125	140	150	160	180	200	225	245	270	290
				fz	0.008	0.011	0.026	0.026	0.026	0.035	0.045	0.06	0.09	0.12	0.15	0.18	0.2
				RPM	17507	18038	15915	15915	14854	11937	10186	9549	7958	7162	6499	5371	4615
				FEED	280	397	828	828	772	836	917	1146	1432	1719	1950	1934	1846
				Ap	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3
	8-9		0.2D	Vc	45	65	75	95	105	120	130	145	160	180	195	215	230
				fz	0.008	0.011	0.023	0.023	0.023	0.032	0.040	0.060	0.080	0.100	0.120	0.140	0.160
				RPM	14324	13793	11937	12096	11141	9549	8276	7692	6366	5730	5173	4277	3661
				FEED	229	303	549	556	512	611	662	923	1019	1146	1241	1198	1171
				Ap	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3
	10	High alloyed steel, and tool steel	0.2D	Vc	55	85	100	125	140	150	160	180	200	225	245	270	290
				fz	0.008	0.011	0.026	0.026	0.026	0.035	0.045	0.06	0.09	0.12	0.15	0.18	0.2
				RPM	17507	18038	15915	15915	14854	11937	10186	9549	7958	7162	6499	5371	4615
				FEED	280	397	828	828	772	836	917	1146	1432	1719	1950	1934	1846
				Ap	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3
	11.1 - 11.2		0.2D	Vc	45	65	75	95	105	120	130	145	160	180	195	215	230
				fz	0.008	0.011	0.023	0.023	0.023	0.032	0.040	0.060	0.080	0.100	0.120	0.140	0.160
				RPM	14324	13793	11937	12096	11141	9549	8276	7692	6366	5730	5173	4277	3661
				FEED	229	303	549	556	512	611	662	923	1019	1146	1241	1198	1171
				Ap	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3
K	15-20	Grey cast iron Nodular cast iron Malleable cast iron	0.2D	Vc	55	80	100	125	135	145	160	180	200	220	245	265	290
				fz	0.008	0.011	0.026	0.026	0.026	0.035	0.045	0.06	0.09	0.12	0.15	0.181	0.201
				RPM	17507	16977	15915	15915	14324	11539	10186	9549	7958	7003	6499	5272	4615
				FEED	280	373	828	828	745	808	917	1146	1432	1681	1950	1908	1855
				Ap	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3
H	38.1 - 38.2	Hardened steel	0.1D	Vc	20	30	35	40	50	60	65	65	70	70	75	75	80
				fz	0.008	0.011	0.016	0.016	0.017	0.021	0.024	0.030	0.044	0.055	0.070	0.091	0.113
				RPM	6366	6366	5570	5093	5305	4775	4138	3448	2785	2228	1989	1492	1273
				FEED	102	140	178	163	180	201	199	207	245	245	279	272	288
				Ap	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3
	40	Chilled Cast Iron	0.2D	Vc	45	65	75	95	105	120	130	145	160	180	195	215	230
				fz	0.008	0.011	0.023	0.023	0.023	0.032	0.040	0.060	0.080	0.100	0.120	0.140	0.160
				RPM	14324	13793	11937	12096	11141	9549	8276	7692	6366	5730	5173	4277	3661
				FEED	229	303	549	556	512	611	662	923	1019	1146	1241	1198	1171
				Ap	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3
	41	Hardened Cast Iron	0.1D	Vc	20	30	35	40	50	60	65	65	70	70	75	75	80
				fz	0.008	0.011	0.016	0.016	0.017	0.021	0.024	0.030	0.044	0.055	0.070	0.091	0.113
				RPM	6366	6366	5570	5093	5305	4775	4138	3448	2785	2228	1989	1492	1273
				FEED	102	140	178	163	180	201	199	207	245	245	279	272	288
				Ap	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3

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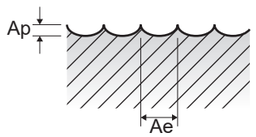


X-POWER PRO END MILLS

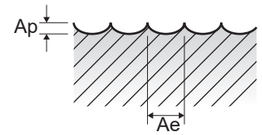
RECOMMENDED CUTTING CONDITIONS
EMPFOHLENE SCHNEIDPARAMETER

GM876, GM813 SERIES — 2 FLUTE BALL NOSE

Vc = m/min.
fz = mm/tooth
RPM = rev./min.
FEED = mm/min
Ap = mm

HIGH SPEED

ISO	VDI 3323	Material Description	Ae	Parameter	Diameter (Ø) 1.0	1.5	2.0	2.5	3.0	4.0	5.0	6.0	8.0	10.0	12.0	16.0	20.0
P	1-5	Non-alloy steel	0.05D	Vc	90	120	150	185	220	295	370	445	470	495	515	540	560
				fz	0.026	0.03	0.035	0.042	0.048	0.07	0.086	0.095	0.12	0.139	0.16	0.181	0.2
				RPM	28648	25465	23873	23555	23343	23475	23555	23608	18701	15756	13661	10743	8913
				FEED	1490	1528	1671	1979	2241	3287	4051	4486	4488	4380	4371	3889	3565
				Ap	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3
	6-9	Low alloy steel	0.05D	Vc	90	120	150	185	220	295	370	445	470	495	515	540	560
				fz	0.026	0.030	0.035	0.042	0.048	0.070	0.086	0.095	0.120	0.139	0.160	0.181	0.200
				RPM	28648	25465	23873	23555	23343	23475	23555	23608	18701	15756	13661	10743	8913
				FEED	1490	1528	1671	1979	2241	3287	4051	4486	4488	4380	4371	3889	3565
				Ap	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3
	10 - 11.2	High alloyed steel, and tool steel	0.05D	Vc	90	120	150	185	220	295	370	445	470	495	515	540	560
				fz	0.026	0.03	0.035	0.042	0.048	0.07	0.086	0.095	0.12	0.139	0.16	0.181	0.2
				RPM	28648	25465	23873	23555	23343	23475	23555	23608	18701	15756	13661	10743	8913
				FEED	1490	1528	1671	1979	2241	3287	4051	4486	4488	4380	4371	3889	3565
				Ap	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3
K	15-20	Grey cast iron Nodular cast iron Malleable cast iron	0.05D	Vc	90	120	150	185	220	295	370	445	470	495	515	540	560
				fz	0.026	0.03	0.035	0.042	0.048	0.07	0.086	0.095	0.12	0.139	0.16	0.181	0.2
				RPM	28648	25465	23873	23555	23343	23475	23555	23608	18701	15756	13661	10743	8913
				FEED	1490	1528	1671	1979	2241	3287	4051	4486	4488	4380	4371	3889	3565
				Ap	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3
H	38.1 - 38.2	Hardened steel	0.05D	Vc	90	120	150	165	180	190	210	220	235	245	255	270	280
				fz	0.016	0.019	0.022	0.026	0.031	0.042	0.050	0.060	0.075	0.086	0.095	0.105	0.115
				RPM	28648	25465	23873	21008	19099	15120	13369	11671	9350	7799	6764	5371	4456
				FEED	917	968	1050	1092	1184	1270	1337	1401	1403	1341	1285	1128	1025
				Ap	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3
	40	Chilled Cast Iron	0.05D	Vc	90	120	150	185	220	295	370	445	470	495	515	540	560
				fz	0.026	0.030	0.035	0.042	0.048	0.070	0.086	0.095	0.120	0.139	0.160	0.181	0.200
				RPM	28648	25465	23873	23555	23343	23475	23555	23608	18701	15756	13661	10743	8913
				FEED	1490	1528	1671	1979	2241	3287	4051	4486	4488	4380	4371	3889	3565
				Ap	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3
	41	Hardened Cast Iron	0.05D	Vc	90	120	150	165	180	190	210	220	235	245	255	270	280
				fz	0.016	0.019	0.022	0.026	0.031	0.042	0.050	0.060	0.075	0.086	0.095	0.105	0.115
				RPM	28648	25465	23873	21008	19099	15120	13369	11671	9350	7799	6764	5371	4456
				FEED	917	968	1050	1092	1184	1270	1337	1401	1403	1341	1285	1128	1025
				Ap	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3



CARBIDE
HSS
CBN END MILLS
i-Xmill END MILLS
i-SMART MODULAR END MILLS
X1-EH END MILLS
X5070 END MILLS
4G MILL END MILLS
X-POWER PRO END MILLS
TitaNox-POWER END MILLS
JET-POWER END MILLS
V7 PLUS END MILLS
ALU-POWER HPC END MILLS
ALU-POWER END MILLS
D-POWER GRAPHITE END MILLS
CRX S END MILLS
K-2 END MILLS
ONLY ONE COATED PM60 END MILLS
TANK POWER END MILLS
GENERAL HSS END MILLS
MILLING CUTTERS

X-POWER PRO END MILLS

RECOMMENDED CUTTING CONDITIONS
EMPFOHLENE SCHNEIDPARAMETER

GM886 SERIES — 2 FLUTE BALL NOSE RIB PROCESSING

Vc = m/min.
fz = mm/tooth
RPM = rev./min.
FEED = mm/min
Ap = mm

ISO	VDI 3323	Material Description	Parameter	Diameter (Ø) 0.5	0.6	0.8	1.0	1.2	1.4
P	1-4	Non-alloy steel	Vc	49~63	58~75	78~101	91~115	90~115	92~114
			fz	0.003~0.006	0.004~0.008	0.004~0.008	0.004~0.010	0.005~0.013	0.006~0.015
			RPM	32550~42000	32550~42000	32550~42000	30450~38330	25200~32030	22050~27300
			FEED	185~515	235~660	235~660	265~735	265~820	265~820
			Ap	0.023~0.045	0.027~0.054	0.036~0.072	0.045~0.090	0.055~0.100	0.062~0.125
	5		Vc	35~45	42~54	57~72	64~82	64~81	66~79
			fz	0.002~0.005	0.002~0.006	0.002~0.006	0.003~0.008	0.004~0.009	0.004~0.011
			RPM	23630~29930	23630~29930	23630~29930	21530~27300	17850~22580	15750~18900
			FEED	90~285	115~370	115~370	130~410	130~410	130~410
			Ap	0.023~0.045	0.027~0.054	0.036~0.072	0.045~0.090	0.055~0.100	0.062~0.125
	6-7	Low alloy steel	Vc	49~63	58~75	78~101	91~115	90~115	92~114
			fz	0.003~0.006	0.004~0.008	0.004~0.008	0.004~0.010	0.005~0.013	0.006~0.015
			RPM	32550~42000	32550~42000	32550~42000	30450~38330	25200~32030	22050~27300
			FEED	185~515	235~660	235~660	265~735	265~820	265~820
			Ap	0.023~0.045	0.027~0.054	0.036~0.072	0.045~0.090	0.055~0.100	0.062~0.125
	8-9		Vc	35~45	42~54	57~72	64~82	64~81	66~79
			fz	0.002~0.005	0.002~0.006	0.002~0.006	0.003~0.008	0.004~0.009	0.004~0.011
			RPM	23630~29930	23630~29930	23630~29930	21530~27300	17850~22580	15750~18900
			FEED	90~285	115~370	115~370	130~410	130~410	130~410
			Ap	0.023~0.045	0.027~0.054	0.036~0.072	0.045~0.090	0.055~0.100	0.062~0.125
	10	High alloyed steel, and tool steel	Vc	49~63	58~75	78~101	91~115	90~115	92~114
			fz	0.003~0.006	0.004~0.008	0.004~0.008	0.004~0.010	0.005~0.013	0.006~0.015
			RPM	32550~42000	32550~42000	32550~42000	30450~38330	25200~32030	22050~27300
			FEED	185~515	235~660	235~660	265~735	265~820	265~820
			Ap	0.023~0.045	0.027~0.054	0.036~0.072	0.045~0.090	0.055~0.100	0.062~0.125
	11.1 - 11.2		Vc	35~45	42~54	57~72	64~82	64~81	66~79
			fz	0.002~0.005	0.002~0.006	0.002~0.006	0.003~0.008	0.004~0.009	0.004~0.011
			RPM	23630~29930	23630~29930	23630~29930	21530~27300	17850~22580	15750~18900
			FEED	90~285	115~370	115~370	130~410	130~410	130~410
			Ap	0.023~0.045	0.027~0.054	0.036~0.072	0.045~0.090	0.055~0.100	0.062~0.125
K	15-20	Grey cast iron Nodular cast iron Malleable cast iron	Vc	49~63	58~75	78~101	91~115	90~115	92~114
			fz	0.003~0.006	0.004~0.008	0.004~0.008	0.004~0.010	0.005~0.013	0.006~0.015
			RPM	32550~42000	32550~42000	32550~42000	30450~38330	25200~32030	22050~27300
			FEED	185~515	235~660	235~660	265~735	265~820	265~820
			Ap	0.023~0.045	0.027~0.054	0.036~0.072	0.045~0.090	0.055~0.100	0.062~0.125
H	38.1 - 38.2	Hardened steel	Vc	22~28	27~34	36~45	41~51	41~52	41~51
			fz	0.003~0.005	0.004~0.006	0.004~0.006	0.005~0.008	0.006~0.009	0.007~0.011
			RPM	15020~18900	15020~18900	15020~18900	13650~17120	11340~14390	9870~12290
			FEED	90~185	115~235	115~235	130~265	130~265	130~265
			Ap	0.005~0.009	0.005~0.011	0.007~0.014	0.009~0.018	0.010~0.022	0.012~0.025
	40	Chilled Cast Iron	Vc	35~45	42~54	57~72	64~82	64~81	66~79
			fz	0.002~0.005	0.002~0.006	0.002~0.006	0.003~0.008	0.004~0.009	0.004~0.011
			RPM	23630~29930	23630~29930	23630~29930	21530~27300	17850~22580	15750~18900
			FEED	90~285	115~370	115~370	130~410	130~410	130~410
			Ap	0.023~0.045	0.027~0.054	0.036~0.072	0.045~0.090	0.055~0.100	0.062~0.125
	41	Hardened Cast Iron	Vc	22~28	27~34	36~45	41~51	41~52	41~51
			fz	0.003~0.005	0.004~0.006	0.004~0.006	0.005~0.008	0.006~0.009	0.007~0.011
			RPM	15020~18900	15020~18900	15020~18900	13650~17120	11340~14390	9870~12290
			FEED	90~185	115~235	115~235	130~265	130~265	130~265
			Ap	0.005~0.009	0.005~0.011	0.007~0.014	0.009~0.018	0.010~0.022	0.012~0.025

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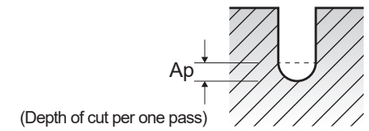

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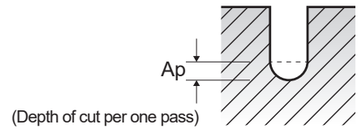
X-POWER PRO END MILLS

RECOMMENDED CUTTING CONDITIONS
EMPFOHLENE SCHNEIDPARAMETER

GM886 SERIES — 2 FLUTE BALL NOSE RIB PROCESSING

Vc = m/min.
fz = mm/tooth
RPM = rev./min.
FEED = mm/min
Ap = mm

VDI 3323		Diameter (Ø) 1.5	1.6	1.8	2.0	3.0	4.0	5.0	6.0
1-4	Vc	90~113	90~118	96~122	97~119	99~123	107~138	107~138	107~138
	fz	0.007~0.016	0.007~0.017	0.007~0.018	0.008~0.021	0.012~0.030	0.015~0.035	0.018~0.044	0.022~0.053
	RPM	19950~25200	18900~24680	17850~22580	16280~19950	11030~13650	8930~11550	7140~9240	5990~7670
	FEED	265~820	265~820	265~820	265~820	265~820	265~820	265~820	265~820
	Ap	0.070~0.135	0.075~0.145	0.080~0.160	0.090~0.180	0.135~0.270	0.180~0.360	0.225~0.450	0.270~0.540
5	Vc	64~82	66~83	68~85	69~85	66~85	73~98	72~97	74~98
	fz	0.005~0.011	0.005~0.012	0.005~0.013	0.006~0.014	0.009~0.022	0.011~0.025	0.014~0.031	0.016~0.038
	RPM	14180~18380	13860~17330	12600~15750	11550~14180	7350~9450	6090~8190	4830~6510	4100~5460
	FEED	130~410	130~410	130~410	130~410	130~410	130~410	130~410	130~410
	Ap	0.070~0.135	0.075~0.145	0.080~0.160	0.090~0.180	0.135~0.270	0.180~0.360	0.225~0.450	0.270~0.540
6-7	Vc	90~113	90~118	96~122	97~119	99~123	107~138	107~138	107~138
	fz	0.007~0.016	0.007~0.017	0.007~0.018	0.008~0.021	0.012~0.030	0.015~0.035	0.018~0.044	0.022~0.053
	RPM	19950~25200	18900~24680	17850~22580	16280~19950	11030~13650	8930~11550	7140~9240	5990~7670
	FEED	265~820	265~820	265~820	265~820	265~820	265~820	265~820	265~820
	Ap	0.070~0.135	0.075~0.145	0.080~0.160	0.090~0.180	0.135~0.270	0.180~0.360	0.225~0.450	0.270~0.540
8-9	Vc	64~82	66~83	68~85	69~85	66~85	73~98	72~97	74~98
	fz	0.005~0.011	0.005~0.012	0.005~0.013	0.006~0.014	0.009~0.022	0.011~0.025	0.014~0.031	0.016~0.038
	RPM	14180~18380	13860~17330	12600~15750	11550~14180	7350~9450	6090~8190	4830~6510	4100~5460
	FEED	130~410	130~410	130~410	130~410	130~410	130~410	130~410	130~410
	Ap	0.070~0.135	0.075~0.145	0.080~0.160	0.090~0.180	0.135~0.270	0.180~0.360	0.225~0.450	0.270~0.540
10	Vc	90~113	90~118	96~122	97~119	99~123	107~138	107~138	107~138
	fz	0.007~0.016	0.007~0.017	0.007~0.018	0.008~0.021	0.012~0.030	0.015~0.035	0.018~0.044	0.022~0.053
	RPM	19950~25200	18900~24680	17850~22580	16280~19950	11030~13650	8930~11550	7140~9240	5990~7670
	FEED	265~820	265~820	265~820	265~820	265~820	265~820	265~820	265~820
	Ap	0.070~0.135	0.075~0.145	0.080~0.160	0.090~0.180	0.135~0.270	0.180~0.360	0.225~0.450	0.270~0.540
11.1 - 11.2	Vc	64~82	66~83	68~85	69~85	66~85	73~98	72~97	74~98
	fz	0.005~0.011	0.005~0.012	0.005~0.013	0.006~0.014	0.009~0.022	0.011~0.025	0.014~0.031	0.016~0.038
	RPM	14180~18380	13860~17330	12600~15750	11550~14180	7350~9450	6090~8190	4830~6510	4100~5460
	FEED	130~410	130~410	130~410	130~410	130~410	130~410	130~410	130~410
	Ap	0.070~0.135	0.075~0.145	0.080~0.160	0.090~0.180	0.135~0.270	0.180~0.360	0.225~0.450	0.270~0.540
15 - 20	Vc	90~113	90~118	96~122	97~119	99~123	107~138	107~138	107~138
	fz	0.007~0.016	0.007~0.017	0.007~0.018	0.008~0.021	0.012~0.030	0.015~0.035	0.018~0.044	0.022~0.053
	RPM	19950~25200	18900~24680	17850~22580	16280~19950	11030~13650	8930~11550	7140~9240	5990~7670
	FEED	265~820	265~820	265~820	265~820	265~820	265~820	265~820	265~820
	Ap	0.070~0.135	0.075~0.145	0.080~0.160	0.090~0.180	0.135~0.270	0.180~0.360	0.225~0.450	0.270~0.540
38.1 - 38.2	Vc	41~50	42~52	42~53	43~54	43~54	49~62	49~61	49~62
	fz	0.007~0.012	0.008~0.012	0.008~0.013	0.009~0.015	0.014~0.022	0.016~0.026	0.020~0.032	0.024~0.038
	RPM	9140~11240	8720~10920	7770~9870	7250~9030	4830~5990	4100~5150	3260~4100	2730~3470
	FEED	130~265	130~265	130~265	130~265	130~265	130~265	130~265	130~265
	Ap	0.014~0.028	0.015~0.030	0.016~0.032	0.018~0.035	0.028~0.055	0.035~0.070	0.044~0.088	0.053~0.105
40	Vc	64~82	66~83	68~85	69~85	66~85	73~98	72~97	74~98
	fz	0.005~0.011	0.005~0.012	0.005~0.013	0.006~0.014	0.009~0.022	0.011~0.025	0.014~0.031	0.016~0.038
	RPM	14180~18380	13860~17330	12600~15750	11550~14180	7350~9450	6090~8190	4830~6510	4100~5460
	FEED	130~410	130~410	130~410	130~410	130~410	130~410	130~410	130~410
	Ap	0.070~0.135	0.075~0.145	0.080~0.160	0.090~0.180	0.135~0.270	0.180~0.360	0.225~0.450	0.270~0.540
41	Vc	41~50	42~52	42~53	43~54	43~54	49~62	49~61	49~62
	fz	0.007~0.012	0.008~0.012	0.008~0.013	0.009~0.015	0.014~0.022	0.016~0.026	0.020~0.032	0.024~0.038
	RPM	9140~11240	8720~10920	7770~9870	7250~9030	4830~5990	4100~5150	3260~4100	2730~3470
	FEED	130~265	130~265	130~265	130~265	130~265	130~265	130~265	130~265
	Ap	0.014~0.028	0.015~0.030	0.016~0.032	0.018~0.035	0.028~0.055	0.035~0.070	0.044~0.088	0.053~0.105



X-POWER PRO END MILLS

RECOMMENDED CUTTING CONDITIONS
EMPFOHLENE SCHNEIDPARAMETER

GM902 SERIES — 2 FLUTE BALL NOSE with TAPER NECK

Vc = m/min.
fz = mm/tooth
RPM = rev./min.
FEED = mm/min
Ap = mm

NORMAL SPEED

ISO	VDI 3323	Material Description	Ae	Parameter	Diameter (Ø) 1.0	2.0	3.0	4.0	5.0	6.0	8.0
P	5	Non-alloy steel	0.2D	Vc	35	60	80	90	95	110	120
				fz	0.008	0.014	0.023	0.031	0.040	0.060	0.080
				RPM	11141	9549	8488	7162	6048	5836	4775
				FEED	178	267	390	444	484	700	764
				Ap	0.2	0.2	0.2	0.2	0.2	0.2	0.3
	8-9	Low alloy steel	0.2D	Vc	35	60	80	90	95	110	120
				fz	0.008	0.014	0.023	0.031	0.040	0.060	0.080
				RPM	11141	9549	8488	7162	6048	5836	4775
				FEED	178	267	390	444	484	700	764
				Ap	0.2	0.2	0.2	0.2	0.2	0.2	0.3
	11.1	High alloyed steel, and tool steel	0.2D	Vc	35	60	80	90	95	110	120
				fz	0.008	0.014	0.023	0.031	0.040	0.060	0.080
				RPM	11141	9549	8488	7162	6048	5836	4775
				FEED	178	267	390	444	484	700	764
				Ap	0.2	0.2	0.2	0.2	0.2	0.2	0.3
	11.2		0.1D	Vc	55	75	100	110	125	135	150
				fz	0.012	0.028	0.043	0.052	0.059	0.067	0.075
				RPM	17507	11937	10610	8754	7958	7162	5968
				FEED	420	668	912	910	939	960	895
				Ap	0.05	0.1	0.15	0.2	0.25	0.25	0.25
H	38.1	Hardened steel	0.1D	Vc	55	75	100	110	125	135	150
				fz	0.012	0.028	0.043	0.052	0.059	0.067	0.075
				RPM	17507	11937	10610	8754	7958	7162	5968
				FEED	420	668	912	910	939	960	895
				Ap	0.05	0.1	0.15	0.2	0.25	0.25	0.25
	38.2		0.1D	Vc	55	75	95	110	125	130	140
				fz	0.012	0.026	0.043	0.052	0.059	0.068	0.075
				RPM	17507	11937	10080	8754	7958	6897	5570
				FEED	420	621	867	910	939	938	836
				Ap	0.05	0.1	0.15	0.2	0.25	0.25	0.25
	40	Chilled Cast Iron	0.1D	Vc	55	75	100	110	125	135	150
				fz	0.012	0.028	0.043	0.052	0.059	0.067	0.075
				RPM	17507	11937	10610	8754	7958	7162	5968
				FEED	420	668	912	910	939	960	895
				Ap	0.05	0.1	0.15	0.2	0.25	0.25	0.25
	41	Hardened Cast Iron	0.1D	Vc	55	75	95	110	125	130	140
				fz	0.012	0.026	0.043	0.052	0.059	0.068	0.075
				RPM	17507	11937	10080	8754	7958	6897	5570
				FEED	420	621	867	910	939	938	836
				Ap	0.05	0.1	0.15	0.2	0.25	0.25	0.25

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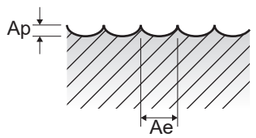


X-POWER PRO END MILLS

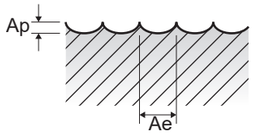
RECOMMENDED CUTTING CONDITIONS
EMPFOHLENE SCHNEIDPARAMETER

GM902 SERIES — 2 FLUTE BALL NOSE with TAPER NECK

Vc = m/min.
fz = mm/tooth
RPM = rev./min.
FEED = mm/min
Ap = mm

HIGH SPEED

ISO	VDI 3323	Material Description	Ae	Parameter	Diameter (Ø) 1.0	2.0	3.0	4.0	5.0	6.0	8.0
P	1-5	Non-alloy steel	0.05D	Vc	65	110	165	220	275	335	355
				fz	0.026	0.036	0.048	0.07	0.086	0.095	0.119
				RPM	20690	17507	17507	17507	17507	17772	14125
				FEED	1076	1261	1681	2451	3011	3377	3362
				Ap	0.2	0.2	0.2	0.2	0.2	0.2	0.3
	6-9	Low alloy steel	0.05D	Vc	65	110	165	220	275	335	355
				fz	0.026	0.036	0.048	0.070	0.086	0.095	0.119
				RPM	20690	17507	17507	17507	17507	17772	14125
				FEED	1076	1261	1681	2451	3011	3377	3362
				Ap	0.2	0.2	0.2	0.2	0.2	0.2	0.3
	10 - 11.2	High alloyed steel, and tool steel	0.05D	Vc	65	110	165	220	275	335	355
				fz	0.026	0.036	0.048	0.07	0.086	0.095	0.119
				RPM	20690	17507	17507	17507	17507	17772	14125
				FEED	1076	1261	1681	2451	3011	3377	3362
				Ap	0.2	0.2	0.2	0.2	0.2	0.2	0.3
K	15-20	Grey cast iron Nodular cast iron Malleable cast iron	0.05D	Vc	65	110	165	220	275	335	355
				fz	0.026	0.036	0.048	0.07	0.086	0.095	0.119
				RPM	20690	17507	17507	17507	17507	17772	14125
				FEED	1076	1261	1681	2451	3011	3377	3362
				Ap	0.2	0.2	0.2	0.2	0.2	0.2	0.3
H	38	Hardened steel	0.05D	Vc	55	75	100	110	125	135	150
				fz	0.019	0.037	0.069	0.080	0.088	0.101	0.112
				RPM	17507	11937	10610	8754	7958	7162	5968
				FEED	665	883	1464	1401	1401	1447	1337
				Ap	0.05	0.10	0.15	0.2	0.25	0.25	0.25
	38.2		0.05D	Vc	55	75	95	110	120	130	140
				fz	0.017	0.043	0.066	0.079	0.087	0.102	0.109
				RPM	17507	11937	10080	8754	7639	6897	5570
				FEED	595	1027	1331	1383	1329	1407	1214
				Ap	0.05	0.10	0.15	0.2	0.25	0.25	0.25
	40	Chilled Cast Iron	0.05D	Vc	65	110	165	220	275	335	355
				fz	0.026	0.036	0.048	0.07	0.086	0.095	0.119
				RPM	20690	17507	17507	17507	17507	17772	14125
				FEED	1076	1261	1681	2451	3011	3377	3362
				Ap	0.2	0.2	0.2	0.2	0.2	0.2	0.3
	41	Hardened Cast Iron	0.05D	Vc	55	75	95	110	120	130	140
				fz	0.017	0.043	0.066	0.079	0.087	0.102	0.109
				RPM	17507	11937	10080	8754	7639	6897	5570
				FEED	595	1027	1331	1383	1329	1407	1214
				Ap	0.05	0.10	0.15	0.2	0.25	0.25	0.25



X-POWER PRO END MILLS

RECOMMENDED CUTTING CONDITIONS
EMPFOHLENE SCHNEIDPARAMETER

GM815 SERIES — **4 FLUTE BALL NOSE**

Vc = m/min.
fz = mm/tooth
RPM = rev./min.
FEED = mm/min
Ap = mm

NORMAL SPEED

ISO	VDI 3323	Material Description	Ae	Parameter	Diameter (Ø) 2.0	3.0	4.0	5.0	6.0	8.0	10.0	12.0	16.0
P	1-4	Non-alloy steel	0.2D	Vc	105	130	140	150	170	190	210	230	250
				fz	0.013	0.019	0.026	0.034	0.045	0.068	0.09	0.111	0.136
				RPM	16711	13793	11141	9549	9019	7560	6685	6101	4974
				FEED	869	1048	1159	1299	1623	2056	2406	2709	2706
				Ap	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3
	5		0.2D	Vc	75	100	110	120	135	150	170	185	200
				fz	0.010	0.017	0.024	0.030	0.045	0.060	0.075	0.089	0.106
				RPM	11937	10610	8754	7639	7162	5968	5411	4907	3979
				FEED	477	722	840	917	1289	1432	1623	1747	1687
				Ap	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3
	6-7	Low alloy steel	0.2D	Vc	105	130	140	150	170	190	210	230	250
				fz	0.013	0.019	0.026	0.034	0.045	0.068	0.09	0.111	0.136
				RPM	16711	13793	11141	9549	9019	7560	6685	6101	4974
				FEED	869	1048	1159	1299	1623	2056	2406	2709	2706
				Ap	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3
	8-9		0.2D	Vc	75	100	110	120	135	150	170	185	200
				fz	0.010	0.017	0.024	0.030	0.045	0.060	0.075	0.089	0.106
				RPM	11937	10610	8754	7639	7162	5968	5411	4907	3979
				FEED	477	722	840	917	1289	1432	1623	1747	1687
				Ap	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3
	10	High alloyed steel, and tool steel	0.2D	Vc	105	130	140	150	170	190	210	230	250
				fz	0.013	0.019	0.026	0.034	0.045	0.068	0.09	0.111	0.136
				RPM	16711	13793	11141	9549	9019	7560	6685	6101	4974
				FEED	869	1048	1159	1299	1623	2056	2406	2709	2706
				Ap	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3
	11.1 - 11.2		0.2D	Vc	75	100	110	120	135	150	170	185	200
				fz	0.010	0.017	0.024	0.030	0.045	0.060	0.075	0.089	0.106
				RPM	11937	10610	8754	7639	7162	5968	5411	4907	3979
				FEED	477	722	840	917	1289	1432	1623	1747	1687
				Ap	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3
K	15-20	Grey cast iron Nodular cast iron Malleable cast iron	0.2D	Vc	105	130	140	150	170	190	210	230	250
				fz	0.013	0.019	0.026	0.034	0.045	0.068	0.09	0.111	0.136
				RPM	16711	13793	11141	9549	9019	7560	6685	6101	4974
				FEED	869	1048	1159	1299	1623	2056	2406	2709	2706
				Ap	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3
H	38.1 - 39.2	Hardened steel	0.1D	Vc	30	45	55	60	65	65	65	70	70
				fz	0.008	0.012	0.016	0.018	0.022	0.033	0.041	0.053	0.069
				RPM	4775	4775	4377	3820	3448	2586	2069	1857	1393
				FEED	153	229	280	275	303	341	339	394	384
				Ap	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3
	40	Chilled Cast Iron	0.2D	Vc	75	100	110	120	135	150	170	185	200
				fz	0.01	0.017	0.024	0.03	0.045	0.06	0.075	0.089	0.106
				RPM	11937	10610	8754	7639	7162	5968	5411	4907	3979
				FEED	477	722	840	917	1289	1432	1623	1747	1687
				Ap	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3
	41	Hardened Cast Iron	0.1D	Vc	30	45	55	60	65	65	65	70	70
				fz	0.008	0.012	0.016	0.018	0.022	0.033	0.041	0.053	0.069
				RPM	4775	4775	4377	3820	3448	2586	2069	1857	1393
				FEED	153	229	280	275	303	341	339	394	384
				Ap	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3

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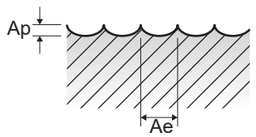


X-POWER PRO END MILLS

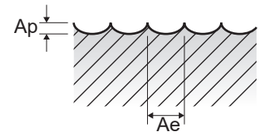
RECOMMENDED CUTTING CONDITIONS
EMPFOHLENE SCHNEIDPARAMETER

GM815 SERIES — 4 FLUTE BALL NOSE

Vc = m/min.
fz = mm/tooth
RPM = rev./min.
FEED = mm/min
Ap = mm

HIGH SPEED

ISO	VDI 3323	Material Description	Ae	Parameter	Diameter (Ø) 2.0	3.0	4.0	5.0	6.0	8.0	10.0	12.0	16.0
P	1-5	Non-alloy steel	0.05D	Vc	140	210	275	345	415	440	460	485	505
				fz	0.026	0.036	0.052	0.064	0.071	0.09	0.105	0.12	0.136
				RPM	22282	22282	21884	21963	22016	17507	14642	12865	10047
				FEED	2317	3209	4552	5623	6253	6303	6150	6175	5465
				Ap	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3
	6-9	Low alloy steel	0.05D	Vc	140	210	275	345	415	440	460	485	505
				fz	0.026	0.036	0.052	0.064	0.071	0.090	0.105	0.120	0.136
				RPM	22282	22282	21884	21963	22016	17507	14642	12865	10047
				FEED	2317	3209	4552	5623	6253	6303	6150	6175	5465
				Ap	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3
	10 - 11.2	High alloyed steel, and tool steel	0.05D	Vc	140	210	275	345	415	440	460	485	505
				fz	0.026	0.036	0.052	0.064	0.071	0.09	0.105	0.12	0.136
				RPM	22282	22282	21884	21963	22016	17507	14642	12865	10047
				FEED	2317	3209	4552	5623	6253	6303	6150	6175	5465
				Ap	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3
K	15-20	Grey cast iron Nodular cast iron Malleable cast iron	0.05D	Vc	140	210	275	345	415	440	460	485	505
				fz	0.026	0.036	0.052	0.064	0.071	0.09	0.105	0.12	0.136
				RPM	22282	22282	21884	21963	22016	17507	14642	12865	10047
				FEED	2317	3209	4552	5623	6253	6303	6150	6175	5465
				Ap	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3
H	38.1 - 39.2	Hardened steel	0.05D	Vc	140	170	180	200	210	220	230	240	250
				fz	0.017	0.023	0.032	0.038	0.045	0.056	0.064	0.071	0.079
				RPM	22282	18038	14324	12732	11141	8754	7321	6366	4974
				FEED	1515	1659	1833	1935	2005	1961	1874	1808	1572
				Ap	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3
	40	Chilled Cast Iron	0.05D	Vc	140	210	275	345	415	440	460	485	505
				fz	0.026	0.036	0.052	0.064	0.071	0.09	0.105	0.12	0.136
				RPM	22282	22282	21884	21963	22016	17507	14642	12865	10047
				FEED	2317	3209	4552	5623	6253	6303	6150	6175	5465
				Ap	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3
	41	Hardened Cast Iron	0.05D	Vc	140	170	180	200	210	220	230	240	250
				fz	0.017	0.023	0.032	0.038	0.045	0.056	0.064	0.071	0.079
				RPM	22282	18038	14324	12732	11141	8754	7321	6366	4974
				FEED	1515	1659	1833	1935	2005	1961	1874	1808	1572
				Ap	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3



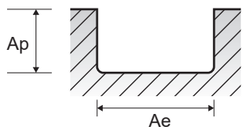
X-POWER PRO END MILLS

RECOMMENDED CUTTING CONDITIONS
EMPFOHLENE SCHNEIDPARAMETER

GM818 SERIES — 2 FLUTE CORNER RADIUS - SLOTTING

Vc = m/min.
fz = mm/tooth
RPM = rev./min.
FEED = mm/min.

ISO	VDI 3323	Material Description	Ae	Ap	Parameter	Diameter (Ø) 4.0	5.0	6.0	8.0	10.0	12.0
P	1-4	Non-alloy steel	1.0D	0.3D	Vc	75	80	80	85	85	85
					fz	0.016	0.023	0.032	0.045	0.053	0.051
					RPM	5968	5093	4244	3382	2706	2255
					FEED	191	234	272	304	287	230
	5		1.0D	0.3D	Vc	45	50	50	55	55	60
					fz	0.013	0.017	0.025	0.033	0.039	0.041
					RPM	3581	3183	2653	2188	1751	1592
					FEED	93	108	133	144	137	131
	6-7	Low alloy steel	1.0D	0.3D	Vc	75	80	80	85	85	85
					fz	0.016	0.023	0.032	0.045	0.053	0.051
					RPM	5968	5093	4244	3382	2706	2255
					FEED	191	234	272	304	287	230
	8-9		1.0D	0.3D	Vc	45	50	50	55	55	60
					fz	0.013	0.017	0.025	0.033	0.039	0.041
					RPM	3581	3183	2653	2188	1751	1592
					FEED	93	108	133	144	137	131
	10	High alloyed steel, and tool steel	1.0D	0.3D	Vc	75	80	80	85	85	85
					fz	0.016	0.023	0.032	0.045	0.053	0.051
					RPM	5968	5093	4244	3382	2706	2255
					FEED	191	234	272	304	287	230
	11.1 - 11.2		1.0D	0.3D	Vc	45	50	50	55	55	60
					fz	0.013	0.017	0.025	0.033	0.039	0.041
					RPM	3581	3183	2653	2188	1751	1592
					FEED	93	108	133	144	137	131
K	15-20	Grey cast iron Nodular cast iron Malleable cast iron	1.0D	0.3D	Vc	75	80	80	85	85	85
					fz	0.016	0.023	0.032	0.045	0.053	0.051
					RPM	5968	5093	4244	3382	2706	2255
					FEED	191	234	272	304	287	230
H	38.1 - 38.2	Hardened steel	1.0D	0.3D	Vc	30	35	35	35	35	35
					fz	0.006	0.008	0.010	0.013	0.016	0.019
					RPM	2387	2228	1857	1393	1114	928
					FEED	29	36	37	36	36	35
	40	Chilled Cast Iron	1.0D	0.3D	Vc	45	50	50	55	55	60
					fz	0.013	0.017	0.025	0.033	0.039	0.041
					RPM	3581	3183	2653	2188	1751	1592
					FEED	93	108	133	144	137	131
	41	Hardened Cast Iron	1.0D	0.3D	Vc	30	35	35	35	35	35
					fz	0.006	0.008	0.01	0.013	0.016	0.019
					RPM	2387	2228	1857	1393	1114	928
					FEED	29	36	37	36	36	35



CARBIDE
HSS
CBN END MILLS
i-Xmill END MILLS
i-SMART MODULAR END MILLS
X1-EH END MILLS
X5070 END MILLS
4G MILL END MILLS
X-POWER PRO END MILLS
TitaNox-POWER END MILLS
JET-POWER END MILLS
V7 PLUS END MILLS
ALU-POWER HPC END MILLS
ALU-POWER END MILLS
D-POWER GRAPHITE END MILLS
CRX S END MILLS
K-2 END MILLS
ONLY ONE COATED PM60 END MILLS
TANK POWER END MILLS
GENERAL HSS END MILLS
MILLING CUTTERS

X-POWER PRO END MILLS

RECOMMENDED CUTTING CONDITIONS
EMPFOHLENE SCHNEIDPARAMETER

GM8A1 SERIES — 2 FLUTE CORNER RADIUS RIB PROCESSING

Vc = m/min.
fz = mm/tooth
RPM = rev./min.
FEED = mm/min
Ap = mm

ISO	VDI 3323	Material Description	Parameter	Diameter (Ø) 1.0	1.2	1.4	1.5	1.6	1.8
P	1-4	Non-alloy steel	Vc	71~88	70~85	70~88	68~87	70~90	74~93
			fz	0.006~0.014	0.008~0.020	0.009~0.023	0.010~0.024	0.010~0.025	0.011~0.027
			RPM	23630~29400	19430~23630	16800~21000	15230~19430	14700~18900	13650~17330
			FEED	295~850	295~945	295~945	295~945	295~945	295~945
			Ap	0.045~0.090	0.055~0.100	0.062~0.125	0.070~0.135	0.075~0.145	0.080~0.160
	5		Vc	49~63	49~62	51~62	49~64	51~64	52~65
			fz	0.006~0.015	0.007~0.018	0.008~0.021	0.009~0.022	0.009~0.023	0.010~0.026
			RPM	16490~21000	13650~17330	12080~14700	11030~14180	10710~13440	9660~12080
			FEED	200~630	200~630	200~630	200~630	200~630	200~630
			Ap	0.045~0.090	0.055~0.100	0.062~0.125	0.070~0.135	0.075~0.145	0.080~0.160
	6-7	Low alloy steel	Vc	71~88	70~85	70~88	68~87	70~90	74~93
			fz	0.006~0.014	0.008~0.020	0.009~0.023	0.010~0.024	0.010~0.025	0.011~0.027
			RPM	23630~29400	19430~23630	16800~21000	15230~19430	14700~18900	13650~17330
			FEED	295~850	295~945	295~945	295~945	295~945	295~945
			Ap	0.045~0.090	0.055~0.100	0.062~0.125	0.070~0.135	0.075~0.145	0.080~0.160
	8-9		Vc	49~63	49~62	51~62	49~64	51~64	52~65
			fz	0.006~0.015	0.007~0.018	0.008~0.021	0.009~0.022	0.009~0.023	0.010~0.026
			RPM	16490~21000	13650~17330	12080~14700	11030~14180	10710~13440	9660~12080
			FEED	200~630	200~630	200~630	200~630	200~630	200~630
			Ap	0.045~0.090	0.055~0.100	0.062~0.125	0.070~0.135	0.075~0.145	0.080~0.160
	10	High alloyed steel, and tool steel	Vc	71~88	70~85	70~88	68~87	70~90	74~93
			fz	0.006~0.014	0.008~0.020	0.009~0.023	0.010~0.024	0.010~0.025	0.011~0.027
			RPM	23630~29400	19430~23630	16800~21000	15230~19430	14700~18900	13650~17330
			FEED	295~850	295~945	295~945	295~945	295~945	295~945
			Ap	0.045~0.090	0.055~0.100	0.062~0.125	0.070~0.135	0.075~0.145	0.080~0.160
	11.1 - 11.2		Vc	49~63	49~62	51~62	49~64	51~64	52~65
			fz	0.006~0.015	0.007~0.018	0.008~0.021	0.009~0.022	0.009~0.023	0.010~0.026
			RPM	16490~21000	13650~17330	12080~14700	11030~14180	10710~13440	9660~12080
			FEED	200~630	200~630	200~630	200~630	200~630	200~630
			Ap	0.045~0.090	0.055~0.100	0.062~0.125	0.070~0.135	0.075~0.145	0.080~0.160
K	15-20	Grey cast iron Nodular cast iron Malleable cast iron	Vc	71~88	70~85	70~88	68~87	70~90	74~93
			fz	0.006~0.014	0.008~0.020	0.009~0.023	0.010~0.024	0.010~0.025	0.011~0.027
			RPM	23630~29400	19430~23630	16800~21000	15230~19430	14700~18900	13650~17330
			FEED	295~850	295~945	295~945	295~945	295~945	295~945
			Ap	0.045~0.090	0.055~0.100	0.062~0.125	0.070~0.135	0.075~0.145	0.080~0.160
H	38.1 - 38.2	Hardened steel	Vc	31~39	31~40	32~40	32~39	32~40	32~41
			fz	0.003~0.005	0.004~0.006	0.005~0.007	0.005~0.008	0.005~0.008	0.006~0.009
			RPM	10500~13130	8720~11030	7560~9450	7040~8610	6720~8400	5990~7560
			FEED	70~135	70~135	70~135	70~135	70~135	70~135
			Ap	0.009~0.018	0.010~0.022	0.012~0.025	0.014~0.028	0.015~0.030	0.016~0.032
	40	Chilled Cast Iron	Vc	49~63	49~62	51~62	49~64	51~64	52~65
			fz	0.006~0.015	0.007~0.018	0.008~0.021	0.009~0.022	0.009~0.023	0.010~0.026
			RPM	16490~21000	13650~17330	12080~14700	11030~14180	10710~13440	9660~12080
			FEED	200~630	200~630	200~630	200~630	200~630	200~630
			Ap	0.045~0.090	0.055~0.100	0.062~0.125	0.070~0.135	0.075~0.145	0.080~0.160
	41	Hardened Cast Iron	Vc	31~39	31~40	32~40	32~39	32~40	32~41
			fz	0.003~0.005	0.004~0.006	0.005~0.007	0.005~0.008	0.005~0.008	0.006~0.009
			RPM	10500~13130	8720~11030	7560~9450	7040~8610	6720~8400	5990~7560
			FEED	70~135	70~135	70~135	70~135	70~135	70~135
			Ap	0.009~0.018	0.010~0.022	0.012~0.025	0.014~0.028	0.015~0.030	0.016~0.032

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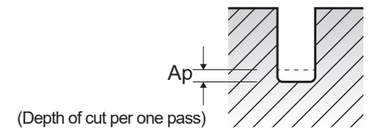


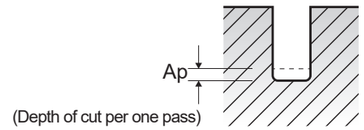
X-POWER PRO END MILLS

RECOMMENDED CUTTING CONDITIONS
EMPFOHLENE SCHNEIDPARAMETER

GM8A1 SERIES — 2 FLUTE CORNER RADIUS RIB PROCESSING

Vc = m/min.
fz = mm/tooth
RPM = rev./min.
FEED = mm/min
Ap = mm

ISO	VDI 3323	Material Description	Parameter	Diameter (Ø) 2.0	2.5	3.0	4.0	5.0	6.0
P	1-4	Non-alloy steel	Vc	75~91	75~94	75~94	75~94	75~94	75~94
			fz	0.012~0.031	0.015~0.038	0.018~0.045	0.023~0.060	0.029~0.075	0.035~0.090
			RPM	12600~15230	9980~12600	8400~10500	6300~7880	5040~6300	4200~5250
			FEED	295~945	295~945	295~945	295~945	295~945	295~945
			Ap	0.090~0.180	0.112~0.235	0.135~0.270	0.180~0.360	0.225~0.450	0.270~0.540
	5		Vc	52~66	53~67	52~66	52~67	52~66	53~66
			fz	0.011~0.029	0.014~0.035	0.017~0.043	0.023~0.057	0.029~0.071	0.034~0.086
			RPM	8720~11030	7040~8930	5780~7350	4310~5570	3470~4410	2940~3680
			FEED	200~630	200~630	200~630	200~630	200~630	200~630
			Ap	0.090~0.180	0.112~0.235	0.135~0.270	0.180~0.360	0.225~0.450	0.270~0.540
	6-7	Low alloy steel	Vc	75~91	75~94	75~94	75~94	75~94	75~94
			fz	0.012~0.031	0.015~0.038	0.018~0.045	0.023~0.060	0.029~0.075	0.035~0.090
			RPM	12600~15230	9980~12600	8400~10500	6300~7880	5040~6300	4200~5250
			FEED	295~945	295~945	295~945	295~945	295~945	295~945
			Ap	0.090~0.180	0.112~0.235	0.135~0.270	0.180~0.360	0.225~0.450	0.270~0.540
	8-9		Vc	52~66	53~67	52~66	52~67	52~66	53~66
			fz	0.011~0.029	0.014~0.035	0.017~0.043	0.023~0.057	0.029~0.071	0.034~0.086
			RPM	8720~11030	7040~8930	5780~7350	4310~5570	3470~4410	2940~3680
			FEED	200~630	200~630	200~630	200~630	200~630	200~630
			Ap	0.090~0.180	0.112~0.235	0.135~0.270	0.180~0.360	0.225~0.450	0.270~0.540
	10	High alloyed steel, and tool steel	Vc	75~91	75~94	75~94	75~94	75~94	75~94
			fz	0.012~0.031	0.015~0.038	0.018~0.045	0.023~0.060	0.029~0.075	0.035~0.090
			RPM	12600~15230	9980~12600	8400~10500	6300~7880	5040~6300	4200~5250
			FEED	295~945	295~945	295~945	295~945	295~945	295~945
			Ap	0.090~0.180	0.112~0.235	0.135~0.270	0.180~0.360	0.225~0.450	0.270~0.540
	11.1 - 11.2		Vc	52~66	53~67	52~66	52~67	52~66	53~66
			fz	0.011~0.029	0.014~0.035	0.017~0.043	0.023~0.057	0.029~0.071	0.034~0.086
			RPM	8720~11030	7040~8930	5780~7350	4310~5570	3470~4410	2940~3680
			FEED	200~630	200~630	200~630	200~630	200~630	200~630
			Ap	0.090~0.180	0.112~0.235	0.135~0.270	0.180~0.360	0.225~0.450	0.270~0.540
K	15-20	Grey cast iron Nodular cast iron Malleable cast iron	Vc	75~91	75~94	75~94	75~94	75~94	75~94
			fz	0.012~0.031	0.015~0.038	0.018~0.045	0.023~0.060	0.029~0.075	0.035~0.090
			RPM	12600~15230	9980~12600	8400~10500	6300~7880	5040~6300	4200~5250
			FEED	295~945	295~945	295~945	295~945	295~945	295~945
			Ap	0.090~0.180	0.112~0.235	0.135~0.270	0.180~0.360	0.225~0.450	0.270~0.540
H	38.1 - 38.2	Hardened steel	Vc	33~41	34~42	33~41	33~41	33~41	33~49
			fz	0.006~0.010	0.008~0.012	0.009~0.015	0.013~0.020	0.015~0.025	0.019~0.025
			RPM	5570~6930	4520~5570	3680~4620	2730~3470	2210~2730	1840~2730
			FEED	70~135	70~135	70~135	70~135	70~135	70~135
			Ap	0.018~0.035	0.022~0.045	0.028~0.055	0.036~0.072	0.045~0.090	0.054~0.108
	40	Chilled Cast Iron	Vc	52~66	53~67	52~66	52~67	52~66	53~66
			fz	0.011~0.029	0.014~0.035	0.017~0.043	0.023~0.057	0.029~0.071	0.034~0.086
			RPM	8720~11030	7040~8930	5780~7350	4310~5570	3470~4410	2940~3680
			FEED	200~630	200~630	200~630	200~630	200~630	200~630
			Ap	0.090~0.180	0.112~0.235	0.135~0.270	0.180~0.360	0.225~0.450	0.270~0.540
	41	Hardened Cast Iron	Vc	33~41	34~42	33~41	33~41	33~41	33~49
			fz	0.006~0.010	0.008~0.012	0.009~0.015	0.013~0.020	0.015~0.025	0.019~0.025
			RPM	5570~6930	4520~5570	3680~4620	2730~3470	2210~2730	1840~2730
			FEED	70~135	70~135	70~135	70~135	70~135	70~135
			Ap	0.018~0.035	0.022~0.045	0.028~0.055	0.036~0.072	0.045~0.090	0.054~0.108



CARBIDE
HSS
CBN END MILLS
i-Xmill END MILLS
i-SMART MODULAR END MILLS
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ALU-POWER END MILLS
D-POWER GRAPHITE END MILLS
CRX S END MILLS
K-2 END MILLS
ONLY ONE COATED PM60 END MILLS
TANK POWER END MILLS
GENERAL HSS END MILLS
MILLING CUTTERS

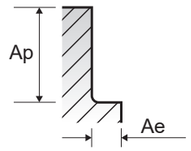
X-POWER PRO END MILLS

RECOMMENDED CUTTING CONDITIONS
EMPFOHLENE SCHNEIDPARAMETER

GM839 SERIES — 4 FLUTE CORNER RADIUS - SIDE CUTTING

Vc = m/min.
fz = mm/tooth
RPM = rev./min.
FEED = mm/min.

ISO	VDI 3323	Material Description	Ae	Ap	Parameter	Diameter (Ø) 2.0	3.0	4.0	6.0	8.0	10.0	12.0
P	1-4	Non-alloy steel	0.05D	1.0D	Vc	95	110	125	140	140	135	135
					fz	0.006	0.009	0.019	0.03	0.042	0.047	0.048
					RPM	15120	11671	9947	7427	5570	4297	3581
					FEED	363	420	756	891	936	808	688
	5		0.05D	1.0D	Vc	65	70	75	85	85	85	85
					fz	0.006	0.009	0.019	0.030	0.038	0.037	0.037
					RPM	10345	7427	5968	4509	3382	2706	2255
					FEED	248	267	454	541	514	400	334
	6-7	Low alloy steel	0.05D	1.0D	Vc	95	110	125	140	140	135	135
					fz	0.006	0.009	0.019	0.03	0.042	0.047	0.048
					RPM	15120	11671	9947	7427	5570	4297	3581
					FEED	363	420	756	891	936	808	688
	8-9		0.05D	1.0D	Vc	65	70	75	85	85	85	85
					fz	0.006	0.009	0.019	0.030	0.038	0.037	0.037
					RPM	10345	7427	5968	4509	3382	2706	2255
					FEED	248	267	454	541	514	400	334
	10	High alloyed steel, and tool steel	0.05D	1.0D	Vc	95	110	125	140	140	135	135
					fz	0.006	0.009	0.019	0.03	0.042	0.047	0.048
					RPM	15120	11671	9947	7427	5570	4297	3581
					FEED	363	420	756	891	936	808	688
	11.1 - 11.2		0.05D	1.0D	Vc	65	70	75	85	85	85	85
					fz	0.006	0.009	0.019	0.030	0.038	0.037	0.037
					RPM	10345	7427	5968	4509	3382	2706	2255
					FEED	248	267	454	541	514	400	334
K	15-20	Grey cast iron Nodular cast iron Malleable cast iron	0.05D	1.0D	Vc	95	110	125	140	140	135	135
					fz	0.006	0.009	0.019	0.03	0.042	0.047	0.048
					RPM	15120	11671	9947	7427	5570	4297	3581
					FEED	363	420	756	891	936	808	688
H	38.1 - 38.2	Hardened steel	0.05D	1.0D	Vc	40	40	50	50	55	55	60
					fz	0.002	0.004	0.005	0.010	0.016	0.017	0.017
					RPM	6366	4244	3979	2653	2188	1751	1592
					FEED	51	68	80	106	140	119	108
	40	Chilled Cast Iron	0.05D	1.0D	Vc	65	70	75	85	85	85	85
					fz	0.006	0.009	0.019	0.030	0.038	0.037	0.037
					RPM	10345	7427	5968	4509	3382	2706	2255
					FEED	248	267	454	541	514	400	334
	41	Hardened Cast Iron	0.05D	1.0D	Vc	40	40	50	50	55	55	60
					fz	0.002	0.004	0.005	0.010	0.016	0.017	0.017
					RPM	6366	4244	3979	2653	2188	1751	1592
					FEED	51	68	80	106	140	119	108



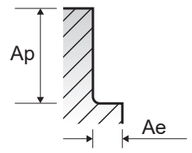
X-POWER PRO END MILLS

RECOMMENDED CUTTING CONDITIONS
EMPFOHLENE SCHNEIDPARAMETER

GM819 SERIES — 4 FLUTE CORNER RADIUS - SIDE CUTTING

Vc = m/min.
fz = mm/tooth
RPM = rev./min.
FEED = mm/min.

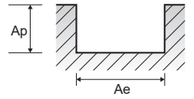
ISO	VDI 3323	Material Description	Ae	Ap	Parameter	Diameter (Ø) 3.0	4.0	5.0	6.0	8.0	10.0	12.0	16.0	20.0
P	1-4	Non-alloy steel	0.05D	2.5D	Vc	70	75	80	80	85	85	85	95	85
					fz	0.006	0.01	0.012	0.014	0.019	0.023	0.022	0.023	0.022
					RPM	7427	5968	5093	4244	3382	2706	2255	1890	1353
					FEED	178	239	244	238	257	249	198	174	119
	5		0.05D	2.5D	Vc	45	45	50	50	55	55	60	60	55
					fz	0.008	0.011	0.016	0.018	0.024	0.028	0.029	0.030	0.028
					RPM	4775	3581	3183	2653	2188	1751	1592	1194	875
					FEED	153	158	204	191	210	196	185	143	98
	6-7	Low alloy steel	0.05D	2.5D	Vc	70	75	80	80	85	85	85	95	85
					fz	0.006	0.01	0.012	0.014	0.019	0.023	0.022	0.023	0.022
					RPM	7427	5968	5093	4244	3382	2706	2255	1890	1353
					FEED	178	239	244	238	257	249	198	174	119
	8-9		0.05D	2.5D	Vc	45	45	50	50	55	55	60	60	55
					fz	0.008	0.011	0.016	0.018	0.024	0.028	0.029	0.030	0.028
					RPM	4775	3581	3183	2653	2188	1751	1592	1194	875
					FEED	153	158	204	191	210	196	185	143	98
	10	High alloyed steel, and tool steel	0.05D	2.5D	Vc	70	75	80	80	85	85	85	95	85
					fz	0.006	0.01	0.012	0.014	0.019	0.023	0.022	0.023	0.022
					RPM	7427	5968	5093	4244	3382	2706	2255	1890	1353
					FEED	178	239	244	238	257	249	198	174	119
	11.1 - 11.2		0.05D	2.5D	Vc	45	45	50	50	55	55	60	60	55
					fz	0.008	0.011	0.016	0.018	0.024	0.028	0.029	0.030	0.028
					RPM	4775	3581	3183	2653	2188	1751	1592	1194	875
					FEED	153	158	204	191	210	196	185	143	98
K	15-20	Grey cast iron Nodular cast iron Malleable cast iron	0.05D	2.5D	Vc	70	75	80	80	85	85	85	95	85
					fz	0.006	0.01	0.012	0.014	0.019	0.023	0.022	0.023	0.022
					RPM	7427	5968	5093	4244	3382	2706	2255	1890	1353
					FEED	178	239	244	238	257	249	198	174	119
H	38.1 - 38.2	Hardened steel	0.02D	2.0D	Vc	25	30	35	35	35	35	35	35	35
					fz	0.006	0.008	0.011	0.013	0.017	0.021	0.020	0.022	0.023
					RPM	2653	2387	2228	1857	1393	1114	928	696	557
					FEED	64	76	98	97	95	94	74	61	51
	40	Chilled Cast Iron	0.05D	2.5D	Vc	45	45	50	50	55	55	60	60	55
					fz	0.008	0.011	0.016	0.018	0.024	0.028	0.029	0.030	0.028
					RPM	4775	3581	3183	2653	2188	1751	1592	1194	875
					FEED	153	158	204	191	210	196	185	143	98
	41	Hardened Cast Iron	0.02D	2.0D	Vc	25	30	35	35	35	35	35	35	35
					fz	0.006	0.008	0.011	0.013	0.017	0.021	0.020	0.022	0.023
					RPM	2653	2387	2228	1857	1393	1114	928	696	557
					FEED	64	76	98	97	95	94	74	61	51



X-POWER PRO END MILLS

RECOMMENDED CUTTING CONDITIONS
EMPFOHLENE SCHNEIDPARAMETER

GM810 SERIES — 2 FLUTE - SLOTTING



Vc = m/min.
fz = mm/tooth
RPM = rev./min.
FEED = mm/min.

ISO	VDI 3323	Material Description	Ae	Ap	Parameter	Diameter (Ø) 0.4	0.8	1.0	1.2	1.5
P	5	Non-alloy steel	1.0D	D<1:0.15D D≥1:0.25D	Vc	40	65	70	65	60
					fz	0.002	0.003	0.004	0.005	0.006
					RPM	31831	25863	22282	17242	12732
					FEED	127	155	178	172	153
	8-9	Low alloy steel	1.0D	D<1:0.15D D≥1:0.25D	Vc	40	65	70	65	60
					fz	0.002	0.003	0.004	0.005	0.006
					RPM	31831	25863	22282	17242	12732
					FEED	127	155	178	172	153
	11.1 - 11.2	High alloyed steel, and tool steel	1.0D	D<1:0.15D D≥1:0.25D	Vc	40	65	70	65	60
					fz	0.002	0.003	0.004	0.005	0.006
					RPM	31831	25863	22282	17242	12732
					FEED	127	155	178	172	153
H	38.1 - 38.2	Hardened steel	1.0D	D<1:0.02D D≥1:0.05D	Vc	30	50	50	50	45
					fz	0.001	0.002	0.003	0.003	0.004
					RPM	23873	19894	15915	13263	9549
					FEED	48	80	95	80	76
	40	Chilled Cast Iron	1.0D	D<1:0.15D D≥1:0.25D	Vc	40	65	70	65	60
					fz	0.002	0.003	0.004	0.005	0.006
					RPM	31831	25863	22282	17242	12732
					FEED	127	155	178	172	153
	41	Hardened Cast Iron	1.0D	D<1:0.02D D≥1:0.05D	Vc	30	50	50	50	45
					fz	0.001	0.002	0.003	0.003	0.004
					RPM	23873	19894	15915	13263	9549
					FEED	48	80	95	80	76

ISO	VDI 3323	Material Description	Ae	Ap	Parameter	Diameter (Ø) 2.0	3.0	4.0	5.0	6.0	8.0	10.0	12.0	16.0	20.0
P	1-4	Non-alloy steel	1.0D	D≤3:0.2D D>3:0.5D	Vc	65	75	85	90	95	95	90	95	100	95
					fz	0.01	0.015	0.025	0.032	0.039	0.057	0.064	0.064	0.062	0.063
					RPM	10345	7958	6764	5730	5040	3780	2865	2520	1989	1512
					FEED	207	239	338	367	393	431	367	323	247	191
	5		1.0D	D≤3:0.2D D>3:0.5D	Vc	45	45	50	55	55	55	55	55	60	60
					fz	0.010	0.016	0.024	0.032	0.041	0.050	0.050	0.048	0.051	0.047
					RPM	7162	4775	3979	3501	2918	2188	1751	1459	1194	955
					FEED	143	153	191	224	239	219	175	140	122	90
	6-7	Low alloy steel	1.0D	D≤3:0.2D D>3:0.5D	Vc	65	75	85	90	95	95	90	95	100	95
					fz	0.01	0.015	0.025	0.032	0.039	0.057	0.064	0.064	0.062	0.063
					RPM	10345	7958	6764	5730	5040	3780	2865	2520	1989	1512
					FEED	207	239	338	367	393	431	367	323	247	191
	8-9		1.0D	D≤3:0.2D D>3:0.5D	Vc	45	45	50	55	55	55	55	55	60	60
					fz	0.010	0.016	0.024	0.032	0.041	0.050	0.050	0.048	0.051	0.047
					RPM	7162	4775	3979	3501	2918	2188	1751	1459	1194	955
					FEED	143	153	191	224	239	219	175	140	122	90
	10	High alloyed steel, and tool steel	1.0D	D≤3:0.2D D>3:0.5D	Vc	65	75	85	90	95	95	90	95	100	95
					fz	0.01	0.015	0.025	0.032	0.039	0.057	0.064	0.064	0.062	0.063
					RPM	10345	7958	6764	5730	5040	3780	2865	2520	1989	1512
					FEED	207	239	338	367	393	431	367	323	247	191
	11.1 - 11.2		1.0D	D≤3:0.2D D>3:0.5D	Vc	45	45	50	55	55	55	55	55	60	60
					fz	0.010	0.016	0.024	0.032	0.041	0.050	0.050	0.048	0.051	0.047
					RPM	7162	4775	3979	3501	2918	2188	1751	1459	1194	955
					FEED	143	153	191	224	239	219	175	140	122	90
M	14.1	Stainless steel	1.0D	D≤3:0.2D D>3:0.5D	Vc	35	40	45	45	50	45	45	45	50	45
					fz	0.009	0.016	0.024	0.032	0.039	0.053	0.06	0.059	0.066	0.06
					RPM	5570	4244	3581	2865	2653	1790	1432	1194	995	716
					FEED	100	136	172	183	207	190	172	141	131	86
K	15-20	Grey cast iron Nodular cast iron Malleable cast iron	1.0D	D≤3:0.2D D>3:0.5D	Vc	65	75	85	90	95	95	90	95	100	95
					fz	0.01	0.015	0.025	0.032	0.039	0.057	0.064	0.064	0.062	0.063
					RPM	10345	7958	6764	5730	5040	3780	2865	2520	1989	1512
					FEED	207	239	338	367	393	431	367	323	247	191
H	38.1 - 38.2	Hardened steel	1.0D	0.05D	Vc	30	30	35	35	35	40	40	40	40	40
					fz	0.004	0.007	0.009	0.013	0.017	0.028	0.027	0.029	0.028	0.028
					RPM	4775	3183	2785	2228	1857	1592	1273	1061	796	637
					FEED	38	45	50	58	63	89	69	62	45	36
	40	Chilled Cast Iron	1.0D	D≤3:0.2D D>3:0.5D	Vc	45	45	50	55	55	55	55	55	60	60
					fz	0.01	0.016	0.024	0.032	0.041	0.05	0.05	0.048	0.051	0.047
					RPM	7162	4775	3979	3501	2918	2188	1751	1459	1194	955
					FEED	143	153	191	224	239	219	175	140	122	90
	41	Hardened Cast Iron	1.0D	0.05D	Vc	30	30	35	35	35	40	40	40	40	40
					fz	0.004	0.007	0.009	0.013	0.017	0.028	0.027	0.029	0.028	0.028
					RPM	4775	3183	2785	2228	1857	1592	1273	1061	796	637
					FEED	38	45	50	58	63	89	69	62	45	36

X-POWER PRO END MILLS

RECOMMENDED CUTTING CONDITIONS
EMPFOHLENE SCHNEIDPARAMETER

GM883 SERIES — 2 FLUTE RIB PROCESSING

Vc = m/min.
fz = mm/tooth
RPM = rev./min.
FEED = mm/min
Ap = mm

ISO	VDI 3323	Material Description	Parameter	Diameter (Ø) 0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.2
P	1-4	Non-alloy steel	Vc	39~50	49~63	58~75	68~88	68~88	71~89	71~88	70~85
			fz	0.003~0.006	0.003~0.006	0.004~0.007	0.004~0.007	0.005~0.009	0.006~0.011	0.006~0.014	0.008~0.020
			RPM	32550~42000	32550~42000	32550~42000	32550~42000	28350~36750	26250~33080	23630~29400	19430~23630
			FEED	210~460	210~460	265~600	265~600	295~660	295~755	295~850	295~945
			Ap	0.007~0.018	0.009~0.022	0.011~0.026	0.012~0.031	0.014~0.035	0.030~0.060	0.045~0.090	0.055~0.100
	5		Vc	28~35	35~44	42~53	49~62	49~62	49~64	49~63	49~62
			fz	0.002~0.006	0.002~0.006	0.002~0.008	0.002~0.008	0.003~0.010	0.005~0.012	0.006~0.015	0.007~0.018
			RPM	23630~29400	23630~29400	23630~29400	23630~29400	20480~25730	18380~23630	16490~21000	13650~17330
			FEED	90~355	90~355	115~450	115~450	125~505	170~565	200~630	200~630
			Ap	0.007~0.018	0.009~0.022	0.011~0.026	0.012~0.031	0.014~0.035	0.030~0.060	0.045~0.090	0.055~0.100
	6-7	Low alloy steel	Vc	39~50	49~63	58~75	68~88	68~88	71~89	71~88	70~85
			fz	0.003~0.006	0.003~0.006	0.004~0.007	0.004~0.007	0.005~0.009	0.006~0.011	0.006~0.014	0.008~0.020
			RPM	32550~42000	32550~42000	32550~42000	32550~42000	28350~36750	26250~33080	23630~29400	19430~23630
			FEED	210~460	210~460	265~600	265~600	295~660	295~755	295~850	295~945
			Ap	0.007~0.018	0.009~0.022	0.011~0.026	0.012~0.031	0.014~0.035	0.030~0.060	0.045~0.090	0.055~0.100
	8-9		Vc	28~35	35~44	42~53	49~62	49~62	49~64	49~63	49~62
			fz	0.002~0.006	0.002~0.006	0.002~0.008	0.002~0.008	0.003~0.010	0.005~0.012	0.006~0.015	0.007~0.018
			RPM	23630~29400	23630~29400	23630~29400	23630~29400	20480~25730	18380~23630	16490~21000	13650~17330
			FEED	90~355	90~355	115~450	115~450	125~505	170~565	200~630	200~630
			Ap	0.007~0.018	0.009~0.022	0.011~0.026	0.012~0.031	0.014~0.035	0.030~0.060	0.045~0.090	0.055~0.100
	10	High alloyed steel, and tool steel	Vc	39~50	49~63	58~75	68~88	68~88	71~89	71~88	70~85
			fz	0.003~0.006	0.003~0.006	0.004~0.007	0.004~0.007	0.005~0.009	0.006~0.011	0.006~0.014	0.008~0.020
			RPM	32550~42000	32550~42000	32550~42000	32550~42000	28350~36750	26250~33080	23630~29400	19430~23630
			FEED	210~460	210~460	265~600	265~600	295~660	295~755	295~850	295~945
			Ap	0.007~0.018	0.009~0.022	0.011~0.026	0.012~0.031	0.014~0.035	0.030~0.060	0.045~0.090	0.055~0.100
	11.1 - 11.2		Vc	28~35	35~44	42~53	49~62	49~62	49~64	49~63	49~62
			fz	0.002~0.006	0.002~0.006	0.002~0.008	0.002~0.008	0.003~0.010	0.005~0.012	0.006~0.015	0.007~0.018
			RPM	23630~29400	23630~29400	23630~29400	23630~29400	20480~25730	18380~23630	16490~21000	13650~17330
			FEED	90~355	90~355	115~450	115~450	125~505	170~565	200~630	200~630
			Ap	0.007~0.018	0.009~0.022	0.011~0.026	0.012~0.031	0.014~0.035	0.030~0.060	0.045~0.090	0.055~0.100
K	15-20	Grey cast iron Nodular cast iron Malleable cast iron	Vc	39~50	49~63	58~75	68~88	68~88	71~89	71~88	70~85
			fz	0.003~0.006	0.003~0.006	0.004~0.007	0.004~0.007	0.005~0.009	0.006~0.011	0.006~0.014	0.008~0.020
			RPM	32550~42000	32550~42000	32550~42000	32550~42000	28350~36750	26250~33080	23630~29400	19430~23630
			FEED	210~460	210~460	265~600	265~600	295~660	295~755	295~850	295~945
			Ap	0.007~0.018	0.009~0.022	0.011~0.026	0.012~0.031	0.014~0.035	0.030~0.060	0.045~0.090	0.055~0.100
H	38.1 - 38.2	Hardened steel	Vc	18~21	22~27	27~32	31~37	31~37	31~35	31~39	31~40
			fz	0.001~0.003	0.001~0.003	0.001~0.003	0.001~0.003	0.002~0.004	0.003~0.005	0.003~0.005	0.004~0.006
			RPM	15020~17850	15020~17850	15020~17850	15020~17850	13130~15540	11550~13130	10500~13130	8720~11030
			FEED	30~95	30~95	40~115	40~115	45~130	60~135	70~135	70~135
			Ap	0.004~0.008	0.004~0.009	0.005~0.011	0.006~0.013	0.007~0.015	0.008~0.016	0.009~0.018	0.010~0.022
	40	Chilled Cast Iron	Vc	28~35	35~44	42~53	49~62	49~62	49~64	49~63	49~62
			fz	0.002~0.006	0.002~0.006	0.002~0.008	0.002~0.008	0.003~0.010	0.005~0.012	0.006~0.015	0.007~0.018
			RPM	23630~29400	23630~29400	23630~29400	23630~29400	20480~25730	18380~23630	16490~21000	13650~17330
			FEED	90~355	90~355	115~450	115~450	125~505	170~565	200~630	200~630
			Ap	0.007~0.018	0.009~0.022	0.011~0.026	0.012~0.031	0.014~0.035	0.030~0.060	0.045~0.090	0.055~0.100
	41	Hardened Cast Iron	Vc	18~21	22~27	27~32	31~37	31~37	31~35	31~39	31~40
			fz	0.001~0.003	0.001~0.003	0.001~0.003	0.001~0.003	0.002~0.004	0.003~0.005	0.003~0.005	0.004~0.006
			RPM	15020~17850	15020~17850	15020~17850	15020~17850	13130~15540	11550~13130	10500~13130	8720~11030
			FEED	30~95	30~95	40~115	40~115	45~130	60~135	70~135	70~135
			Ap	0.004~0.008	0.004~0.009	0.005~0.011	0.006~0.013	0.007~0.015	0.008~0.016	0.009~0.018	0.010~0.022

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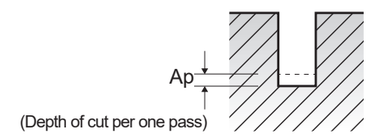
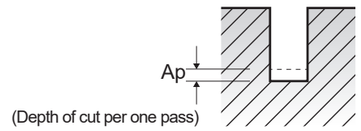


X-POWER PRO END MILLS
RECOMMENDED CUTTING CONDITIONS
EMPFOHLENE SCHNEIDPARAMETER
GM883 SERIES — 2 FLUTE RIB PROCESSING
Vc = m/min.
fz = mm/tooth
RPM = rev./min.
FEED = mm/min
Ap = mm

VDI 3323	Parameter	1.4	1.5	1.6	1.8	2.0	2.5	3.0	4.0	5.0	6.0
1-4	Vc	70~88	68~87	70~90	74~93	75~91	75~94	75~94	75~94	75~94	75~94
	fz	0.009~0.023	0.010~0.024	0.010~0.025	0.011~0.027	0.012~0.031	0.015~0.038	0.018~0.045	0.023~0.060	0.029~0.075	0.035~0.090
	RPM	16800~21000	15230~19430	14700~18900	13650~17330	12600~15230	9980~12600	8400~10500	6300~7880	5040~6300	4200~5250
	FEED	295~945	295~945	295~945	295~945	295~945	295~945	295~945	295~945	295~945	295~945
	Ap	0.062~0.125	0.070~0.135	0.075~0.145	0.080~0.160	0.090~0.180	0.112~0.235	0.135~0.270	0.180~0.360	0.225~0.450	0.270~0.540
5	Vc	51~62	49~64	51~64	52~65	52~66	53~67	52~66	52~67	52~66	53~66
	fz	0.008~0.021	0.009~0.022	0.009~0.023	0.010~0.026	0.011~0.029	0.014~0.035	0.017~0.043	0.023~0.057	0.029~0.071	0.034~0.086
	RPM	12080~14700	11030~14180	10710~13440	9660~12080	8720~11030	7040~8930	5780~7350	4310~5570	3470~4410	2940~3680
	FEED	200~630	200~630	200~630	200~630	200~630	200~630	200~630	200~630	200~630	200~630
	Ap	0.062~0.125	0.070~0.135	0.075~0.145	0.080~0.160	0.090~0.180	0.112~0.235	0.135~0.270	0.180~0.360	0.225~0.450	0.270~0.540
6-7	Vc	70~88	68~87	70~90	74~93	75~91	75~94	75~94	75~94	75~94	75~94
	fz	0.009~0.023	0.010~0.024	0.010~0.025	0.011~0.027	0.012~0.031	0.015~0.038	0.018~0.045	0.023~0.060	0.029~0.075	0.035~0.090
	RPM	16800~21000	15230~19430	14700~18900	13650~17330	12600~15230	9980~12600	8400~10500	6300~7880	5040~6300	4200~5250
	FEED	295~945	295~945	295~945	295~945	295~945	295~945	295~945	295~945	295~945	295~945
	Ap	0.062~0.125	0.070~0.135	0.075~0.145	0.080~0.160	0.090~0.180	0.112~0.235	0.135~0.270	0.180~0.360	0.225~0.450	0.270~0.540
8-9	Vc	51~62	49~64	51~64	52~65	52~66	53~67	52~66	52~67	52~66	53~66
	fz	0.008~0.021	0.009~0.022	0.009~0.023	0.010~0.026	0.011~0.029	0.014~0.035	0.017~0.043	0.023~0.057	0.029~0.071	0.034~0.086
	RPM	12080~14700	11030~14180	10710~13440	9660~12080	8720~11030	7040~8930	5780~7350	4310~5570	3470~4410	2940~3680
	FEED	200~630	200~630	200~630	200~630	200~630	200~630	200~630	200~630	200~630	200~630
	Ap	0.062~0.125	0.070~0.135	0.075~0.145	0.080~0.160	0.090~0.180	0.112~0.235	0.135~0.270	0.180~0.360	0.225~0.450	0.270~0.540
10	Vc	70~88	68~87	70~90	74~93	75~91	75~94	75~94	75~94	75~94	75~94
	fz	0.009~0.023	0.010~0.024	0.010~0.025	0.011~0.027	0.012~0.031	0.015~0.038	0.018~0.045	0.023~0.060	0.029~0.075	0.035~0.090
	RPM	16800~21000	15230~19430	14700~18900	13650~17330	12600~15230	9980~12600	8400~10500	6300~7880	5040~6300	4200~5250
	FEED	295~945	295~945	295~945	295~945	295~945	295~945	295~945	295~945	295~945	295~945
	Ap	0.062~0.125	0.070~0.135	0.075~0.145	0.080~0.160	0.090~0.180	0.112~0.235	0.135~0.270	0.180~0.360	0.225~0.450	0.270~0.540
11.1 - 11.2	Vc	51~62	49~64	51~64	52~65	52~66	53~67	52~66	52~67	52~66	53~66
	fz	0.008~0.021	0.009~0.022	0.009~0.023	0.010~0.026	0.011~0.029	0.014~0.035	0.017~0.043	0.023~0.057	0.029~0.071	0.034~0.086
	RPM	12080~14700	11030~14180	10710~13440	9660~12080	8720~11030	7040~8930	5780~7350	4310~5570	3470~4410	2940~3680
	FEED	200~630	200~630	200~630	200~630	200~630	200~630	200~630	200~630	200~630	200~630
	Ap	0.062~0.125	0.070~0.135	0.075~0.145	0.080~0.160	0.090~0.180	0.112~0.235	0.135~0.270	0.180~0.360	0.225~0.450	0.270~0.540
15 - 20	Vc	70~88	68~87	70~90	74~93	75~91	75~94	75~94	75~94	75~94	75~94
	fz	0.009~0.023	0.010~0.024	0.010~0.025	0.011~0.027	0.012~0.031	0.015~0.038	0.018~0.045	0.023~0.060	0.029~0.075	0.035~0.090
	RPM	16800~21000	15230~19430	14700~18900	13650~17330	12600~15230	9980~12600	8400~10500	6300~7880	5040~6300	4200~5250
	FEED	295~945	295~945	295~945	295~945	295~945	295~945	295~945	295~945	295~945	295~945
	Ap	0.062~0.125	0.070~0.135	0.075~0.145	0.080~0.160	0.090~0.180	0.112~0.235	0.135~0.270	0.180~0.360	0.225~0.450	0.270~0.540
38.1 - 38.2	Vc	32~40	32~39	32~40	32~41	33~41	34~42	33~41	33~41	33~41	33~49
	fz	0.005~0.007	0.005~0.008	0.005~0.008	0.006~0.009	0.006~0.010	0.008~0.012	0.009~0.015	0.013~0.020	0.015~0.025	0.019~0.025
	RPM	7560~9450	7040~8610	6720~8400	5990~7560	5570~6930	4520~5570	3680~4620	2730~3470	2210~2730	1840~2730
	FEED	70~135	70~135	70~135	70~135	70~135	70~135	70~135	70~135	70~135	70~135
	Ap	0.012~0.025	0.014~0.028	0.015~0.030	0.016~0.032	0.018~0.035	0.022~0.045	0.028~0.055	0.036~0.072	0.045~0.090	0.054~0.108
40	Vc	51~62	49~64	51~64	52~65	52~66	53~67	52~66	52~67	52~66	53~66
	fz	0.008~0.021	0.009~0.022	0.009~0.023	0.010~0.026	0.011~0.029	0.014~0.035	0.017~0.043	0.023~0.057	0.029~0.071	0.034~0.086
	RPM	12080~14700	11030~14180	10710~13440	9660~12080	8720~11030	7040~8930	5780~7350	4310~5570	3470~4410	2940~3680
	FEED	200~630	200~630	200~630	200~630	200~630	200~630	200~630	200~630	200~630	200~630
	Ap	0.062~0.125	0.070~0.135	0.075~0.145	0.080~0.160	0.090~0.180	0.112~0.235	0.135~0.270	0.180~0.360	0.225~0.450	0.270~0.540
41	Vc	32~40	32~39	32~40	32~41	33~41	34~42	33~41	33~41	33~41	33~49
	fz	0.005~0.007	0.005~0.008	0.005~0.008	0.006~0.009	0.006~0.010	0.008~0.012	0.009~0.015	0.013~0.020	0.015~0.025	0.019~0.025
	RPM	7560~9450	7040~8610	6720~8400	5990~7560	5570~6930	4520~5570	3680~4620	2730~3470	2210~2730	1840~2730
	FEED	70~135	70~135	70~135	70~135	70~135	70~135	70~135	70~135	70~135	70~135
	Ap	0.012~0.025	0.014~0.028	0.015~0.030	0.016~0.032	0.018~0.035	0.022~0.045	0.028~0.055	0.036~0.072	0.045~0.090	0.054~0.108



X-POWER PRO END MILLS

RECOMMENDED CUTTING CONDITIONS
EMPFOHLENE SCHNEIDPARAMETER

GM895 SERIES — 3 FLUTE - SLOTTING

Vc = m/min.
fz = mm/tooth
RPM = rev./min.
FEED = mm/min.

ISO	VDI 3323	Material Description	Ae	Ap	Parameter	Diameter (Ø) 2.0	3.0	4.0	5.0	6.0	8.0	10.0	12.0	16.0
P	1-4	Non-alloy steel	1.0D	D≤3:0.2D D>3:0.5D	Vc	80	90	105	110	115	115	115	115	120
					fz	0.005	0.007	0.012	0.015	0.019	0.027	0.031	0.03	0.03
					RPM	12732	9549	8356	7003	6101	4576	3661	3050	2387
					FEED	191	201	301	315	348	371	340	275	215
	5		1.0D	D≤3:0.2D D>3:0.5D	Vc	50	60	65	65	70	70	70	70	75
					fz	0.005	0.008	0.011	0.015	0.020	0.024	0.023	0.023	0.024
					RPM	7958	6366	5173	4138	3714	2785	2228	1857	1492
					FEED	119	153	171	186	223	201	154	128	107
	6-7	Low alloy steel	1.0D	D≤3:0.2D D>3:0.5D	Vc	80	90	105	110	115	115	115	115	120
					fz	0.005	0.007	0.012	0.015	0.019	0.027	0.031	0.03	0.03
					RPM	12732	9549	8356	7003	6101	4576	3661	3050	2387
					FEED	191	201	301	315	348	371	340	275	215
	8-9		1.0D	D≤3:0.2D D>3:0.5D	Vc	50	60	65	65	70	70	70	70	75
					fz	0.005	0.008	0.011	0.015	0.020	0.024	0.023	0.023	0.024
					RPM	7958	6366	5173	4138	3714	2785	2228	1857	1492
					FEED	119	153	171	186	223	201	154	128	107
	10	High alloyed steel, and tool steel	1.0D	D≤3:0.2D D>3:0.5D	Vc	80	90	105	110	115	115	115	115	120
					fz	0.005	0.007	0.012	0.015	0.019	0.027	0.031	0.03	0.03
					RPM	12732	9549	8356	7003	6101	4576	3661	3050	2387
					FEED	191	201	301	315	348	371	340	275	215
	11.1 - 11.2		1.0D	D≤3:0.2D D>3:0.5D	Vc	50	60	65	65	70	70	70	70	75
					fz	0.005	0.008	0.011	0.015	0.020	0.024	0.023	0.023	0.024
					RPM	7958	6366	5173	4138	3714	2785	2228	1857	1492
					FEED	119	153	171	186	223	201	154	128	107
M	14.1	Stainless steel	1.0D	D≤3:0.2D D>3:0.5D	Vc	45	50	55	55	60	60	60	55	60
					fz	0.004	0.008	0.011	0.015	0.019	0.025	0.029	0.029	0.031
					RPM	7162	5305	4377	3501	3183	2387	1910	1459	1194
					FEED	86	127	144	158	181	179	166	127	111
K	15-20	Grey cast iron Nodular cast iron Malleable cast iron	1.0D	D≤3:0.2D D>3:0.5D	Vc	80	90	105	110	115	115	115	115	120
					fz	0.005	0.007	0.012	0.015	0.019	0.027	0.031	0.03	0.03
					RPM	12732	9549	8356	7003	6101	4576	3661	3050	2387
					FEED	191	201	301	315	348	371	340	275	215
H	38.1 - 38.2	Hardened steel	1.0D	0.05D	Vc	35	35	40	40	40	45	45	50	50
					fz	0.002	0.004	0.004	0.007	0.008	0.013	0.013	0.014	0.013
					RPM	5570	3714	3183	2546	2122	1790	1432	1326	995
					FEED	33	45	38	53	51	70	56	56	39
	40	Chilled Cast Iron	1.0D	D≤3:0.2D D>3:0.5D	Vc	50	60	65	65	70	70	70	70	75
					fz	0.005	0.008	0.011	0.015	0.020	0.024	0.023	0.023	0.024
					RPM	7958	6366	5173	4138	3714	2785	2228	1857	1492
					FEED	119	153	171	186	223	201	154	128	107
	41	Hardened Cast Iron	1.0D	0.05D	Vc	35	35	40	40	40	45	45	50	50
					fz	0.002	0.004	0.004	0.007	0.008	0.013	0.013	0.014	0.013
					RPM	5570	3714	3183	2546	2122	1790	1432	1326	995
					FEED	33	45	38	53	51	70	56	56	39

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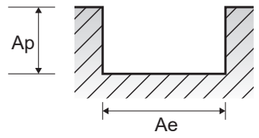


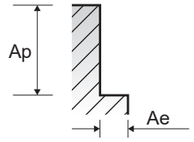
X-POWER PRO END MILLS

RECOMMENDED CUTTING CONDITIONS
EMPFOHLENE SCHNEIDPARAMETER

GM895 SERIES — 3 FLUTE - SIDE CUTTING

Vc = m/min.
fz = mm/tooth
RPM = rev./min.
FEED = mm/min.

ISO	VDI 3323	Material Description	Ae	Ap	Parameter	Diameter (Ø) 2.0	3.0	4.0	5.0	6.0	8.0	10.0	12.0	16.0
P	1-4	Non-alloy steel	0.05D	1.0D	Vc	80	90	105	110	115	115	115	115	120
					fz	0.006	0.009	0.019	0.024	0.03	0.042	0.047	0.048	0.047
					RPM	12732	9549	8356	7003	6101	4576	3661	3050	2387
					FEED	229	258	476	504	549	577	516	439	337
	5		0.05D	1.0D	Vc	50	60	65	65	70	70	70	70	75
					fz	0.006	0.009	0.019	0.024	0.031	0.039	0.039	0.038	0.037
					RPM	7958	6366	5173	4138	3714	2785	2228	1857	1492
					FEED	143	172	295	298	345	326	261	212	166
	6-7	Low alloy steel	0.05D	1.0D	Vc	80	90	105	110	115	115	115	115	120
					fz	0.006	0.009	0.019	0.024	0.03	0.042	0.047	0.048	0.047
					RPM	12732	9549	8356	7003	6101	4576	3661	3050	2387
					FEED	229	258	476	504	549	577	516	439	337
	8-9		0.05D	1.0D	Vc	50	60	65	65	70	70	70	70	75
					fz	0.006	0.009	0.019	0.024	0.031	0.039	0.039	0.038	0.037
					RPM	7958	6366	5173	4138	3714	2785	2228	1857	1492
					FEED	143	172	295	298	345	326	261	212	166
	10	High alloyed steel, and tool steel	0.05D	1.0D	Vc	80	90	105	110	115	115	115	115	120
					fz	0.006	0.009	0.019	0.024	0.03	0.042	0.047	0.048	0.047
					RPM	12732	9549	8356	7003	6101	4576	3661	3050	2387
					FEED	229	258	476	504	549	577	516	439	337
	11.1 - 11.2		0.05D	1.0D	Vc	50	60	65	65	70	70	70	70	75
					fz	0.006	0.009	0.019	0.024	0.031	0.039	0.039	0.038	0.037
					RPM	7958	6366	5173	4138	3714	2785	2228	1857	1492
					FEED	143	172	295	298	345	326	261	212	166
M	14.1	Stainless steel	0.05D	1.0D	Vc	45	50	55	55	60	60	60	55	60
					fz	0.006	0.009	0.018	0.024	0.029	0.042	0.046	0.044	0.047
					RPM	7162	5305	4377	3501	3183	2387	1910	1459	1194
					FEED	129	143	236	252	277	301	264	193	168
K	15-20	Grey cast iron Nodular cast iron Malleable cast iron	0.05D	1.0D	Vc	80	90	105	110	115	115	115	115	120
					fz	0.006	0.009	0.019	0.024	0.03	0.042	0.047	0.048	0.047
					RPM	12732	9549	8356	7003	6101	4576	3661	3050	2387
					FEED	229	258	476	504	549	577	516	439	337
H	38.1 - 38.2	Hardened steel	0.05D	1.0D	Vc	35	35	40	40	40	45	45	50	50
					fz	0.002	0.004	0.005	0.008	0.010	0.016	0.017	0.017	0.017
					RPM	5570	3714	3183	2546	2122	1790	1432	1326	995
					FEED	33	45	48	61	64	86	73	68	51
	40	Chilled Cast Iron	0.05D	1.0D	Vc	50	60	65	65	70	70	70	70	75
					fz	0.006	0.009	0.019	0.024	0.031	0.039	0.039	0.038	0.037
					RPM	7958	6366	5173	4138	3714	2785	2228	1857	1492
					FEED	143	172	295	298	345	326	261	212	166
	41	Hardened Cast Iron	0.05D	1.0D	Vc	35	35	40	40	40	45	45	50	50
					fz	0.002	0.004	0.005	0.008	0.010	0.016	0.017	0.017	0.017
					RPM	5570	3714	3183	2546	2122	1790	1432	1326	995
					FEED	33	45	48	61	64	86	73	68	51



CARBIDE
HSS
CBN END MILLS
i-Xmill END MILLS
i-SMART MODULAR END MILLS
X1-EH END MILLS
X5070 END MILLS
4G MILL END MILLS
X-POWER PRO END MILLS
TitaNox-POWER END MILLS
JET-POWER END MILLS
V7 PLUS END MILLS
ALU-POWER HPC END MILLS
D-POWER GRAPHITE END MILLS
CRX S END MILLS
K-2 END MILLS
ONLY ONE COATED PM60 END MILLS
TANK POWER END MILLS
GENERAL HSS END MILLS
MILLING CUTTERS

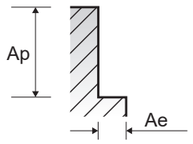
X-POWER PRO END MILLS

RECOMMENDED CUTTING CONDITIONS
EMPFOHLENE SCHNEIDPARAMETER

GM811 SERIES — 4 FLUTE - SIDE CUTTING

Vc = m/min.
fz = mm/tooth
RPM = rev./min.
FEED = mm/min.

ISO	VDI 3323	Material Description	Ae	Ap	Parameter	Diameter (Ø) 2.0	3.0	4.0	5.0	6.0	8.0	10.0	12.0	16.0	20.0	25.0
P	1-4	Non-alloy steel	0.05D	1.0D	Vc	80	95	105	110	115	120	115	115	125	120	120
					fz	0.006	0.009	0.019	0.024	0.03	0.042	0.047	0.047	0.047	0.048	0.046
					RPM	12732	10080	8356	7003	6101	4775	3661	3050	2487	1910	1528
					FEED	306	363	635	672	732	802	688	573	468	367	281
	5		0.05D	1.0D	Vc	55	60	65	65	70	70	70	70	75	75	75
					fz	0.006	0.009	0.019	0.024	0.031	0.038	0.037	0.037	0.037	0.038	0.039
					RPM	8754	6366	5173	4138	3714	2785	2228	1857	1492	1194	955
					FEED	210	229	393	397	460	423	330	275	221	181	149
	6-7	Low alloy steel	0.05D	1.0D	Vc	80	95	105	110	115	120	115	115	125	120	120
					fz	0.006	0.009	0.019	0.024	0.03	0.042	0.047	0.047	0.047	0.048	0.046
					RPM	12732	10080	8356	7003	6101	4775	3661	3050	2487	1910	1528
					FEED	306	363	635	672	732	802	688	573	468	367	281
	8-9		0.05D	1.0D	Vc	55	60	65	65	70	70	70	70	75	75	75
					fz	0.006	0.009	0.019	0.024	0.031	0.038	0.037	0.037	0.037	0.038	0.039
					RPM	8754	6366	5173	4138	3714	2785	2228	1857	1492	1194	955
					FEED	210	229	393	397	460	423	330	275	221	181	149
	10	High alloyed steel, and tool steel	0.05D	1.0D	Vc	80	95	105	110	115	120	115	115	125	120	120
					fz	0.006	0.009	0.019	0.024	0.03	0.042	0.047	0.047	0.047	0.048	0.046
					RPM	12732	10080	8356	7003	6101	4775	3661	3050	2487	1910	1528
					FEED	306	363	635	672	732	802	688	573	468	367	281
	11.1 - 11.2		0.05D	1.0D	Vc	55	60	65	65	70	70	70	70	75	75	75
					fz	0.006	0.009	0.019	0.024	0.031	0.038	0.037	0.037	0.037	0.038	0.039
					RPM	8754	6366	5173	4138	3714	2785	2228	1857	1492	1194	955
					FEED	210	229	393	397	460	423	330	275	221	181	149
M	14.1	Stainless steel	0.05D	1.0D	Vc	45	50	55	55	60	60	60	55	60	60	60
					fz	0.005	0.009	0.018	0.024	0.029	0.041	0.045	0.044	0.046	0.045	0.044
					RPM	7162	5305	4377	3501	3183	2387	1910	1459	1194	955	764
					FEED	143	191	315	336	369	392	344	257	220	172	134
K	15-20	Grey cast iron Nodular cast iron Malleable cast iron	0.05D	1.0D	Vc	80	95	105	110	115	120	115	115	125	120	120
					fz	0.006	0.009	0.019	0.024	0.03	0.042	0.047	0.047	0.047	0.048	0.046
					RPM	12732	10080	8356	7003	6101	4775	3661	3050	2487	1910	1528
					FEED	306	363	635	672	732	802	688	573	468	367	281
H	38.1 - 38.2	Hardened steel	0.05D	1.0D	Vc	35	35	40	40	40	45	50	50	50	50	45
					fz	0.002	0.004	0.005	0.008	0.010	0.017	0.016	0.017	0.016	0.015	0.015
					RPM	5570	3714	3183	2546	2122	1790	1592	1326	995	796	573
					FEED	45	59	64	81	85	122	102	90	64	48	34
	40	Chilled Cast Iron	0.05D	1.0D	Vc	55	60	65	65	70	70	70	70	75	75	75
					fz	0.006	0.009	0.019	0.024	0.031	0.038	0.037	0.037	0.037	0.038	0.039
					RPM	8754	6366	5173	4138	3714	2785	2228	1857	1492	1194	955
					FEED	210	229	393	397	460	423	330	275	221	181	149
	41	Hardened Cast Iron	0.05D	1.0D	Vc	35	35	40	40	40	45	50	50	50	50	45
					fz	0.002	0.004	0.005	0.008	0.010	0.017	0.016	0.017	0.016	0.015	0.015
					RPM	5570	3714	3183	2546	2122	1790	1592	1326	995	796	573
					FEED	45	59	64	81	85	122	102	90	64	48	34

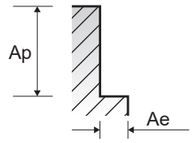


X-POWER PRO END MILLS
RECOMMENDED CUTTING CONDITIONS
EMPFOHLENE SCHNEIDPARAMETER

GM817 SERIES — 4 FLUTE - SIDE CUTTING

Vc = m/min.
fz = mm/tooth
RPM = rev./min.
FEED = mm/min.

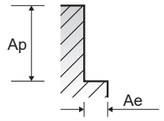
ISO	VDI 3323	Material Description	Ae	Ap	Parameter	Diameter (Ø) 2.0	3.0	4.0	5.0	6.0	8.0	10.0	12.0	16.0	20.0
P	1-4	Non-alloy steel	0.05D	2.5D	Vc	60	65	70	75	80	80	85	80	90	85
					fz	0.006	0.009	0.014	0.021	0.029	0.041	0.049	0.047	0.05	0.049
					RPM	9549	6897	5570	4775	4244	3183	2706	2122	1790	1353
					FEED	229	248	312	401	492	522	530	399	358	265
	5		0.05D	2.5D	Vc	35	40	40	45	45	45	50	50	50	50
					fz	0.004	0.007	0.010	0.014	0.021	0.028	0.033	0.035	0.035	0.033
					RPM	5570	4244	3183	2865	2387	1790	1592	1326	995	796
					FEED	89	119	127	160	201	201	210	186	139	105
	6-7	Low alloy steel	0.05D	2.5D	Vc	60	65	70	75	80	80	85	80	90	85
					fz	0.006	0.009	0.014	0.021	0.029	0.041	0.049	0.047	0.05	0.049
					RPM	9549	6897	5570	4775	4244	3183	2706	2122	1790	1353
					FEED	229	248	312	401	492	522	530	399	358	265
	8-9		0.05D	2.5D	Vc	35	40	40	45	45	45	50	50	50	50
					fz	0.004	0.007	0.010	0.014	0.021	0.028	0.033	0.035	0.035	0.033
					RPM	5570	4244	3183	2865	2387	1790	1592	1326	995	796
					FEED	89	119	127	160	201	201	210	186	139	105
	10	High alloyed steel, and tool steel	0.05D	2.5D	Vc	60	65	70	75	80	80	85	80	90	85
					fz	0.006	0.009	0.014	0.021	0.029	0.041	0.049	0.047	0.05	0.049
					RPM	9549	6897	5570	4775	4244	3183	2706	2122	1790	1353
					FEED	229	248	312	401	492	522	530	399	358	265
	11.1 - 11.2		0.05D	2.5D	Vc	35	40	40	45	45	45	50	50	50	50
					fz	0.004	0.007	0.010	0.014	0.021	0.028	0.033	0.035	0.035	0.033
					RPM	5570	4244	3183	2865	2387	1790	1592	1326	995	796
					FEED	89	119	127	160	201	201	210	186	139	105
K	15-20	Grey cast iron Nodular cast iron Malleable cast iron	0.05D	2.5D	Vc	60	65	70	75	80	80	85	80	90	85
					fz	0.006	0.009	0.014	0.021	0.029	0.041	0.049	0.047	0.05	0.049
					RPM	9549	6897	5570	4775	4244	3183	2706	2122	1790	1353
					FEED	229	248	312	401	492	522	530	399	358	265
H	38.1 - 38.2	Hardened steel	0.02D	2.0D	Vc	20	25	25	30	30	30	30	30	30	30
					fz	0.004	0.006	0.008	0.011	0.016	0.021	0.027	0.026	0.026	0.027
					RPM	3183	2653	1989	1910	1592	1194	955	796	597	477
					FEED	51	64	64	84	102	100	103	83	62	52
	40	Chilled Cast Iron	0.05D	2.5D	Vc	35	40	40	45	45	45	50	50	50	50
					fz	0.004	0.007	0.010	0.014	0.021	0.028	0.033	0.035	0.035	0.033
					RPM	5570	4244	3183	2865	2387	1790	1592	1326	995	796
					FEED	89	119	127	160	201	201	210	186	139	105
	41	Hardened Cast Iron	0.02D	2.0D	Vc	20	25	25	30	30	30	30	30	30	30
					fz	0.004	0.006	0.008	0.011	0.016	0.021	0.027	0.026	0.026	0.027
					RPM	3183	2653	1989	1910	1592	1194	955	796	597	477
					FEED	51	64	64	84	102	100	103	83	62	52



X-POWER PRO END MILLS

RECOMMENDED CUTTING CONDITIONS
EMPFOHLENE SCHNEIDPARAMETER

GM812 SERIES — 6&8 FLUTE - SIDE CUTTING



Vc = m/min.
fz = mm/tooth
RPM = rev./min.
FEED = mm/min.

NORMAL SPEED

ISO	VDI 3323	Material Description	Ae	Ap	Parameter	Diameter (Ø) 6.0	8.0	10.0	12.0	16.0	20.0
P	1-4	Non-alloy steel	0.1D	1.5D	Vc	105	110	110	110	110	105
					fz	0.06	0.079	0.099	0.099	0.1	0.075
					RPM	5570	4377	3501	2918	2188	1671
					FEED	2005	2075	2080	1733	1313	1003
	5		0.05D	1.5D	Vc	75	75	75	75	75	75
					fz	0.059	0.078	0.098	0.097	0.099	0.075
					RPM	3979	2984	2387	1989	1492	1194
					FEED	1409	1397	1404	1158	886	716
	6-7	Low alloy steel	0.1D	1.5D	Vc	105	110	110	110	110	105
					fz	0.06	0.079	0.099	0.099	0.1	0.075
					RPM	5570	4377	3501	2918	2188	1671
					FEED	2005	2075	2080	1733	1313	1003
	8-9		0.05D	1.5D	Vc	75	75	75	75	75	75
					fz	0.059	0.078	0.098	0.097	0.099	0.075
					RPM	3979	2984	2387	1989	1492	1194
					FEED	1409	1397	1404	1158	886	716
	10	High alloyed steel, and tool steel	0.1D	1.5D	Vc	105	110	110	110	110	105
					fz	0.06	0.079	0.099	0.099	0.1	0.075
					RPM	5570	4377	3501	2918	2188	1671
					FEED	2005	2075	2080	1733	1313	1003
	11.1 - 11.2		0.05D	1.5D	Vc	75	75	75	75	75	75
					fz	0.059	0.078	0.098	0.097	0.099	0.075
					RPM	3979	2984	2387	1989	1492	1194
					FEED	1409	1397	1404	1158	886	716
H	38.1	Hardened steel	0.05D	1.5D	Vc	75	75	75	75	75	75
					fz	0.059	0.078	0.098	0.097	0.099	0.075
					RPM	3979	2984	2387	1989	1492	1194
					FEED	1409	1397	1404	1158	886	716
	38.2		0.05D	1.0D	Vc	30	30	30	30	35	30
					fz	0.022	0.030	0.035	0.036	0.035	0.027
					RPM	1592	1194	955	796	696	477
					FEED	210	215	201	172	146	103
	40	Chilled Cast Iron	0.05D	1.5D	Vc	75	75	75	75	75	75
					fz	0.059	0.078	0.098	0.097	0.099	0.075
					RPM	3979	2984	2387	1989	1492	1194
					FEED	1409	1397	1404	1158	886	716
	41	Hardened Cast Iron	0.05D	1.0D	Vc	30	30	30	30	35	30
					fz	0.022	0.030	0.035	0.036	0.035	0.027
					RPM	1592	1194	955	796	696	477
					FEED	210	215	201	172	146	103

HIGH SPEED

ISO	VDI 3323	Material Description	Ae	Ap	Parameter	Diameter (Ø) 6.0	8.0	10.0	12.0	16.0	20.0
P	1-5	Non-alloy steel	0.05D	1.5D	Vc	325	325	320	325	325	325
					fz	0.06	0.081	0.1	0.1	0.1	0.076
					RPM	17242	12931	10186	8621	6466	5173
					FEED	6207	6285	6112	5173	3879	3145
	6-9	Low alloy steel	0.05D	1.5D	Vc	325	325	320	325	325	325
					fz	0.06	0.081	0.1	0.1	0.1	0.076
					RPM	17242	12931	10186	8621	6466	5173
					FEED	6207	6285	6112	5173	3879	3145
	10 - 11.2	High alloyed steel, and tool steel	0.05D	1.5D	Vc	325	325	320	325	325	325
					fz	0.06	0.081	0.1	0.1	0.1	0.076
					RPM	17242	12931	10186	8621	6466	5173
					FEED	6207	6285	6112	5173	3879	3145
H	38.1	Hardened steel	0.05D	1.5D	Vc	325	325	320	325	325	325
					fz	0.060	0.081	0.100	0.100	0.100	0.076
					RPM	17242	12931	10186	8621	6466	5173
					FEED	6207	6285	6112	5173	3879	3145
	38.2		0.05D	1.0D	Vc	160	160	160	160	160	160
					fz	0.060	0.081	0.101	0.100	0.100	0.073
					RPM	8488	6366	5093	4244	3183	2546
					FEED	3056	3094	3086	2546	1910	1487
	40	Chilled Cast Iron	0.05D	1.5D	Vc	325	325	320	325	325	325
					fz	0.060	0.081	0.100	0.100	0.100	0.076
					RPM	17242	12931	10186	8621	6466	5173
					FEED	6207	6285	6112	5173	3879	3145
	41	Hardened Cast Iron	0.05D	1.0D	Vc	160	160	160	160	160	160
					fz	0.060	0.081	0.101	0.100	0.100	0.073
					RPM	8488	6366	5093	4244	3183	2546
					FEED	3056	3094	3086	2546	1910	1487

CARBIDE
HSS
CBN END MILLS
i-Xmill END MILLS
i-SMART MODULAR END MILLS
X1-EH END MILLS
X5070 END MILLS
4G MILL END MILLS
X-POWER PRO END MILLS
TitaNox-POWER END MILLS
JET-POWER END MILLS
V7 PLUS END MILLS
ALU-POWER HPC END MILLS
ALU-POWER END MILLS
D-POWER GRAPHITE END MILLS
CRX S END MILLS
K-2 END MILLS
ONLY ONE COATED PM60 END MILLS
TANK POWER END MILLS
GENERAL HSS END MILLS
MILLING CUTTERS

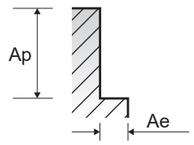
X-POWER PRO END MILLS

RECOMMENDED CUTTING CONDITIONS
EMPFOHLENE SCHNEIDPARAMETER

GM834 SERIES — 6 FLUTE - SIDE CUTTING

Vc = m/min.
fz = mm/tooth
RPM = rev./min.
FEED = mm/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	0.01D	3.0D	Vc	45	45	45	45	45	45	45
					fz	0.035	0.045	0.055	0.06	0.065	0.07	0.074
					RPM	2387	1790	1432	1194	895	716	573
					FEED	501	483	473	430	349	301	254
	5		0.01D	3.0D	Vc	30	30	30	30	30	30	30
					fz	0.035	0.044	0.050	0.053	0.061	0.067	0.071
					RPM	1592	1194	955	796	597	477	382
					FEED	334	315	286	253	218	192	163
	6-7	Low alloy steel	0.01D	3.0D	Vc	45	45	45	45	45	45	45
					fz	0.035	0.045	0.055	0.06	0.065	0.07	0.074
					RPM	2387	1790	1432	1194	895	716	573
					FEED	501	483	473	430	349	301	254
	8-9		0.01D	3.0D	Vc	30	30	30	30	30	30	30
					fz	0.035	0.044	0.050	0.053	0.061	0.067	0.071
					RPM	1592	1194	955	796	597	477	382
					FEED	334	315	286	253	218	192	163
	10	High alloyed steel, and tool steel	0.01D	3.0D	Vc	45	45	45	45	45	45	45
					fz	0.035	0.045	0.055	0.06	0.065	0.07	0.074
					RPM	2387	1790	1432	1194	895	716	573
					FEED	501	483	473	430	349	301	254
	11.1 - 11.2		0.01D	3.0D	Vc	30	30	30	30	30	30	30
					fz	0.035	0.044	0.050	0.053	0.061	0.067	0.071
					RPM	1592	1194	955	796	597	477	382
					FEED	334	315	286	253	218	192	163
K	15-20	Grey cast iron Nodular cast iron Malleable cast iron	0.01D	3.0D	Vc	45	45	45	45	45	45	45
					fz	0.035	0.045	0.055	0.06	0.065	0.07	0.074
					RPM	2387	1790	1432	1194	895	716	573
					FEED	501	483	473	430	349	301	254
H	38.1 - 38.2	Hardened steel	0.005D	3.0D	Vc	25	25	25	25	25	25	25
					fz	0.030	0.038	0.046	0.051	0.054	0.060	0.064
					RPM	1326	995	796	663	497	398	318
					FEED	239	227	220	203	161	143	122
	40	Chilled Cast Iron	0.01D	3.0D	Vc	30	30	30	30	30	30	30
					fz	0.035	0.044	0.050	0.053	0.061	0.067	0.071
					RPM	1592	1194	955	796	597	477	382
					FEED	334	315	286	253	218	192	163
	41	Hardened Cast Iron	0.005D	3.0D	Vc	25	25	25	25	25	25	25
					fz	0.030	0.038	0.046	0.051	0.054	0.060	0.064
					RPM	1326	995	796	663	497	398	318
					FEED	239	227	220	203	161	143	122



X-POWER PRO END MILLS

RECOMMENDED CUTTING CONDITIONS
EMPFOHLENE SCHNEIDPARAMETER

GM814 SERIES — 3&4 FLUTE ROUGHING - SIDE CUTTING

Vc = m/min.
fz = mm/tooth
RPM = rev./min.
FEED = mm/min.

ISO	VDI 3323	Material Description	Ae	Ap	Parameter	Diameter (Ø) 6.0	8.0	10.0	12.0	16.0	20.0
P	1-4	Non-alloy steel	0.3D	1.5D	Vc	310	305	305	315	315	315
					fz	0.05	0.067	0.063	0.075	0.1	0.113
					RPM	16446	12136	9708	8356	6267	5013
					FEED	2467	2439	2447	2507	2507	2266
	5		0.3D	1.5D	Vc	245	245	250	240	255	240
					fz	0.023	0.030	0.028	0.033	0.040	0.039
					RPM	12998	9748	7958	6366	5073	3820
					FEED	897	877	891	840	812	596
	6-7	Low alloy steel	0.3D	1.5D	Vc	310	305	305	315	315	315
					fz	0.05	0.067	0.063	0.075	0.1	0.113
					RPM	16446	12136	9708	8356	6267	5013
					FEED	2467	2439	2447	2507	2507	2266
	8-9		0.3D	1.5D	Vc	245	245	250	240	255	240
					fz	0.023	0.030	0.028	0.033	0.040	0.039
					RPM	12998	9748	7958	6366	5073	3820
					FEED	897	877	891	840	812	596
	10	High alloyed steel, and tool steel	0.3D	1.5D	Vc	310	305	305	315	315	315
					fz	0.05	0.067	0.063	0.075	0.1	0.113
					RPM	16446	12136	9708	8356	6267	5013
					FEED	2467	2439	2447	2507	2507	2266
	11.1 - 11.2		0.3D	1.5D	Vc	245	245	250	240	255	240
					fz	0.023	0.030	0.028	0.033	0.040	0.039
					RPM	12998	9748	7958	6366	5073	3820
					FEED	897	877	891	840	812	596
M	14.1	Stainless steel	0.3D	1.5D	Vc	165	165	170	165	175	160
					fz	0.023	0.03	0.028	0.034	0.039	0.038
					RPM	8754	6565	5411	4377	3482	2546
					FEED	604	591	606	595	543	387
K	15-20	Grey cast iron Nodular cast iron Malleable cast iron	0.3D	1.5D	Vc	310	305	305	315	315	315
					fz	0.05	0.067	0.063	0.075	0.1	0.113
					RPM	16446	12136	9708	8356	6267	5013
					FEED	2467	2439	2447	2507	2507	2266
H	38.1 - 38.2	Hardened steel	0.05D	1.0D	Vc	65	65	65	65	65	65
					fz	0.026	0.033	0.036	0.039	0.034	0.038
					RPM	3448	2586	2069	1724	1293	1035
					FEED	269	256	298	269	176	157
	40	Chilled Cast Iron	0.3D	1.5D	Vc	245	245	250	240	255	240
					fz	0.023	0.030	0.028	0.033	0.040	0.039
					RPM	12998	9748	7958	6366	5073	3820
					FEED	897	877	891	840	812	596
	41	Hardened Cast Iron	0.05D	1.0D	Vc	65	65	65	65	65	65
					fz	0.026	0.033	0.036	0.039	0.034	0.038
					RPM	3448	2586	2069	1724	1293	1035
					FEED	269	256	298	269	176	157