PREMIUM ROTARY CUTTING TOOLS

RobbJack

Applications Guide – 2014

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- TITANIUM, STEEL & HIGH-TEMP ALLOYS
- COMPOSITES
- DIE/MOLD & HARDENED MATERIALS
- MINIATURES
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RobbJack Corporation Lincoln, California USA

RobbJack's got the Solution for Your Next Machining Project

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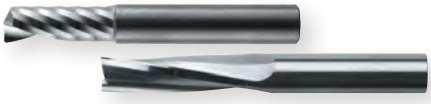

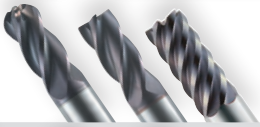

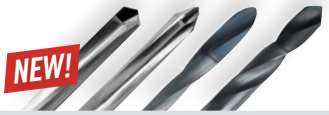

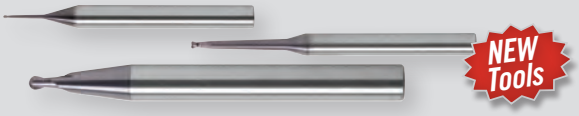

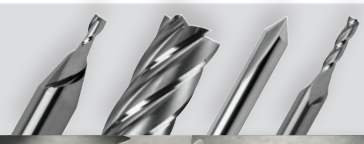

Alphabetical Tool Listing

Legend

- = Aluminum
- = Steel and High-Temp Alloys
- = Die Mold
- = Composites
- = Miniatures
- = Multiple Applications
- = Saws
- = Wood & Plastics

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End Mill General Speeds & Feeds/Formulas

Material	SFM *Surface Feet/Minute*	SMM *Surface Meters/Minute*	Chip Load per Tooth
Aluminum / Non-Ferrous			
Ferrous			
2024	Max RPM	Max RPM	tool diameter x .0256
6061 (T1–T3)	Max RPM	Max RPM	tool diameter x .0128
6061 (T4–T6)	Max RPM	Max RPM	tool diameter x .0256
7075	Max RPM	Max RPM	tool diameter x .0256
Non-Ferrous			
Brass	750	230	tool diameter x .0128
Copper	600	190	tool diameter x .0128
Magnesium	Max RPM	Max RPM	tool diameter x .0256
Titanium, Steel and High-Temp Alloys			
Titanium			
Commercially Pure	350	100	tool diameter x .0048
6AL-4V	230	55	tool diameter x .0048
6AL-6V	180	35	tool diameter x .004
Steel			
1018–1020	350	110	tool diameter x .0064
4130	260	80	tool diameter x .0032
4140	220	70	tool diameter x .0032
4340	280	90	tool diameter x .0032
Tool Steel Annealed			
A2	350	110	tool diameter x .0032
D2	260	80	tool diameter x .0032
H13	230	70	tool diameter x .0032
P20	350	110	tool diameter x .00496
Stainless Steel			
303	500	150	tool diameter x .0048
304	225	70	tool diameter x .0032
316	240	75	tool diameter x .0032
15-5 / 17-4 PH	200	60	tool diameter x .0032
440C	200	60	tool diameter x .0032
Inconel			
625 / 718	100	30	tool diameter x .0036
Composites			
G10 Fiberglass / Polyester	1000	300	tool diameter x .0136
Graphite	1000	300	tool diameter x .0256
Graphite Fiber / Epoxy	800	250	tool diameter x .008
Plastics	1300	400	tool diameter x .0256
Die/Mold			
See Die/Mold section			
Other Material Applications			
Cast Iron			
Ductile Iron	350	110	tool diameter x .0096
Gray Cast Iron	500	150	tool diameter x .0128

INCH SIZES		
Surface Feet per Minute	=	RPM × .262 × Tool Diameter
RPM	=	Surface Feet per Minute x 3.82 / Tool Diameter
Feedrate (in/min.)	=	RPM × Chip Load per Tooth × Number of Flutes
in^3/min	=	Width x Depth × Inches per Minute
Horsepower	=	1.341 × kW
kW	=	.7457 × Horsepower
METRIC SIZES		
Surface Meters per Minute	=	RPM x .00314 × Tool Diameter
RPM	=	Surface Meters per Minute x 318.057 / Tool Diameter
Feedrate (mm/min.)	=	RPM × Chip Load per Tooth × Number of Flutes
cm^3/min	=	Width (mm) Depth (mm) Feedrate (mm/min) / 1000
Horsepower	=	1.341 × kW
kW	=	.7457 × Horsepower

See RobbJack Videos at

www.robbjack.com/videos

Specific End Mill Speeds & Feeds

A1-201 SPEEDS & FEEDS

Tool Diameter	Aluminum 6061-T6, 7075, 2024		Brass		Copper		Plastic		Magnesium	
	RPM	CLPT	RPM	CLPT	RPM	CLPT	RPM	CLPT	RPM	CLPT
1/8"	Max	0.0032"	22900	0.0016"	18300	0.0016"	39700	0.0032"	Max	0.0032"
3/16"	Max	0.0048"	15300	0.0024"	12200	0.0024"	26500	0.0048"	Max	0.0048"
1/4"	Max	0.0064"	11500	0.0032"	9200	0.0032"	19900	0.0064"	Max	0.0064"
5/16"	Max	0.0080"	9200	0.0040"	7300	0.0040"	15900	0.0080"	Max	0.0080"
3/8"	Max	0.0096"	7600	0.0048"	6100	0.0048"	13200	0.0096"	Max	0.0096"
1/2"	Max	0.0128"	5700	0.0064"	4600	0.0064"	9900	0.0128"	Max	0.0128"
5/8"	Max	0.0160"	4600	0.0080"	3700	0.0080"	7900	0.0160"	Max	0.0160"
3/4"	Max	0.0192"	3800	0.0096"	3100	0.0096"	6600	0.0192"	Max	0.0192"
1"	Max	0.0256"	2900	0.0128"	2300	0.0128"	5000	0.0256"	Max	0.0256"

Axial depth of cut up to 1 × diameter of the tool

MA1-201 SPEEDS & FEEDS METRIC

Tool Diameter	Aluminum 6061-T6, 7075, 2024		Brass		Copper		Plastic		Magnesium	
	RPM	CLPT	RPM	CLPT	RPM	CLPT	RPM	CLPT	RPM	CLPT
3mm	Max	0.077mm	24300	0.038mm	19400	0.038mm	42000	0.077mm	Max	0.077mm
4mm	Max	0.102mm	18200	0.051mm	14600	0.051mm	31500	0.102mm	Max	0.102mm
5mm	Max	0.128mm	14600	0.064mm	11600	0.064mm	25200	0.128mm	Max	0.128mm
6mm	Max	0.154mm	12100	0.077mm	9700	0.077mm	21000	0.154mm	Max	0.154mm
8mm	Max	0.205mm	9100	0.102mm	7300	0.102mm	15800	0.205mm	Max	0.205mm
10mm	Max	0.256mm	7300	0.128mm	5800	0.128mm	12600	0.256mm	Max	0.256mm
12mm	Max	0.307mm	6100	0.154mm	4900	0.154mm	10500	0.307mm	Max	0.307mm
16mm	Max	0.410mm	4500	0.205mm	3600	0.205mm	7900	0.410mm	Max	0.410mm
20mm	Max	0.512mm	3600	0.256mm	2900	0.256mm	6300	0.512mm	Max	0.512mm

Axial depth of cut up to 1 × diameter of the tool

A1-303 SPEEDS & FEEDS

Tool Diameter	Aluminum 6061-T6		Aluminum 6061-T3		Aluminum 7075		Aluminum 2024	
	RPM	CLPT	RPM	CLPT	RPM	CLPT	RPM	CLPT
1/8"	Max	0.0020"	Max	0.0018"	Max	0.0020"	Max	0.0020"
3/16"	Max	0.0030"	Max	0.0026"	Max	0.0030"	Max	0.0030"
1/4"	Max	0.0040"	Max	0.0035"	Max	0.0040"	Max	0.0040"
5/16"	Max	0.0050"	Max	0.0044"	Max	0.0050"	Max	0.0050"
3/8"	Max	0.0060"	Max	0.0053"	Max	0.0060"	Max	0.0060"
1/2"	Max	0.0080"	Max	0.0070"	Max	0.0080"	Max	0.0080"
5/8"	Max	0.0100"	Max	0.0088"	Max	0.0100"	Max	0.0100"
3/4"	Max	0.0120"	Max	0.0105"	Max	0.0120"	Max	0.0120"
1"	Max	0.0160"	Max	0.0140"	Max	0.0160"	Max	0.0160"

Axial depth of cut up to 1.5 × diameter of the tool with 50% radial step over.

MA1-303 SPEEDS & FEEDS METRIC

Tool Diameter	Aluminum 6061-T6		Aluminum 6061-T3		Aluminum 7075		Aluminum 2024	
	RPM	CLPT	RPM	CLPT	RPM	CLPT	RPM	CLPT
3mm	Max	0.048mm	Max	0.042mm	Max	0.048mm	Max	0.048mm
4mm	Max	0.064mm	Max	0.056mm	Max	0.064mm	Max	0.064mm
5mm	Max	0.080mm	Max	0.070mm	Max	0.080mm	Max	0.080mm
6mm	Max	0.096mm	Max	0.084mm	Max	0.096mm	Max	0.096mm
8mm	Max	0.128mm	Max	0.112mm	Max	0.128mm	Max	0.128mm
10mm	Max	0.160mm	Max	0.140mm	Max	0.160mm	Max	0.160mm
12mm	Max	0.192mm	Max	0.168mm	Max	0.192mm	Max	0.192mm
16mm	Max	0.256mm	Max	0.224mm	Max	0.256mm	Max	0.256mm
20mm	Max	0.320mm	Max	0.280mm	Max	0.320mm	Max	0.320mm

Axial depth of cut up to 1.5 × diameter of the tool with 50% radial step over.

Specific End Mill Speeds & Feeds

FM SERIES SPEEDS & FEEDS

Tool Dia.	Typical Z-Depth	Aluminum 6061-T6		Aluminum 6061-T3		Aluminum 7075		Aluminum 2024	
		RPM	CLPT	RPM	CLPT	RPM	CLPT	RPM	CLPT
1/4"	0.1500"	Max	0.0040"	Max	0.0035"	Max	0.0040"	Max	0.0040"
5/16"	0.1500"	Max	0.0050"	Max	0.0044"	Max	0.0050"	Max	0.0050"
3/8"	0.1875"	Max	0.0060"	Max	0.0053"	Max	0.0060"	Max	0.0060"
1/2"	0.2000"	Max	0.0080"	Max	0.0070"	Max	0.0080"	Max	0.0080"
5/8"	0.2000"	Max	0.0100"	Max	0.0088"	Max	0.0100"	Max	0.0100"
3/4"	0.2500"	Max	0.0120"	Max	0.0105"	Max	0.0120"	Max	0.0120"
1"	0.2500"	Max	0.0160"	Max	0.0140"	Max	0.0160"	Max	0.0160"

Z-Depth of cut per pass should be deeper than the corner radius to help reduce chatter

MFM SERIES SPEEDS & FEEDS METRIC

Tool Dia.	Typical Z-Depth	Aluminum 6061-T6		Aluminum 6061-T3		Aluminum 7075		Aluminum 2024	
		RPM	CLPT	RPM	CLPT	RPM	CLPT	RPM	CLPT
6mm	4mm	Max	0.096mm	Max	0.084mm	Max	0.096mm	Max	0.096mm
8mm	4mm	Max	0.128mm	Max	0.112mm	Max	0.128mm	Max	0.128mm
10mm	5mm	Max	0.16mm	Max	0.14mm	Max	0.16mm	Max	0.16mm
12mm	5mm	Max	0.192mm	Max	0.168mm	Max	0.192mm	Max	0.192mm
16mm	5mm	Max	0.256mm	Max	0.224mm	Max	0.256mm	Max	0.256mm
20mm	6.5mm	Max	0.32mm	Max	0.28mm	Max	0.32mm	Max	0.32mm
25mm	6.5mm	Max	0.4mm	Max	0.35mm	Max	0.4mm	Max	0.4mm

Z-Depth of cut per pass should be deeper than the corner radius to help reduce chatter

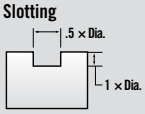
NS SERIES SPEEDS & FEEDS

Material	Surface Footage	3/16"		1/4"		5/16"		3/8"		1/2"		5/8"		3/4"		1"	
		RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min
CAST IRON																	
Ductile	400	8149	20	6112	20	4890	24	4075	28	3056	31	2445	28	2037	24	1528	21
Gray	525	10696	42	8022	42	6418	51	5348	58	4011	64	3209	58	2674	51	2006	45
STEEL																	
1018/1020	500	10187	32	7640	32	6112	39	5093	44	3820	49	3056	44	2547	39	1910	34
4130	400	8149	20	6112	20	4890	24	4075	28	3056	31	2445	28	2037	24	1528	21
4140	400	8149	20	6112	20	4890	24	4075	28	3056	31	2445	28	2037	24	1528	21
4340	415	8455	21	6341	21	5073	25	4227	29	3171	32	2536	29	2114	25	1585	22
TOOL STEEL (ANNEALED)																	
A2	400	8149	17	6112	17	4890	22	4075	24	3056	27	2445	24	2037	22	1528	19
D2	360	7334	16	5501	16	4401	19	3667	22	2750	24	2200	22	1834	19	1375	17
H13	400	8149	17	6112	17	4890	22	4075	24	3056	27	2445	24	2037	22	1528	19
P20	400	8149	23	6112	23	4890	28	4075	31	3056	35	2445	31	2037	28	1528	24

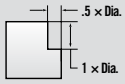
Speeds and feeds are based on applications with very rigid machine tools, toolholders, and fixturing. Speeds and feeds will vary dramatically depending on the application. Extreme forces can be generated and can cause damage, if not appropriate for the cutting conditions.

Helical interpolation or ramping should be used to enter pockets. For the highest material removal rates and longest tool life profile milling is preferred over slotting. (See diagrams below)

Slotting



Profiling



MNS SERIES SPEEDS & FEEDS METRIC

Material	Surface Meters/min	6mm		8mm		10mm		12mm		16mm		20mm		25mm	
		RPM	mm/min	RPM	mm/min	RPM	mm/min	RPM	mm/min	RPM	mm/min	RPM	mm/min	RPM	mm/min
CAST IRON															
Ductile	400	6475	505	4851	505	3881	621	3234	699	2426	776	1941	699	1552	543
Gray	525	8498	1060	6367	1060	5094	1304	4245	1467	3184	1630	2547	1467	2038	1141
STEEL															
1018/1020	500	8093	807	6064	807	4851	994	4043	1118	3032	1242	2426	1118	1941	869
4130	400	6475	505	4851	505	3881	621	3234	699	2426	776	1941	699	1552	543
4140	400	6475	505	4851	505	3881	621	3234	699	2426	776	1941	699	1552	543
4340	415	6717	523	5033	523	4027	644	3356	725	2517	805	2013	725	1611	564
TOOL STEEL (ANNEALED)															
A2	400	6475	444	4851	444	3881	546	3234	615	2426	683	1941	615	1552	478
D2	360	5827	400	4366	400	3493	492	2911	553	2183	615	1747	553	1397	430
H13	400	6475	444	4851	444	3881	546	3234	615	2426	683	1941	615	1552	478
P20	400	6475	575	4851	575	3881	708	3234	796	2426	885	1941	796	1552	619

XG-402 SPEEDS & FEEDS

Material	Surface Feet	1/4"		5/16"		3/8"		1/2"		5/8"		3/4"		1"	
		RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min
CAST IRON															
Ductile	400	6112	28	4890	34	4075	39	3056	43	2445	39	2037	34	1528	30
Gray	525	8022	42	6418	51	5348	58	4011	64	3209	58	2674	51	2006	45
INCONEL															
625/718	100	1528	4	1222	5	1019	6	764	7	611	6	509	5	382	5
STEEL															
1018/1020	500	7640	32	6112	39	5093	44	3820	49	3056	44	2547	39	1910	34
4130	400	6112	20	4890	24	4075	28	3056	31	2445	28	2037	24	1528	21
4140	400	6112	20	4890	24	4075	28	3056	31	2445	28	2037	24	1528	21
4340	415	6341	21	5073	25	4227	29	3171	32	2536	29	2114	25	1585	22

CONTINUED ON NEXT PAGE—

Specific End Mill Speeds & Feeds

—CONTINUED FROM PREVIOUS PAGE

XG-402 SPEEDS & FEEDS

Material	Surface Feet	1/4"		5/16"		3/8"		1/2"		5/8"		3/4"		1"	
		RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min
STAINLESS STEEL															
303	550	8404	31	6723	38	5603	43	4202	48	3362	43	2801	38	2101	34
304	400	6112	17	4890	22	4075	24	3056	27	2445	24	2037	22	1528	19
316	400	6112	17	4890	22	4075	24	3056	27	2445	24	2037	22	1528	19
15-5/17-4	300	4584	13	3667	16	3056	18	2292	20	1834	18	1528	16	1146	14
13-8	300	4584	13	3667	16	3056	18	2292	20	1834	18	1528	16	1146	14
440C	300	4584	13	3667	16	3056	18	2292	20	1834	18	1528	16	1146	14
TOOL STEEL (ANNEALED)															
A2	400	6112	17	4890	22	4075	24	3056	27	2445	24	2037	22	1528	19
D2	360	5501	16	4401	19	3667	22	2750	24	2200	22	1834	19	1375	17
H13	400	6112	17	4890	22	4075	24	3056	27	2445	24	2037	22	1528	19
P20	400	6112	23	4890	28	4075	31	3056	35	2445	31	2037	28	1528	24
TITANIUM															
Com. pure	300	4584	17	3667	21	3056	24	2292	26	1834	24	1528	21	1146	18
6AL-4V	200	3056	9	2445	11	2037	12	1528	13	1222	12	1019	11	764	9
6AL-6V	175	2674	8	2139	9	1783	11	1337	12	1070	11	891	9	669	8

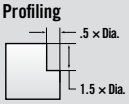
MXG-402 SPEEDS & FEEDS METRIC

Material	Surface Meters	6 mm		8 mm		10 mm		12 mm		16 mm		20 mm	
		RPM	mm/min	RPM	mm/min	RPM	mm/min	RPM	mm/min	RPM	mm/min	RPM	mm/min
CAST IRON													
Ductile	122	6475	706	4851	869	3881	978	3235	1087	2426	978	1941	869
Gray	160	8498	1060	6367	1304	5094	1467	4245	1630	3184	1467	2547	1304
INCONEL													
625/718	30	1619	108	1213	134	970	150	809	167	606	150	485	134
STEEL													
1018/1020	152	8093	807	6063	994	4851	1118	4043	1242	3032	1118	2426	994
4130	122	6475	505	4851	621	3881	699	3235	776	2426	699	1941	621
4140	122	6475	505	4851	621	3881	699	3235	776	2426	699	1941	621
4340	126	6717	523	5033	644	4027	725	3356	805	2517	725	2013	644
STAINLESS STEEL													
303	168	8903	791	6670	973	5337	1095	4448	1217	3335	1095	2668	973
304	122	6475	444	4851	546	3881	615	3235	683	2426	615	1941	546
316	122	6475	444	4851	546	3881	615	3235	683	2426	615	1941	546
15-5/17-4	91	4856	333	3638	410	2911	461	2426	512	1819	461	1455	410
13-8	91	4856	333	3638	410	2911	461	2426	512	1819	461	1455	410
440C	91	4856	333	3638	410	2911	461	2426	512	1819	461	1455	410
TOOL STEEL (ANNEALED)													
A2	122	6475	444	4851	546	3881	615	3235	683	2426	615	1941	546
D2	110	5827	400	4366	492	3493	553	2911	615	2183	553	1747	492
H13	122	6475	444	4851	546	3881	615	3235	683	2426	615	1941	546
P20	122	6475	575	4851	708	3881	796	3235	885	2426	796	1941	708
TITANIUM													
Com. pure	91	4856	431	3638	531	2911	597	2426	664	1819	597	1455	531
6AL-4V	61	3237	222	2425	273	1941	307	1617	342	1213	307	970	273
6AL-6V	53	2833	194	2122	239	1698	269	1415	299	1061	269	849	239

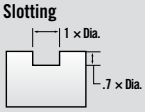
General Guidelines for XG-402 and MXG-402

- Speeds and feeds are based on applications with very rigid machine tools, toolholders, and fixturing. Speeds and feeds will vary dramatically depending on the application. Extreme forces can be generated and can cause damage, if not appropriate for the cutting conditions.
- Helical interpolation or ramping should be used to enter pockets.
- For the highest material removal rates and longest tool life profile milling is preferred over slotting (See diagrams at right).
- Use shrink fit or equivalent tool holder. If not, use flats to eliminate slippage in the tool holder!
- Climb milling is recommended.
- For ball end tools reduce feed rate by 10%.

Profiling



Slotting

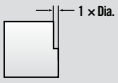


Specific End Mill Speeds & Feeds

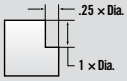
XG-502 AND XF SERIES SPEEDS & FEEDS

Material	Surface Feet	3/8"		1/2"		5/8"		3/4"		1"	
		RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min
CAST IRON											
Ductile	400	4075	58	3056	64	2445	58	2037	68	1528	60
Gray	525	5348	86	4011	96	3209	86	2674	102	2006	90
INCONEL											
625/718	150	1528	12	1146	14	917	12	764	16	573	14
STEEL											
1018/1020	500	5093	62	3820	68	3056	62	2547	74	1910	32
4130	400	4075	42	3056	46	2445	42	2037	48	1528	42
4140	400	4075	42	3056	46	2445	42	2037	48	1528	42
4340	415	4227	42	3171	48	2536	42	2114	50	1585	44
STAINLESS STEEL											
303	550	5603	62	4202	68	3362	62	2801	72	2101	64
304	400	4075	36	3056	40	2445	36	2037	44	1528	38
316	400	4075	36	3056	40	2445	36	2037	44	1528	38
15-5/17-4	300	3056	28	2292	30	1834	28	1528	32	1146	28
13-8	300	3056	28	2292	30	1834	28	1528	32	1146	28
440C	300	3056	28	2292	30	1834	28	1528	32	1146	28
TOOL STEEL (ANNEALED)											
A2	400	4075	36	3056	40	2445	36	2037	44	1528	38
D2	360	3667	32	2750	36	2200	32	1834	38	1375	34
H13	400	4075	36	3056	40	2445	36	2037	44	1528	38
P20	400	4075	44	3056	50	2445	44	2037	52	1528	46
TITANIUM											
Com. pure	300	3056	34	2292	38	1834	34	1528	40	1146	34
6AL-4V	380	3871	42	2903	48	2323	42	1935	50	1452	44
6AL-6V	175	1783	20	1337	22	1070	20	891	24	669	20

XF Finish Profiling



XG-502 Profiling



DM SERIES SPEEDS & FEEDS (Chipload per Tooth)

Tool Number	Cutter Diameter	Steels 30–40 HRc		Steels 40–50 HRc		Steels 50–60 HRc	
		ROUGHING	FINISHING	ROUGHING	FINISHING	ROUGHING	FINISHING
DM-201-01	1/32"	0.0006–0.0008	0.0005–0.0006	0.0005–0.0006	0.0004–0.0005	0.0004–0.0005	0.0003–0.0004
DM-201-02	1/16"	0.0013–0.0015	0.0010–0.0013	0.0010–0.0013	0.0008–0.0010	0.0008–0.0010	0.0005–0.0008
DM-201-03	3/32"	0.0019–0.0023	0.0015–0.0019	0.0015–0.0019	0.0011–0.0015	0.0011–0.0015	0.0008–0.0011
DM-201-04	1/8"	0.0025–0.0030	0.0020–0.0025	0.0020–0.0025	0.0015–0.0020	0.0015–0.0020	0.0010–0.0015
DM-201-06	3/16"	0.0038–0.0045	0.0030–0.0038	0.0030–0.0038	0.0023–0.0030	0.0023–0.0030	0.0015–0.0023
DM-201-08	1/4"	0.0050–0.0060	0.0040–0.0050	0.0040–0.0050	0.0030–0.0040	0.0030–0.0040	0.0020–0.0030
DM-201-10	5/16"	0.0063–0.0075	0.0050–0.0063	0.0050–0.0063	0.0038–0.0050	0.0038–0.0050	0.0025–0.0038
DM-201-12	3/8"	0.0075–0.0090	0.0060–0.0075	0.0060–0.0075	0.0045–0.0060	0.0045–0.0060	0.0030–0.0045
DM-201-14	7/16"	0.0088–0.0105	0.0070–0.0088	0.0070–0.0088	0.0053–0.0070	0.0053–0.0070	0.0035–0.0053
DM-201-16	1/2"	0.0100–0.0120	0.0080–0.0100	0.0080–0.0100	0.0060–0.0080	0.0060–0.0080	0.0040–0.0060

DM SERIES SPEEDS & FEEDS (Roughing & Semi-Finishing)

Tool Number	Cutter Diameter	Rotations Per Minute (RPM)		
		STEELS 30–40HRc	STEELS 40–50HRc	STEELS 50–60HRc
DM-201-01	1/32"	20,000–40,000	20,000–40,000	20,000–40,000
DM-201-02	1/16"	20,000–40,000	20,000–40,000	20,000–36,000
DM-201-03	3/32"	20,000–32,000	20,000–32,000	16,000–24,000
DM-201-04	1/8"	15,000–24,000	18,000–24,000	12,000–18,000
DM-201-06	3/16"	10,000–16,000	12,000–16,000	8,100–12,000
DM-201-08	1/4"	7,600–12,000	9,100–12,000	6,100–9,100
DM-201-10	5/16"	6,000–9,700	7,300–9,700	4,800–7,300
DM-201-12	3/8"	5,000–8,100	6,100–8,100	4,000–6,100
DM-201-14	7/16"	4,300–6,900	5,200–6,900	3,400–5,200
DM-201-16	1/2"	3,800–6,100	4,500–6,100	3,000–4,500

DM Series Guidelines

- Special diameters and lengths are available on a make-to-order basis.
- Air or mist coolant on materials greater than 40 HRc.

Radial Step Over

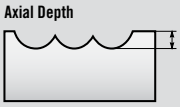
Roughing or Semi-Finishing 25%–40% of tool diameter

Radial Step Over for finishing depends on finish requirements.

Specific End Mill Speeds & Feeds

DM SERIES SPEEDS & FEEDS (Finishing)

Tool Number	Cutter Diameter	Rotations Per Minute (RPM)		
		STEELS 30–40HRc	STEELS 40–50HRc	STEELS 50–60HRc
DM-201-01	1/32"	20,000–40,000	20,000–40,000	20,000–40,000
DM-201-02	1/16"	20,000–40,000	20,000–40,000	20,000–36,000
DM-201-03	3/32"	20,000–32,000	20,000–32,000	16,000–24,000
DM-201-04	1/8"	15,000–24,000	18,000–24,000	12,000–18,000
DM-201-06	3/16"	10,000–16,000	12,000–16,000	8,100–12,000
DM-201-08	1/4"	7,600–12,000	9,100–12,000	6,100–9,100
DM-201-10	5/16"	6,000–9,700	7,300–9,700	4,800–7,300
DM-201-12	3/8"	5,000–8,100	6,100–8,100	4,000–6,100
DM-201-14	7/16"	4,300–6,900	5,200–6,900	3,400–5,200
DM-201-16	1/2"	3,800–6,100	4,500–6,100	3,000–4,500



30–40 HRc Axial depth = 10% of tool diameter
40–50 HRc Axial depth = 5% of tool diameter
50–60 HRc Axial depth = 4% of tool diameter

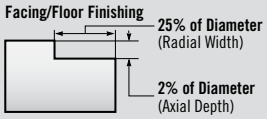
TM SERIES SPEEDS & FEEDS (Semi-Finishing & Finishing)

Tool Number	Cutter Diameter	Steels 30–40 HRc		Steels 40–50 HRc		Steels 50–60 HRc	
		ROUGHING	FINISHING	ROUGHING	FINISHING	ROUGHING	FINISHING
TM-201-01	1/32"	34,000–40,000	0.0001–0.00025	26,000–30,000	0.0001–0.0002	16,000–18,000	0.0001–0.0002
TM-201-02	1/16"	34,000–40,000	0.0003–0.0005	25000–30,000	0.0003–0.0005	16,000–18,000	0.0002–0.0004
TM-201-03	3/32"	22,000–26,000	0.0006–0.00075	16,000–19,000	0.0005–0.0007	10,000–12,000	0.0005–0.0006
TM-201-04	1/8"	17,000–20,000	0.0008–0.001	13,000–17,000	0.0007–0.0009	8,000–13,000	0.0006–0.0008
TM-201-06	3/16"	12,000–14,000	0.0011–0.0015	9,000–12,000	0.0001–0.0014	5,300–9,000	0.0009–0.0012
TM-201-08	1/4"	9,000–10400	0.0015–0.002	7,000–9,000	0.0014–0.0018	4,000–6,600	0.0012–0.0016
TM-201-10	5/16"	7,200–8,300	0.0019–0.0025	5,500–7,200	0.0017–0.0023	3,200–5,400	0.0015–0.0020
TM-201-12	3/8"	6,000–6,900	0.0020–0.003	4,600–6,000	0.0018–0.0027	2,700–4,500	0.0016–0.0024
TM-201-14	7/16"	5,200–6,000	0.0023–0.0035	4,000–5,200	0.0021–0.0032	2,300–3,900	0.0019–0.0028
TM-201-16	1/2"	4,500–5,200	0.0025–0.004	3,500–4,500	0.0023–0.0036	2,100–3,500	0.0020–0.0032

(Use maximum RPM if suggested RPM is higher than the machine's capabilities)

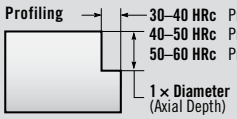
Additional Notes

- Special diameters, lengths, and corner radii are available on a make-to-order basis.
- Special draft angles (blend angle) or necked shanks for part clearance are available upon request and usually ship within the next business day.



TM Series Guidelines

- Speeds and feeds are only general starting points and may vary depending on specific applications.
- Use Climb Milling for better finish and longer tool life.
- Air or mist coolant on materials greater than 40 HRc.
- Good machines, tool holders, and programming methods all help in extending tool life.
- The best way to engage into the material is by helical interpolation or entering from off the part.
- Use for tight areas like helical bores or tight corners. For large open areas use HM/MHM Series.



30–40 HRc Profiling Radial Width = 5% of Diameter
40–50 HRc Profiling Radial Width = 5% of Diameter
50–60 HRc Profiling Radial Width = 2% of Diameter

HM SERIES SPEEDS & FEEDS (Semi-Finishing & Finishing)

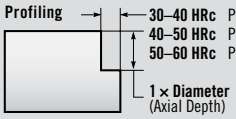
Tool Number	Cutter Diameter	Steels 30–40 HRc		Steels 40–50 HRc		Steels 50–60 HRc	
		RPM	CLPT	RPM	CLPT	RPM	CLPT
HM-402-04	1/8"	17,000–20,000	0.0008–0.001	13,000–17,000	0.0007–0.0009	8,000–13,000	0.0006–0.0008
HM-402-06	3/16"	12,000–14,000	0.0011–0.0015	9,000–12,000	0.0010–0.0014	5,300–9,000	0.0009–0.0012
HM-602-08	1/4"	9,000–10,400	0.0015–0.002	7,000–9,000	0.0014–0.0018	4,000–6,600	0.0012–0.0016
HM-602-10	5/16"	7,200–8,300	0.0019–0.0025	5,500–7,200	0.0017–0.0023	3,200–5,400	0.0015–0.0020
HM-602-12	3/8"	6,000–6,900	0.0020–0.003	4,600–6,000	0.0018–0.0027	2,700–4,500	0.0016–0.0024
HM-602-14	7/16"	5,200–6,000	0.0023–0.0035	4,000–5,200	0.0021–0.0032	2,300–3,900	0.0019–0.0028
HM-602-16	1/2"	4,500–5,200	0.0025–0.004	3,500–4,500	0.0023–0.0036	2,100–3,500	0.0020–0.0032
HM-602-20	5/8"	3,600–4,150	0.0026–0.0042	2,800–3,600	0.0023–0.0038	1,600–2,750	0.0021–0.0034
HM-802-24	3/4"	3,000–3,500	0.0028–0.005	2,300–3,000	0.0025–0.0045	1,350–2,250	0.0023–0.0041
HM-102-32	1"	2,200–2,600	0.0030–0.006	1,700–2,200	0.0027–0.0054	1,000–1,700	0.0024–0.0049

Additional Notes

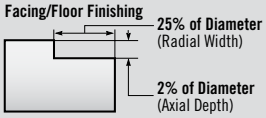
- Special draft angles (blend angle) or necked shanks for part clearance are available upon request.
- Special diameters, lengths, and corner radii are available on a make-to-order basis.

HM Series Guidelines

- Speeds and feeds are only general starting points and may vary depending on specific applications.
- Use Climb Milling for better finish and longer tool life.
- Air or mist coolant on materials greater than 40 HRc.
- Good machines, tool holders, and programming methods all help in extending tool life.
- The best way to engage into the material is by helical interpolation or entering from off the part.
- Use for open areas of floors or walls. For tight areas like helical bores or tight corners use TM/MTM Series.



30–40 HRc Profiling Radial Width = 5% of Diameter
40–50 HRc Profiling Radial Width = 5% of Diameter
50–60 HRc Profiling Radial Width = 2% of Diameter



Speeds & Feeds

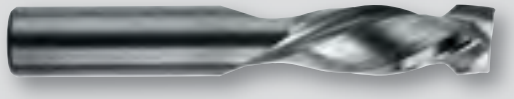
SAWS

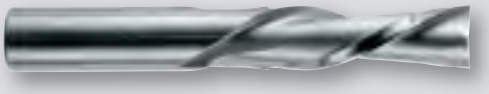
Material	Max Axial Depth/Pass (Times Thickness)	Teeth	Inch: SFM Surface Feet/Minute	Inch: Chip Load per Tooth – Standard: Saw Thickness .002"-.031"	Inch: Saw Thickness .031"-.100"	Inch: Saw Thickness >.100"	Metric: SMM Surface Meters/Minute	Metric: Chip Load per Tooth – Metric: Saw Thickness .05mm-1.0mm	Metric: Saw Thickness 1.0mm-3.0mm	Metric: Saw Thickness >3.0mm
Aluminum / Non-Ferrous										
Ferrous										
2024	4	Coarse	3600	.000234"/.000273"	.000273"/.00052"	0.00052"	1100	.0059mm/.0069mm	.0069mm/.013mm	0.013mm
6061 (T1–T3)	4	Coarse	3600	.000234"/.000273"	.000273"/.00052"	0.00052"	1100	.0059mm/.0069mm	.0069mm/.013mm	0.013mm
6061 (T4–T6)	4	Coarse	3600	.000234"/.000273"	.000273"/.00052"	0.00052"	1100	.0059mm/.0069mm	.0069mm/.013mm	0.013mm
7075	4	Coarse	3600	.000234"/.000273"	.000273"/.00052"	0.00052"	1100	.0059mm/.0069mm	.0069mm/.013mm	0.013mm
Non-Ferrous										
Brass	4	Coarse	750	.000234"/.000273"	.000273"/.00052"	0.00052"	230	.0059mm/.0069mm	.0069mm/.013mm	0.013mm
Copper	4	Coarse	600	.000234"/.000273"	.000273"/.00052"	0.00052"	190	.0059mm/.0069mm	.0069mm/.013mm	0.013mm
Magnesium	4	Coarse	3600	.000234"/.000273"	.000273"/.00052"	0.00052"	1100	.0059mm/.0069mm	.0069mm/.013mm	0.013mm
Titanium, Steel and High-Temp Alloys										
Titanium										
Commercially Pure	2	Fine	700	.00018"/.00021"	.00021"/.0004"	0.0004"	210	.0046mm/.0053mm	.0053mm/.010mm	0.010mm
6AL-4V	2	Fine	350	.00018"/.00021"	.00021"/.0004"	0.0004"	105	.0046mm/.0053mm	.0053mm/.010mm	0.010mm
6AL-6V	2	Fine	230	.00018"/.00021"	.00021"/.0004"	0.0004"	70	.0046mm/.0053mm	.0053mm/.010mm	0.010mm
Steel										
1018–1020	4	Fine	350	.00018"/.00021"	.00021"/.0004"	0.0004"	110	.0046mm/.0053mm	.0053mm/.010mm	0.010mm
4130	2	Fine	260	.00018"/.00021"	.00021"/.0004"	0.0004"	80	.0046mm/.0053mm	.0053mm/.010mm	0.010mm
4140	2	Fine	220	.00018"/.00021"	.00021"/.0004"	0.0004"	70	.0046mm/.0053mm	.0053mm/.010mm	0.010mm
4340	2	Fine	280	.00018"/.00021"	.00021"/.0004"	0.0004"	90	.0046mm/.0053mm	.0053mm/.010mm	0.010mm
Tool Steel Annealed										
A2	2	Fine	350	.00018"/.00021"	.00021"/.0004"	0.0004"	110	.0046mm/.0053mm	.0053mm/.010mm	0.010mm
D2	2	Fine	260	.00018"/.00021"	.00021"/.0004"	0.0004"	80	.0046mm/.0053mm	.0053mm/.010mm	0.010mm
H13	2	Fine	230	.00018"/.00021"	.00021"/.0004"	0.0004"	70	.0046mm/.0053mm	.0053mm/.010mm	0.010mm
P20	2	Fine	350	.00018"/.00021"	.00021"/.0004"	0.0004"	110	.0046mm/.0053mm	.0053mm/.010mm	0.010mm
Stainless Steel										
303	2	Fine	500	.00018"/.00021"	.00021"/.0004"	0.0004"	150	.0046mm/.0053mm	.0053mm/.010mm	0.010mm
304	2	Fine	200	.00018"/.00021"	.00021"/.0004"	0.0004"	70	.0046mm/.0053mm	.0053mm/.010mm	0.010mm
316	2	Fine	240	.00018"/.00021"	.00021"/.0004"	0.0004"	75	.0046mm/.0053mm	.0053mm/.010mm	0.010mm
15-5/17-4 PH	2	Fine	200	.00018"/.00021"	.00021"/.0004"	0.0004"	60	.0046mm/.0053mm	.0053mm/.010mm	0.010mm
440C	2	Fine	200	.00018"/.00021"	.00021"/.0004"	0.0004"	60	.0046mm/.0053mm	.0053mm/.010mm	0.010mm
Inconel										
625 / 718	2	Fine	100	.00018"/.00021"	.00021"/.0004"	0.0004"	30	.0046mm/.0053mm	.0053mm/.010mm	0.010mm
Composites										
G10 Fiberglass/Polyester	4	Coarse	1000	.000234"/.000273"	.000273"/.00052"	0.00052"	300	.0059mm/.0069mm	.0069mm/.013mm	0.013mm
Graphite	4	Coarse	1000	.000234"/.000273"	.000273"/.00052"	0.00052"	300	.0059mm/.0069mm	.0069mm/.013mm	0.013mm
Graphite Fiber/Epoxy	4	Coarse	800	.000234"/.000273"	.000273"/.00052"	0.00052"	250	.0059mm/.0069mm	.0069mm/.013mm	0.013mm
Other Material Applications										
Cast Iron										
Ductile Iron	2	Fine	350	.00018"/.00021"	.00021"/.0004"	0.0004"	110	.0046mm/.0053mm	.0053mm/.010mm	0.010mm
Gray Cast Iron	2	Fine	500	.00018"/.00021"	.00021"/.0004"	0.0004"	150	.0046mm/.0053mm	.0053mm/.010mm	0.010mm
Wood & Plastics										
Wood	4	Coarse	3600	.000234"/.000273"	.000273"/.00052"	0.00052"	1100	.0059mm/.0069mm	.0069mm/.013mm	0.013mm
Plastics	4	Coarse	1600	.000234"/.000273"	.000273"/.00052"	0.00052"	400	.0059mm/.0069mm	.0069mm/.013mm	0.013mm

Speeds & Feeds

ET SPEEDS & FEEDS

Material	5000 RPM	7500 RPM	10,000 RPM
	in/min	in/min	in/min
NON-FERROUS METALS			
Aluminum/Aluminum Alloys	10 ipm	15 ipm	20 ipm
Brass/Bronze	10 ipm	15 ipm	20 ipm
Copper/Copper Alloys	10 ipm	15 ipm	20 ipm
Magnesium	10 ipm	15 ipm	20 ipm
COMPOSITES			
G10 Fiberglass	15 ipm	22.5 ipm	30 ipm
Graphite	15 ipm	22.5 ipm	30 ipm
Carbon Fiber	15 ipm	22.5 ipm	30 ipm
Plastics	15 ipm	22.5 ipm	30 ipm
FERROUS METALS			
Cast Iron	5 ipm	7.5 ipm	10 ipm
Steel, Low Carbon	5 ipm	7.5 ipm	10 ipm
Steel, Medium Carbon	7.5 ipm	11.25 ipm	15 ipm
Steel, Hardened	2.5 ipm	3.75 ipm	5 ipm
Stainless Steel, Soft	5 ipm	7.5 ipm	10 ipm
Stainless Steel, Hard	2.5 ipm	3.75 ipm	5 ipm
Inconel	4 ipm	6 ipm	8 ipm
Titanium, Soft	5 ipm	7.5 ipm	10 ipm
Titanium, Hard	2.5 ipm	3.75 ipm	5 ipm





WOOD SERIES SPEEDS & FEEDS

Material	RPM (1/4")	Feed Inches/Minute
Wood		
Hardwoods	18,000	180–250
Softwoods	18,000	180–250
MDF	18,000	150–250
Laminated Materials	18,000	150–250
Plastics, Others		
Solid Surface	15,300	70–130
Fiberglass	15,300	80–150
Phenolic	15,300	80–150
Aluminum (Soft)	18,000	90–120
Aluminum (Aircraft Grade)	18,000	180–230
Copper	9,200	45–60
Foam	18,000	150–300
Plastics (Soft)	18,000	180–250
Plastics (Hard)	18,000	150–200

General Guidelines

- Select the shortest flute length possible for the application. Shorter flute length router tools offer better stability and increased feed rates.
- Select the largest diameter tool for the job. Increasing diameter by 10% provides 25% more strength.
- Adjust RPM and feed rate to reduce vibration. Vibration will cause poor finish and chip tools. Feed rates that are too slow can also cause vibration and poor tool life.
- Regular cleaning of tool holders and collets help ensure the tool's performance and life.
- Securing the part as rigidly as possible will improve finishes and tool life.

Visit RobbJack's New Website!

TOOL SEARCH

Dynamic Tool Search at www.robbjack.com

1 Click Here for Tool Search!

Click on the Red Search Tab and Find the Exact Tool You're Looking For!

Click on an Icon or Enter Your Specifications.

Make Your Selections Here!

2

Find a Tool by:
Tool Type
Your Specifications
Tool Characteristics
Materials
Application

3 See Search Results Here!

Make changes in your search criteria, see new results here immediately!

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5 Complete Tool Description

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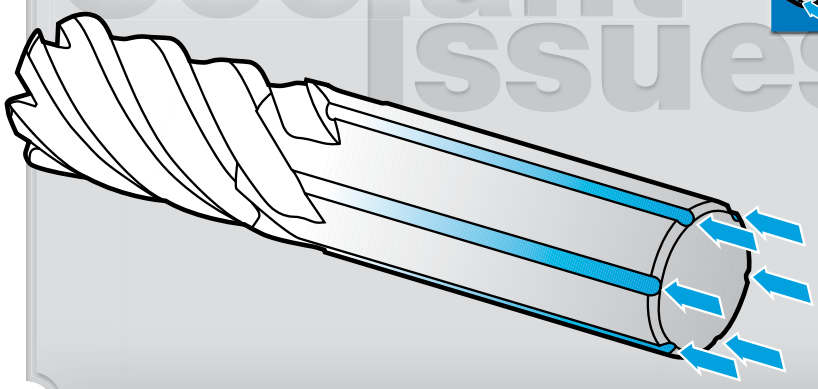
- **Troubleshooting**
- **Printable results**
- **Simultaneous tool recommendations**

ROBBJACK'S Speed & Feed

End Mill Modifications

Coolant Grooves

Coolant Issues?



Coolant Grooves allow coolant to flow around the outside of the tool for through-spindle coolant applications. It is a lower-cost option to through-the-tool coolant holes.

To order a RobbJack tool with a **Coolant Grooves**, use the existing standard *Part Number*, and add *-CG.*

Example:
An A1-201-12 with coolant grooves is Part Number:

A1-201-12-CG
See price sheet for pricing

Mirror Edge™

Chatter Problems?

Our edge preparation dampens vibration to help eliminate chatter.

Mirror Edge

Non-Mirror Edge

Applications

- Deep pocket and thin wall aluminum
- Long reaches more than 3:1 length-to-diameter ratio
- Plunging corners in titanium, steels, stainless, aluminum, etc.
- High end valves used with Feather Blend and T-Process

Must Use Coolant

Our patented Mirror Edge geometry helps to eliminate chatter. This geometry can be used in any application where chatter is a problem, usually for thin walls, valves, deep pockets or where the tool sticks out more than 3:1 length to diameter ratio.

To order RobbJack tools with **Mirror Edge**, use the existing standard *Part Number*, and add *-ME.*

Example:
An A1-201-12 with Mirror Edge is Part Number:

A1-201-12-ME
See price sheet for pricing

T-Process

Chipping?

T-Process is a honed edge we put on an end mill to help eliminate chipping.

Pros: T-Process strengthens the edge, helps eliminate chipping and gives a smooth edge.
Cons: T-Process will bring up a burr in certain materials, and it is not for materials that like a sharp edge, such as aluminum and plastics.

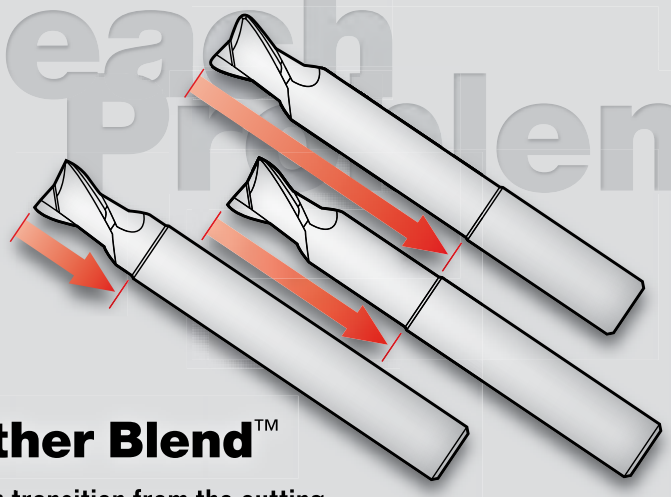
To order a RobbJack tool with a **T-Process**, use the existing standard *Part Number*, and add *-TP.*

Example:
An XG-402-16 with a T-Process is Part Number:

XG-402-16-TP
See price sheet for pricing

End Mill Modifications

Reach Problems?



Reach

Modify any standard tool with a neck to get the job done quickly.

A neck will increase rigidity, reduce tool deflection and last longer than a long length of cut tool. Necking can be added to most standard tools in 1–2 days.

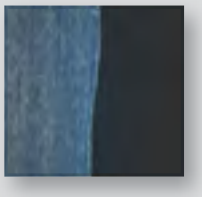
To order a RobbJack tool with a **Reach**, use the existing standard *Part Number*, and add *-N* and the desired length from the end of the tool.

Example:
An A1-201-12 necked with 1.0" Reach is Part Number:

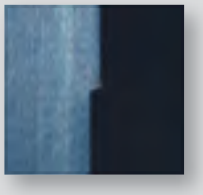
▶ **A1-201-12-N 1.0"**
See price sheet for pricing

Feather Blend™

A smooth transition from the cutting diameter to the neck diameter.



Feather Blend



Standard Neck

Applications

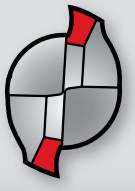
- Any necked tool
- Eliminates swirl lines during plunging
- Eliminates stress risers in parts

A tool necked with Feather Blend has a reduction in the tool diameter after the cutting length so the tool can cut deeper than its cutting length. It features a smooth transition from the cutting diameter to the neck diameter. Feather Blend reduces staircase marks and stress risers in parts and helps maintain the strongest tool possible.

Swirl Marks?

Wiper Flats

A Wiper Flat is a small flat on the end of the tool where there is no concavity. It is used to minimize swirl marks on the floor of parts.



Pros: A Wiper Flat gives better floor finishes.
Cons: Wiper Flats will increase surface contact, not for use on thin floors.

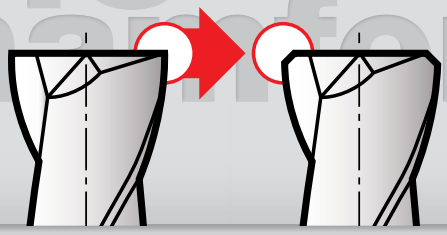
To order a RobbJack tool with a **Wiper Flats**, use the existing standard *Part Number*, and add *-WF.*

Example:
An A1-201-12 with wiper flats is Part Number:

▶ **A1-201-12-WF**
See price sheet for pricing

45° Chamfer?

45° Chamfer



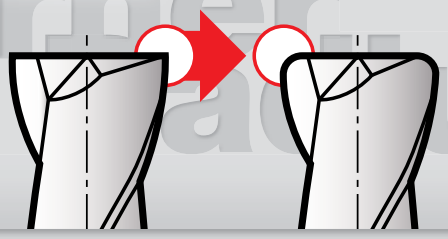
To order a RobbJack tool with a **45° Chamfer**, use the existing standard *Part Number*, add *-CH* and amount of *Chamfer.*

Example:
A1-201-12 with a .040" 45° chamfer is Part Number:

▶ **A1-201-12-CH .040"**
See price sheet for pricing

End Mill Modifications

Corner Radius



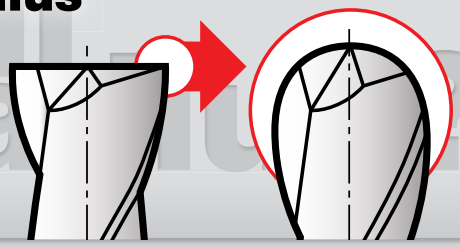
To order a RobbJack tool with a **Corner Radius**, use the existing standard *Part Number*, add *-CR* and desired *Radius Size.*

Example: An A1-201-12 with a .005 corner radius is Part Number:

▶ **A1-201-12-CR .005**
See price sheet for pricing

SPECIAL NOTE: 2 flutes under .050" *call for pricing.*
3 or more flutes under .080" *call for pricing.*

Full Radius



To order a RobbJack tool with a **Full Radius** (or Ball End), use the existing standard *Part Number*, and add *-BN.*

Example: An A1-201-12 with a Full Radius (Ball End) is Part Number:

▶ **A1-201-12-BN**
See price sheet for pricing

Weldon Flats

To order RobbJack tools with **Weldon Flats**, use the existing standard *Part Number*, and add *-FL.*

Example: An A1-201-12 with a Weldon Flat is Part Number:

▶ **A1-201-12-FL**
No Charge

Regrinding

Let RobbJack recondition your used cutting tools and get RobbJack quality grinds and specifications on tools with any brand name!

Wouldn't it be nice if resharpened tools performed as well as new? Let us regrind yours the way we do ours and it can happen. We will add our grinds and finishes to any tools, regardless of manufacturer. Our prices are competitive, our delivery is the best in the industry, and we do our own, in-house PVD coatings and re-coatings.

GO GREEN

Try RobbJack's in-house carbide recycling program.

Many times the tools we receive for regrinding are too badly damaged to justify reconditioning. For all tools that we determine fall into this category, **we will either:**

- ***Return the tools to you marked "No Work Done" (NWD)***

OR…

- ***Put the tools, as scrap, into our recycling program and send you a certificate for a 10% discount on your next regrinding order.***

We will offer you this choice every time we receive tools that we determine are NWD. We recycle scrap tools to carbide re-manufacturers, who crush the tools and use the recycled shards and powder to make shredders or non-critical carbide grades.

YOUR OWN COATING

Get state-of-the art coating technology without delivery hassles.

RobbJack owns and operates their PVD coating facility in Lincoln, CA under the tenets of ISO9000 certification. Our factory-trained technicians take the same special care with your tools as with ours, assuring you of the best PVD coatings available. We do this as part of our process, reducing or eliminating delays in delivery.

Download our Regrinding Order Form at **www.robbjack.com/technical/regrindform** to get started. Or email or call us!

Phone: **(916) 645-6045**
Toll-Free: **(800) 527-8883**
Fax: **(916) 645-0146**
sales@robbjack.com
sherry@robbjack.com

TOOLS FOR

Aluminum Applications

Aluminum Machining Without Chatter!

Scan this code to:

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- Get Technical Info
- Get Tips and Tricks to Cut Thin Wall and Deep Pocket Parts
- And More...

Featured Tools:

FM-Series – 41 Hours vs. 1 Hour*

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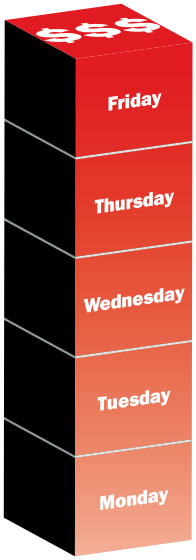

Cycle Time Before FM

**Actual results from a major defense manufacturer in deep pocket/thin wall aluminum*

VS.

Cycle Time After FM

"I just wish we tried this tool sooner! It is truly amazing!"

MAX RPM!
MAX Feed Rate!
No Chatter!

Eliminate Tool Pull Out!
1/4"–5/16" h5 Shank Tolerance
3/8"–1" h4 Shank Tolerance
Tightest in the Industry!

A1-303 – The Only Tool That Could Make the Part*

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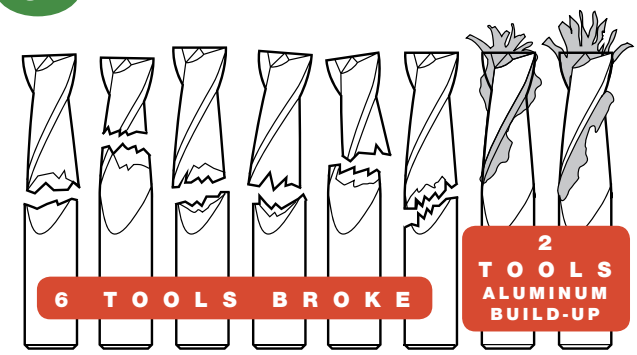


8 Other High-Performance Tools (Tried and Failed)

** Automotive aluminum part: No chatter, superfast feed rates, very high production 450 ipm in an aluminum extrusion.*

VS.

1 RJ A1-303 Tool

MAX RPM!
MAX Feed Rate!
No Chatter!

A1-303 Series: Polished & Mirror Edge!

Aluminum Applications Tools

A1 / **MA1** 201	2 Flute		18
A1 / **MA1** 303	3 Flute		20
FM / **MFM** 201/202/203/204/205	2 Flute (Short to Long Reach)	NEW!	22
FM / **MFM** 301/302/303/304/305	3 Flute (Short to Long Reach)	NEW!	26
S1 / **MS1** 201/301/401	2, 3 and 4 Flute		36
C1 / **MC1** 201/301/401	2, 3 and 4 Flute		38
PM / **MPM** / **PMD** Routers	1 Flute Routers (See Composites & Plastics)		40
WU1 / **WD1** 310	3 Flute Up and Down Shear		41
SB / **MSB** 201 **B** / **MB** 203	2 Flute Ball End (See Multiple Applications)		110
C8 201/203/301/303	2 and 3 Flute on ¼" Shank (See Multiple Applications)		105
NR / **MNR** 204/303/404	2, 3 and 4 Flute (See Multiple Applications)		114
PCD 203 Routers	2 Flute PCD-Tipped Routers (See Composites & Plastics)		71
PCD-BN 201 Routers	2 Flute PCD-Tipped Routers, Ball Nose (See Composites & Plastics)		71
MINIATURES	(See Miniatures Applications)		89
SAWS	(See Saws Applications)		121

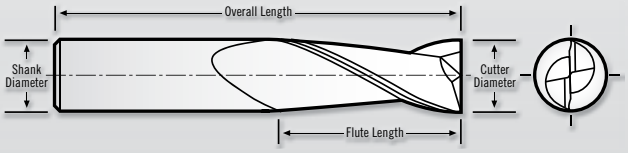
A1/MA1 2 Flute High Performance Tools for Aluminum

Characteristics Square End · Corner Break · 2 Flute · 30° Helix

Applications Slotting · Side Milling · Helical Interpolation · Ramping · High Performance · Roughing · Semi-Finishing · Finishing · Dry · Wet · Cold Air · Spray Mist

Materials Aluminum · Copper · Magnesium · Plastics · Brass

Coatings Diamond-Like Carbon (DLC)



A1 Series Tolerances:
Cutting Dia. = –.001/–.0015"
Shank Dia. = –.0001/–.0002"
Flute Length = +.060/–.000"
OAL = +/– .060"

MA1 Series Tolerances:
Cutting Dia. = –0.025/–0.038mm
Shank Dia. = –0.002/–0.005mm
Flute Length (<10D) = +0.75/–0.000mm
(>10D) = +1.5/–0.000mm
OAL = +/–1.000mm

A1-201 2 Flute Stub Length

Cutting Diameter	Shank Diameter	Flute Length	Corner Chamfer	Overall Length	Tool Number Uncoated	Tool Number DLC Coated
1/8"	1/8"	3/16"	.005"	1-1/2"	A1-201-04	A1-201-04-**DLC**
3/16"	3/16"	9/32"	.005"	2"	A1-201-06	A1-201-06-**DLC**
1/4"	1/4"	3/8"	.005"	2"	A1-201-08	A1-201-08-**DLC**
5/16"	5/16"	15/32"	.005"	2-1/2"	A1-201-10	A1-201-10-**DLC**
3/8"	3/8"	9/16"	.010"	2-1/2"	A1-201-12	A1-201-12-**DLC**
1/2"	1/2"	3/4"	.010"	3"	A1-201-16	A1-201-16-**DLC**
5/8"	5/8"	15/16"	.010"	3-1/2"	A1-201-20	A1-201-20-**DLC**
3/4"	3/4"	1-1/8"	.010"	4"	A1-201-24	A1-201-24-**DLC**
1"	1"	1-1/2"	.015"	4"	A1-201-32	A1-201-32-**DLC**

MA1-201 Metric 2 Flute Stub Length METRIC

Cutting Diameter	Shank Diameter	Flute Length	Corner Chamfer	Overall Length	Tool Number Uncoated	Tool Number DLC Coated
3mm	3mm	4.5mm	0.12mm	38mm	MA1-201-03	MA1-201-03-**DLC**
4mm	4mm	6mm	0.12mm	50mm	MA1-201-04	MA1-201-04-**DLC**
5mm	5mm	7.5mm	0.12mm	50mm	MA1-201-05	MA1-201-05-**DLC**
6mm	6mm	9mm	0.12mm	50mm	MA1-201-06	MA1-201-06-**DLC**
8mm	8mm	12mm	0.25mm	63mm	MA1-201-08	MA1-201-08-**DLC**
10mm	10mm	15mm	0.25mm	72mm	MA1-201-10	MA1-201-10-**DLC**
12mm	12mm	18mm	0.25mm	83mm	MA1-201-12	MA1-201-12-**DLC**
16mm	16mm	24mm	0.25mm	92mm	MA1-201-16	MA1-201-16-**DLC**
20mm	20mm	30mm	0.3mm	104mm	MA1-201-20	MA1-201-20-**DLC**

2 Flute High Performance Tools for Aluminum A1/MA1

A1-201 SPEEDS & FEEDS

Tool Diameter	Aluminum 6061-T6, 7075, 2024		Brass		Copper		Plastic		Magnesium	
	RPM	CLPT	RPM	CLPT	RPM	CLPT	RPM	CLPT	RPM	CLPT
1/8"	Max	0.0032"	22900	0.0016"	18300	0.0016"	39700	0.0032"	Max	0.0032"
3/16"	Max	0.0048"	15300	0.0024"	12200	0.0024"	26500	0.0048"	Max	0.0048"
1/4"	Max	0.0064"	11500	0.0032"	9200	0.0032"	19900	0.0064"	Max	0.0064"
5/16"	Max	0.0080"	9200	0.0040"	7300	0.0040"	15900	0.0080"	Max	0.0080"
3/8"	Max	0.0096"	7600	0.0048"	6100	0.0048"	13200	0.0096"	Max	0.0096"
1/2"	Max	0.0128"	5700	0.0064"	4600	0.0064"	9900	0.0128"	Max	0.0128"
5/8"	Max	0.0160"	4600	0.0080"	3700	0.0080"	7900	0.0160"	Max	0.0160"
3/4"	Max	0.0192"	3800	0.0096"	3100	0.0096"	6600	0.0192"	Max	0.0192"
1"	Max	0.0256"	2900	0.0128"	2300	0.0128"	5000	0.0256"	Max	0.0256"

Axial depth of cut up to 1 × diameter of the tool

MA1-201 SPEEDS & FEEDS

Tool Diameter	Aluminum 6061-T6, 7075, 2024		Brass		Copper		Plastic		Magnesium	
	RPM	CLPT	RPM	CLPT	RPM	CLPT	RPM	CLPT	RPM	CLPT
3mm	Max	0.077mm	24300	0.038mm	19400	0.038mm	42000	0.077mm	Max	0.077mm
4mm	Max	0.102mm	18200	0.051mm	14600	0.051mm	31500	0.102mm	Max	0.102mm
5mm	Max	0.128mm	14600	0.064mm	11600	0.064mm	25200	0.128mm	Max	0.128mm
6mm	Max	0.154mm	12100	0.077mm	9700	0.077mm	21000	0.154mm	Max	0.154mm
8mm	Max	0.205mm	9100	0.102mm	7300	0.102mm	15800	0.205mm	Max	0.205mm
10mm	Max	0.256mm	7300	0.128mm	5800	0.128mm	12600	0.256mm	Max	0.256mm
12mm	Max	0.307mm	6100	0.154mm	4900	0.154mm	10500	0.307mm	Max	0.307mm
16mm	Max	0.410mm	4500	0.205mm	3600	0.205mm	7900	0.410mm	Max	0.410mm
20mm	Max	0.512mm	3600	0.256mm	2900	0.256mm	6300	0.512mm	Max	0.512mm

Axial depth of cut up to 1 × diameter of the tool

See RobbJack Videos at
www.robbjack.com/videos

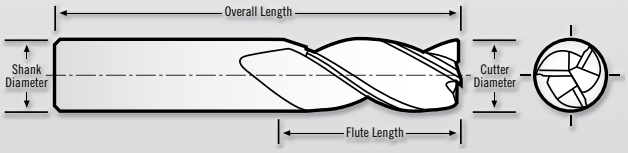
A1/MA1 3 Flute High Performance Tools for Aluminum

Characteristics Square End, Corner Break, 3 Flute, 35° Helix, Mirror Edge, Polished

Applications Slotting, Side Milling, Helical Interpolation, Ramping, High Performance, Roughing, Semi-Finishing, Finishing, Wet

Materials Aluminum, Copper, Magnesium, Brass

Coatings Diamond-Like Carbon (DLC)



A1 Series Tolerances:
Cutting Dia. = –.001/–.0015"
Shank Dia. = –.0001/–.0002"
Flute Length = +.060/–.000"
OAL = +/– .060"

MA1 Series Tolerances:
Cutting Dia. = –0.025/–0.038mm
Shank Dia. = –0.002/–0.005mm
Flute Length (<10D) = +0.750/–0.000mm
(>10D) = +1.500/–0.000mm
OAL = +/–1.000mm

A1-303 3 Flute Standard Length

Cutting Diameter	Shank Diameter	Flute Length	Corner Chamfer	Overall Length	Tool Number Uncoated	Tool Number DLC Coated
1/8"	1/8"	3/8"	.005"	1-1/2"	A1-303-04	A1-303-04-**DLC**
3/16"	3/16"	9/16"	.005"	2"	A1-303-06	A1-303-06-**DLC**
1/4"	1/4"	3/4"	.005"	2-1/2"	A1-303-08	A1-303-08-**DLC**
5/16"	5/16"	7/8"	.005"	2-1/2"	A1-303-10	A1-303-10-**DLC**
3/8"	3/8"	1"	.010"	2-1/2"	A1-303-12	A1-303-12-**DLC**
1/2"	1/2"	1-1/8"	.010"	3"	A1-303-16	A1-303-16-**DLC**
5/8"	5/8"	1-1/4"	.010"	3-1/2"	A1-303-20	A1-303-20-**DLC**
3/4"	3/4"	1-5/8"	.010"	4"	A1-303-24	A1-303-24-**DLC**
1"	1"	2"	.015"	4"	A1-303-32	A1-303-32-**DLC**

MA1-303 Metric 3 Flute Standard Length METRIC

Cutting Diameter	Shank Diameter	Flute Length	Corner Chamfer	Overall Length	Tool Number Uncoated	Tool Number DLC Coated
3mm	3mm	8mm	0.1mm	38mm	MA1-303-03	MA1-303-03-**DLC**
4mm	4mm	12mm	0.1mm	50mm	MA1-303-04	MA1-303-04-**DLC**
5mm	5mm	14mm	0.1mm	50mm	MA1-303-05	MA1-303-05-**DLC**
6mm	6mm	15mm	0.1mm	63mm	MA1-303-06	MA1-303-06-**DLC**
8mm	8mm	20mm	0.1mm	63mm	MA1-303-08	MA1-303-08-**DLC**
10mm	10mm	22mm	0.1mm	72mm	MA1-303-10	MA1-303-10-**DLC**
12mm	12mm	26mm	0.2mm	83mm	MA1-303-12	MA1-303-12-**DLC**
16mm	16mm	33mm	0.2mm	92mm	MA1-303-16	MA1-303-16-**DLC**
20mm	20mm	42mm	0.2mm	104mm	MA1-303-20	MA1-303-20-**DLC**

3 Flute High Performance Tools for Aluminum A1/MA1

A1-303 SPEEDS & FEEDS

Tool Diameter	Aluminum 6061-T6		Aluminum 6061-T3		Aluminum 7075		Aluminum 2024	
	RPM	CLPT	RPM	CLPT	RPM	CLPT	RPM	CLPT
1/8"	Max	0.0020"	Max	0.0018"	Max	0.0020"	Max	0.0020"
3/16"	Max	0.0030"	Max	0.0026"	Max	0.0030"	Max	0.0030"
1/4"	Max	0.0040"	Max	0.0035"	Max	0.0040"	Max	0.0040"
5/16"	Max	0.0050"	Max	0.0044"	Max	0.0050"	Max	0.0050"
3/8"	Max	0.0060"	Max	0.0053"	Max	0.0060"	Max	0.0060"
1/2"	Max	0.0080"	Max	0.0070"	Max	0.0080"	Max	0.0080"
5/8"	Max	0.0100"	Max	0.0088"	Max	0.0100"	Max	0.0100"
3/4"	Max	0.0120"	Max	0.0105"	Max	0.0120"	Max	0.0120"
1"	Max	0.0160"	Max	0.0140"	Max	0.0160"	Max	0.0160"

Axial depth of cut up to 1.5 × diameter of the tool with 50% radial step over.

MA1-303 SPEEDS & FEEDS

Tool Diameter	Aluminum 6061-T6		Aluminum 6061-T3		Aluminum 7075		Aluminum 2024	
	RPM	CLPT	RPM	CLPT	RPM	CLPT	RPM	CLPT
3mm	Max	0.048mm	Max	0.042mm	Max	0.048mm	Max	0.048mm
4mm	Max	0.064mm	Max	0.056mm	Max	0.064mm	Max	0.064mm
5mm	Max	0.080mm	Max	0.070mm	Max	0.080mm	Max	0.080mm
6mm	Max	0.096mm	Max	0.084mm	Max	0.096mm	Max	0.096mm
8mm	Max	0.128mm	Max	0.112mm	Max	0.128mm	Max	0.128mm
10mm	Max	0.160mm	Max	0.140mm	Max	0.160mm	Max	0.160mm
12mm	Max	0.192mm	Max	0.168mm	Max	0.192mm	Max	0.192mm
16mm	Max	0.256mm	Max	0.224mm	Max	0.256mm	Max	0.256mm
20mm	Max	0.320mm	Max	0.280mm	Max	0.320mm	Max	0.320mm

Axial depth of cut up to 1.5 × diameter of the tool with 50% radial step over.

See RobbJack Videos at
www.robbjack.com/videos

FM 2 Flute High Performance Tools for Aluminum

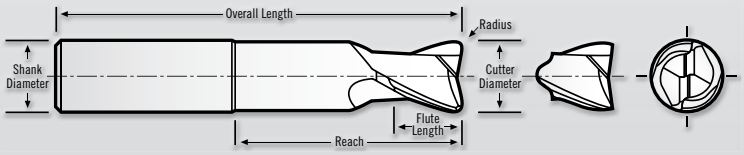
Characteristics: Square End, Corner Radius, Ball End, 2 Flute, 40° Helix, Feather Blend, Necked, Mirror Edge

Applications: Slotting, Side Milling, Helical Interpolation, Ramping, High Performance, 3-D, Roughing, Semi-Finishing, Finishing, Wet

Materials: Aluminum, Copper, Magnesium, Brass

Coatings: Diamond-Like Carbon (DLC)

FM Series comes with Mirror Edge! for Chatter Reduction



FM Series Tolerances:
Cutting Dia. = –.001/–.0015"
Shank Dia. = –.0001/–.0002"
Flute Length = +.060/–.000"
OAL = +/– .060"

Eliminate Tool Pull Out!
1/4"–5/16" h5 Shank Tolerance
3/8"–1" h4 Shank Tolerance
Tightest in the Industry!

NEW!

FM 2 Flute (Short to Long Reach)

	Cutting Diameter	Shank Diameter	Flute Length	Corner Radius	Reach Length*	Overall Length	Tool Number Uncoated	Tool Number DLC Coated	
SHORT	1/4"	1/4"	1/4"	Sq. End	0.625"	3"	FM-201-08	FM-201-08-**DLC**	1/4" DIAMETER
	1/4"	1/4"	1/4"	0.03"	0.625"	3"	FM-201-08-030	FM-201-08-030-**DLC**	
	1/4"	1/4"	1/4"	0.06"	0.625"	3"	FM-201-08-060	FM-201-08-060-**DLC**	
	1/4"	1/4"	1/4"	0.09"	0.625"	3"	FM-201-08-090	FM-201-08-090-**DLC**	
	1/4"	1/4"	1/4"	Ball End	0.625"	3"	FM-201-08-BN	FM-201-08-BN-**DLC**	
MEDIUM	1/4"	1/4"	1/4"	Sq. End	0.875"	3"	FM-202-08	FM-202-08-**DLC**	
	1/4"	1/4"	1/4"	0.03"	0.875"	3"	FM-202-08-030	FM-202-08-030-**DLC**	
	1/4"	1/4"	1/4"	0.06"	0.875"	3"	FM-202-08-060	FM-202-08-060-**DLC**	
	1/4"	1/4"	1/4"	0.09"	0.875"	3"	FM-202-08-090	FM-202-08-090-**DLC**	
	1/4"	1/4"	1/4"	Ball End	0.875"	3"	FM-202-08-BN	FM-202-08-BN-**DLC**	
LONG	1/4"	1/4"	1/4"	Sq. End	1.063"	3"	FM-204-08	FM-204-08-**DLC**	
	1/4"	1/4"	1/4"	0.03"	1.063"	3"	FM-204-08-030	FM-204-08-030-**DLC**	
	1/4"	1/4"	1/4"	0.06"	1.063"	3"	FM-204-08-060	FM-204-08-060-**DLC**	
	1/4"	1/4"	1/4"	0.09"	1.063"	3"	FM-204-08-090	FM-204-08-090-**DLC**	
	1/4"	1/4"	1/4"	Ball End	1.063"	3"	FM-204-08-BN	FM-204-08-BN-**DLC**	
EXTRA LONG	1/4"	1/4"	1/4"	Sq. End	1.500"	3"	FM-205-08	FM-205-08-**DLC**	
	1/4"	1/4"	1/4"	0.03"	1.500"	3"	FM-205-08-030	FM-205-08-030-**DLC**	
	1/4"	1/4"	1/4"	0.06"	1.500"	3"	FM-205-08-060	FM-205-08-060-**DLC**	
	1/4"	1/4"	1/4"	0.09"	1.500"	3"	FM-205-08-090	FM-205-08-090-**DLC**	
	1/4"	1/4"	1/4"	Ball End	1.500"	3"	FM-205-08-BN	FM-205-08-BN-**DLC**	
SHORT	5/16"	5/16"	5/16"	Sq. End	0.875"	3-1/8"	FM-201-10	FM-201-10-**DLC**	5/16" DIAMETER
	5/16"	5/16"	5/16"	0.03"	0.875"	3-1/8"	FM-201-10-030	FM-201-10-030-**DLC**	
	5/16"	5/16"	5/16"	0.06"	0.875"	3-1/8"	FM-201-10-060	FM-201-10-060-**DLC**	
	5/16"	5/16"	5/16"	0.09"	0.875"	3-1/8"	FM-201-10-090	FM-201-10-090-**DLC**	
	5/16"	5/16"	5/16"	0.12"	0.875"	3-1/8"	FM-201-10-120	FM-201-10-120-**DLC**	
	5/16"	5/16"	5/16"	Ball End	0.875"	3-1/8"	FM-201-10-BN	FM-201-10-BN-**DLC**	
MEDIUM	5/16"	5/16"	5/16"	Sq. End	1.094"	3-1/8"	FM-202-10	FM-202-10-**DLC**	
	5/16"	5/16"	5/16"	0.03"	1.094"	3-1/8"	FM-202-10-030	FM-202-10-030-**DLC**	
	5/16"	5/16"	5/16"	0.06"	1.094"	3-1/8"	FM-202-10-060	FM-202-10-060-**DLC**	
	5/16"	5/16"	5/16"	0.09"	1.094"	3-1/8"	FM-202-10-090	FM-202-10-090-**DLC**	
	5/16"	5/16"	5/16"	0.12"	1.094"	3-1/8"	FM-202-10-120	FM-202-10-120-**DLC**	
	5/16"	5/16"	5/16"	Ball End	1.094"	3-1/8"	FM-202-10-BN	FM-202-10-BN-**DLC**	

**Other Reach Lengths available upon request.*

CONTINUED ON NEXT PAGE—

2 Flute High Performance Tools for Aluminum FM

NEW!

FM 2 Flute (Short to Long Reach) —CONTINUED FROM PREVIOUS

	Cutting Diameter	Shank Diameter	Flute Length	Corner Radius	Reach Length*	Overall Length	Tool Number Uncoated	Tool Number DLC Coated	
LONG	5/16"	5/16"	5/16"	Sq. End	1.313"	3-1/8"	FM-204-10	FM-204-10-**DLC**	5/16" DIAMETER
	5/16"	5/16"	5/16"	0.03"	1.313"	3-1/8"	FM-204-10-030	FM-204-10-030-**DLC**	
	5/16"	5/16"	5/16"	0.06"	1.313"	3-1/8"	FM-204-10-060	FM-204-10-060-**DLC**	
	5/16"	5/16"	5/16"	0.09"	1.313"	3-1/8"	FM-204-10-090	FM-204-10-090-**DLC**	
	5/16"	5/16"	5/16"	0.12"	1.313"	3-1/8"	FM-204-10-120	FM-204-10-120-**DLC**	
	5/16"	5/16"	5/16"	Ball End	1.313"	3-1/8"	FM-204-10-BN	FM-204-10-BN-**DLC**	
EXTRA LONG	5/16"	5/16"	5/16"	Sq. End	1.625"	3-1/8"	FM-205-10	FM-205-10-**DLC**	
	5/16"	5/16"	5/16"	0.03"	1.625"	3-1/8"	FM-205-10-030	FM-205-10-030-**DLC**	
	5/16"	5/16"	5/16"	0.06"	1.625"	3-1/8"	FM-205-10-060	FM-205-10-060-**DLC**	
	5/16"	5/16"	5/16"	0.09"	1.625"	3-1/8"	FM-205-10-090	FM-205-10-090-**DLC**	
	5/16"	5/16"	5/16"	0.12"	1.625"	3-1/8"	FM-205-10-120	FM-205-10-120-**DLC**	
	5/16"	5/16"	5/16"	Ball End	1.625"	3-1/8"	FM-205-10-BN	FM-205-10-BN-**DLC**	
SHORT	3/8"	3/8"	3/8"	Sq. End	1.000"	4"	FM-201-12	FM-201-12-**DLC**	3/8" DIAMETER
	3/8"	3/8"	3/8"	0.03"	1.000"	4"	FM-201-12-030	FM-201-12-030-**DLC**	
	3/8"	3/8"	3/8"	0.06"	1.000"	4"	FM-201-12-060	FM-201-12-060-**DLC**	
	3/8"	3/8"	3/8"	0.09"	1.000"	4"	FM-201-12-090	FM-201-12-090-**DLC**	
	3/8"	3/8"	3/8"	0.12"	1.000"	4"	FM-201-12-120	FM-201-12-120-**DLC**	
	3/8"	3/8"	3/8"	Ball End	1.000"	4"	FM-201-12-BN	FM-201-12-BN-**DLC**	
MEDIUM	3/8"	3/8"	3/8"	Sq. End	1.250"	4"	FM-202-12	FM-202-12-**DLC**	
	3/8"	3/8"	3/8"	0.03"	1.250"	4"	FM-202-12-030	FM-202-12-030-**DLC**	
	3/8"	3/8"	3/8"	0.06"	1.250"	4"	FM-202-12-060	FM-202-12-060-**DLC**	
	3/8"	3/8"	3/8"	0.09"	1.250"	4"	FM-202-12-090	FM-202-12-090-**DLC**	
	3/8"	3/8"	3/8"	0.12"	1.250"	4"	FM-202-12-120	FM-202-12-120-**DLC**	
	3/8"	3/8"	3/8"	Ball End	1.250"	4"	FM-202-12-BN	FM-202-12-BN-**DLC**	
LONG	3/8"	3/8"	3/8"	Sq. End	1.563"	4"	FM-204-12	FM-204-12-**DLC**	
	3/8"	3/8"	3/8"	0.03"	1.563"	4"	FM-204-12-030	FM-204-12-030-**DLC**	
	3/8"	3/8"	3/8"	0.06"	1.563"	4"	FM-204-12-060	FM-204-12-060-**DLC**	
	3/8"	3/8"	3/8"	0.09"	1.563"	4"	FM-204-12-090	FM-204-12-090-**DLC**	
	3/8"	3/8"	3/8"	0.12"	1.563"	4"	FM-204-12-120	FM-204-12-120-**DLC**	
	3/8"	3/8"	3/8"	Ball End	1.563"	4"	FM-204-12-BN	FM-204-12-BN-**DLC**	
EXTRA LONG	3/8"	3/8"	3/8"	Sq. End	2.125"	4"	FM-205-12	FM-205-12-**DLC**	
	3/8"	3/8"	3/8"	0.03"	2.125"	4"	FM-205-12-030	FM-205-12-030-**DLC**	
	3/8"	3/8"	3/8"	0.06"	2.125"	4"	FM-205-12-060	FM-205-12-060-**DLC**	
	3/8"	3/8"	3/8"	0.09"	2.125"	4"	FM-205-12-090	FM-205-12-090-**DLC**	
	3/8"	3/8"	3/8"	0.12"	2.125"	4"	FM-205-12-120	FM-205-12-120-**DLC**	
	3/8"	3/8"	3/8"	Ball End	2.125"	4"	FM-205-12-BN	FM-205-12-BN-**DLC**	
SHORT	1/2"	1/2"	1/2"	Sq. End	1.250"	5"	FM-201-16	FM-201-16-**DLC**	1/2" DIAMETER
	1/2"	1/2"	1/2"	0.03"	1.250"	5"	FM-201-16-030	FM-201-16-030-**DLC**	
	1/2"	1/2"	1/2"	0.06"	1.250"	5"	FM-201-16-060	FM-201-16-060-**DLC**	
	1/2"	1/2"	1/2"	0.09"	1.250"	5"	FM-201-16-090	FM-201-16-090-**DLC**	
	1/2"	1/2"	1/2"	0.12"	1.250"	5"	FM-201-16-120	FM-201-16-120-**DLC**	
	1/2"	1/2"	1/2"	Ball End	1.250"	5"	FM-201-16-BN	FM-201-16-BN-**DLC**	
MEDIUM	1/2"	1/2"	1/2"	Sq. End	1.625"	5"	FM-202-16	FM-202-16-**DLC**	
	1/2"	1/2"	1/2"	0.03"	1.625"	5"	FM-202-16-030	FM-202-16-030-**DLC**	
	1/2"	1/2"	1/2"	0.06"	1.625"	5"	FM-202-16-060	FM-202-16-060-**DLC**	
	1/2"	1/2"	1/2"	0.09"	1.625"	5"	FM-202-16-090	FM-202-16-090-**DLC**	
	1/2"	1/2"	1/2"	0.12"	1.625"	5"	FM-202-16-120	FM-202-16-120-**DLC**	
	1/2"	1/2"	1/2"	Ball End	1.625"	5"	FM-202-16-BN	FM-202-16-BN-**DLC**	
LONG	1/2"	1/2"	1/2"	Sq. End	2.125"	5"	FM-204-16	FM-204-16-**DLC**	
	1/2"	1/2"	1/2"	0.03"	2.125"	5"	FM-204-16-030	FM-204-16-030-**DLC**	
	1/2"	1/2"	1/2"	0.06"	2.125"	5"	FM-204-16-060	FM-204-16-060-**DLC**	
	1/2"	1/2"	1/2"	0.09"	2.125"	5"	FM-204-16-090	FM-204-16-090-**DLC**	
	1/2"	1/2"	1/2"	0.12"	2.125"	5"	FM-204-16-120	FM-204-16-120-**DLC**	
	1/2"	1/2"	1/2"	Ball End	2.125"	5"	FM-204-16-BN	FM-204-16-BN-**DLC**	

**Other Reach Lengths available upon request.*

CONTINUED ON NEXT PAGE—

FM 2 Flute High Performance Tools for Aluminum

NEW!

FM 2 Flute (Short to Long Reach) —CONTINUED FROM PREVIOUS

	Cutting Diameter	Shank Diameter	Flute Length	Corner Radius	Reach Length*	Overall Length	Tool Number Uncoated	Tool Number DLC Coated	
EXTRA LONG	1/2"	1/2"	1/2"	Sq. End	2.625"	5"	FM-205-16	FM-205-16-**DLC**	1/2" DIAMETER
	1/2"	1/2"	1/2"	0.03"	2.625"	5"	FM-205-16-030	FM-205-16-030-**DLC**	
	1/2"	1/2"	1/2"	0.06"	2.625"	5"	FM-205-16-060	FM-205-16-060-**DLC**	
	1/2"	1/2"	1/2"	0.09"	2.625"	5"	FM-205-16-090	FM-205-16-090-**DLC**	
	1/2"	1/2"	1/2"	0.12"	2.625"	5"	FM-205-16-120	FM-205-16-120-**DLC**	
	1/2"	1/2"	1/2"	Ball End	2.625"	5"	FM-205-16-BN	FM-205-16-BN-**DLC**	
SHORT	5/8"	5/8"	5/8"	Sq. End	1.500"	6"	FM-201-20	FM-201-20-**DLC**	5/8" DIAMETER
	5/8"	5/8"	5/8"	0.03"	1.500"	6"	FM-201-20-030	FM-201-20-030-**DLC**	
	5/8"	5/8"	5/8"	0.06"	1.500"	6"	FM-201-20-060	FM-201-20-060-**DLC**	
	5/8"	5/8"	5/8"	0.09"	1.500"	6"	FM-201-20-090	FM-201-20-090-**DLC**	
	5/8"	5/8"	5/8"	0.12"	1.500"	6"	FM-201-20-120	FM-201-20-120-**DLC**	
	5/8"	5/8"	5/8"	Ball End	1.500"	6"	FM-201-20-BN	FM-201-20-BN-**DLC**	
MEDIUM	5/8"	5/8"	5/8"	Sq. End	2.063"	6"	FM-202-20	FM-202-20-**DLC**	
	5/8"	5/8"	5/8"	0.03"	2.063"	6"	FM-202-20-030	FM-202-20-030-**DLC**	
	5/8"	5/8"	5/8"	0.06"	2.063"	6"	FM-202-20-060	FM-202-20-060-**DLC**	
	5/8"	5/8"	5/8"	0.09"	2.063"	6"	FM-202-20-090	FM-202-20-090-**DLC**	
	5/8"	5/8"	5/8"	0.12"	2.063"	6"	FM-202-20-120	FM-202-20-120-**DLC**	
	5/8"	5/8"	5/8"	Ball End	2.063"	6"	FM-202-20-BN	FM-202-20-BN-**DLC**	
LONG	5/8"	5/8"	5/8"	Sq. End	2.625"	6"	FM-204-20	FM-204-20-**DLC**	
	5/8"	5/8"	5/8"	0.03"	2.625"	6"	FM-204-20-030	FM-204-20-030-**DLC**	
	5/8"	5/8"	5/8"	0.06"	2.625"	6"	FM-204-20-060	FM-204-20-060-**DLC**	
	5/8"	5/8"	5/8"	0.09"	2.625"	6"	FM-204-20-090	FM-204-20-090-**DLC**	
	5/8"	5/8"	5/8"	0.12"	2.625"	6"	FM-204-20-120	FM-204-20-120-**DLC**	
	5/8"	5/8"	5/8"	Ball End	2.625"	6"	FM-204-20-BN	FM-204-20-BN-**DLC**	
EXTRA LONG	5/8"	5/8"	5/8"	Sq. End	3.125"	6"	FM-205-20	FM-205-20-**DLC**	
	5/8"	5/8"	5/8"	0.03"	3.125"	6"	FM-205-20-030	FM-205-20-030-**DLC**	
	5/8"	5/8"	5/8"	0.06"	3.125"	6"	FM-205-20-060	FM-205-20-060-**DLC**	
	5/8"	5/8"	5/8"	0.09"	3.125"	6"	FM-205-20-090	FM-205-20-090-**DLC**	
	5/8"	5/8"	5/8"	0.12"	3.125"	6"	FM-205-20-120	FM-205-20-120-**DLC**	
	5/8"	5/8"	5/8"	Ball End	3.125"	6"	FM-205-20-BN	FM-205-20-BN-**DLC**	
SHORT	3/4"	3/4"	3/4"	Sq. End	2.000"	6"	FM-201-24	FM-201-24-**DLC**	3/4" DIAMETER
	3/4"	3/4"	3/4"	0.03"	2.000"	6"	FM-201-24-030	FM-201-24-030-**DLC**	
	3/4"	3/4"	3/4"	0.06"	2.000"	6"	FM-201-24-060	FM-201-24-060-**DLC**	
	3/4"	3/4"	3/4"	0.09"	2.000"	6"	FM-201-24-090	FM-201-24-090-**DLC**	
	3/4"	3/4"	3/4"	0.12"	2.000"	6"	FM-201-24-120	FM-201-24-120-**DLC**	
	3/4"	3/4"	3/4"	Ball End	2.000"	6"	FM-201-24-BN	FM-201-24-BN-**DLC**	
MEDIUM	3/4"	3/4"	3/4"	Sq. End	2.563"	6"	FM-202-24	FM-202-24-**DLC**	
	3/4"	3/4"	3/4"	0.03"	2.563"	6"	FM-202-24-030	FM-202-24-030-**DLC**	
	3/4"	3/4"	3/4"	0.06"	2.563"	6"	FM-202-24-060	FM-202-24-060-**DLC**	
	3/4"	3/4"	3/4"	0.09"	2.563"	6"	FM-202-24-090	FM-202-24-090-**DLC**	
	3/4"	3/4"	3/4"	0.12"	2.563"	6"	FM-202-24-120	FM-202-24-120-**DLC**	
	3/4"	3/4"	3/4"	Ball End	2.563"	6"	FM-202-24-BN	FM-202-24-BN-**DLC**	
LONG	3/4"	3/4"	3/4"	Sq. End	3.125"	6"	FM-204-24	FM-204-24-**DLC**	
	3/4"	3/4"	3/4"	0.03"	3.125"	6"	FM-204-24-030	FM-204-24-030-**DLC**	
	3/4"	3/4"	3/4"	0.06"	3.125"	6"	FM-204-24-060	FM-204-24-060-**DLC**	
	3/4"	3/4"	3/4"	0.09"	3.125"	6"	FM-204-24-090	FM-204-24-090-**DLC**	
	3/4"	3/4"	3/4"	0.12"	3.125"	6"	FM-204-24-120	FM-204-24-120-**DLC**	
	3/4"	3/4"	3/4"	Ball End	3.125"	6"	FM-204-24-BN	FM-204-24-BN-**DLC**	
EXTRA LONG	3/4"	3/4"	3/4"	Sq. End	3.750"	6"	FM-205-24	FM-205-24-**DLC**	
	3/4"	3/4"	3/4"	0.03"	3.750"	6"	FM-205-24-030	FM-205-24-030-**DLC**	
	3/4"	3/4"	3/4"	0.06"	3.750"	6"	FM-205-24-060	FM-205-24-060-**DLC**	
	3/4"	3/4"	3/4"	0.09"	3.750"	6"	FM-205-24-090	FM-205-24-090-**DLC**	
	3/4"	3/4"	3/4"	0.12"	3.750"	6"	FM-205-24-120	FM-205-24-120-**DLC**	
	3/4"	3/4"	3/4"	Ball End	3.750"	6"	FM-205-24-BN	FM-205-24-BN-**DLC**	

**Other Reach Lengths available upon request.*

CONTINUED ON NEXT PAGE—

2 Flute High Performance Tools for Aluminum FM

NEW!

FM 2 Flute (Short to Long Reach) —CONTINUED FROM PREVIOUS

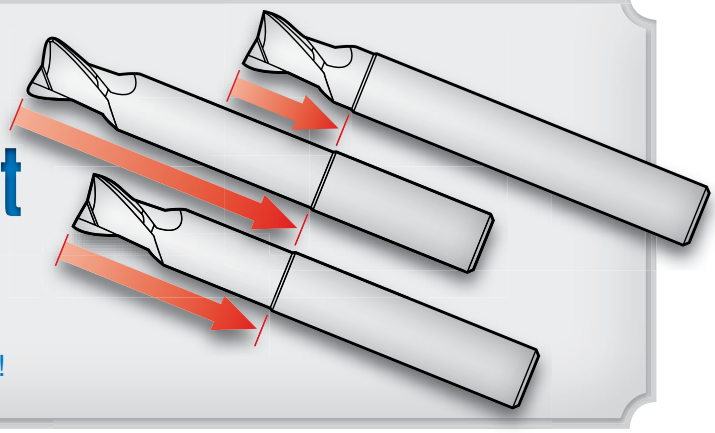
	Cutting Diameter	Shank Diameter	Flute Length	Corner Radius	Reach Length*	Overall Length	Tool Number Uncoated	Tool Number DLC Coated
SHORT	1"	1"	1"	Sq. End	2.000"	6"	FM-201-32	FM-201-32-**DLC**
	1"	1"	1"	0.03"	2.000"	6"	FM-201-32-030	FM-201-32-030-**DLC**
	1"	1"	1"	0.06"	2.000"	6"	FM-201-32-060	FM-201-32-060-**DLC**
	1"	1"	1"	0.09"	2.000"	6"	FM-201-32-090	FM-201-32-090-**DLC**
	1"	1"	1"	0.12"	2.000"	6"	FM-201-32-120	FM-201-32-120-**DLC**
	1"	1"	1"	Ball End	2.000"	6"	FM-201-32-BN	FM-201-32-BN-**DLC**
MEDIUM	1"	1"	1"	Sq. End	3.000"	6"	FM-202-32	FM-202-32-**DLC**
	1"	1"	1"	0.03"	3.000"	6"	FM-202-32-030	FM-202-32-030-**DLC**
	1"	1"	1"	0.06"	3.000"	6"	FM-202-32-060	FM-202-32-060-**DLC**
	1"	1"	1"	0.09"	3.000"	6"	FM-202-32-090	FM-202-32-090-**DLC**
	1"	1"	1"	0.12"	3.000"	6"	FM-202-32-120	FM-202-32-120-**DLC**
	1"	1"	1"	Ball End	3.000"	6"	FM-202-32-BN	FM-202-32-BN-**DLC**
LONG	1"	1"	1"	Sq. End	3.500"	6"	FM-203-32	FM-203-32-**DLC**
	1"	1"	1"	0.03"	3.500"	6"	FM-203-32-030	FM-203-32-030-**DLC**
	1"	1"	1"	0.06"	3.500"	6"	FM-203-32-060	FM-203-32-060-**DLC**
	1"	1"	1"	0.09"	3.500"	6"	FM-203-32-090	FM-203-32-090-**DLC**
	1"	1"	1"	0.12"	3.500"	6"	FM-203-32-120	FM-203-32-120-**DLC**
	1"	1"	1"	Ball End	3.500"	6"	FM-203-32-BN	FM-203-32-BN-**DLC**
EXTRA LONG	1"	1"	1"	Sq. End	4.000"	6"	FM-204-32	FM-204-32-**DLC**
	1"	1"	1"	0.03"	4.000"	6"	FM-204-32-030	FM-204-32-030-**DLC**
	1"	1"	1"	0.06"	4.000"	6"	FM-204-32-060	FM-204-32-060-**DLC**
	1"	1"	1"	0.09"	4.000"	6"	FM-204-32-090	FM-204-32-090-**DLC**
	1"	1"	1"	0.12"	4.000"	6"	FM-204-32-120	FM-204-32-120-**DLC**
	1"	1"	1"	Ball End	4.000"	6"	FM-204-32-BN	FM-204-32-BN-**DLC**

1" DIAMETER

**Other Reach Lengths available upon request.*

Need a Different Reach?

Any neck length available at same price!



Eliminate Tool Pull Out!

1/4"–5/16" h5 Shank Tolerance

3/8"–1" h4 Shank Tolerance

Tightest in the Industry!

FM SERIES SPEEDS & FEEDS

Tool Diameter	Typical Z-Depth	Aluminum 6061-T6		Aluminum 6061-T3		Aluminum 7075		Aluminum 2024	
		RPM	CLPT	RPM	CLPT	RPM	CLPT	RPM	CLPT
1/4"	0.1500"	Max	0.0040"	Max	0.0035"	Max	0.0040"	Max	0.0040"
5/16"	0.1500"	Max	0.0050"	Max	0.0044"	Max	0.0050"	Max	0.0050"
3/8"	0.1875"	Max	0.0060"	Max	0.0053"	Max	0.0060"	Max	0.0060"
1/2"	0.2000"	Max	0.0080"	Max	0.0070"	Max	0.0080"	Max	0.0080"
5/8"	0.2000"	Max	0.0100"	Max	0.0088"	Max	0.0100"	Max	0.0100"
3/4"	0.2500"	Max	0.0120"	Max	0.0105"	Max	0.0120"	Max	0.0120"
1"	0.2500"	Max	0.0160"	Max	0.0140"	Max	0.0160"	Max	0.0160"

Z-Depth of cut per pass should be deeper than the corner radius to help reduce chatter

FM 3 Flute High Performance Tools for Aluminum

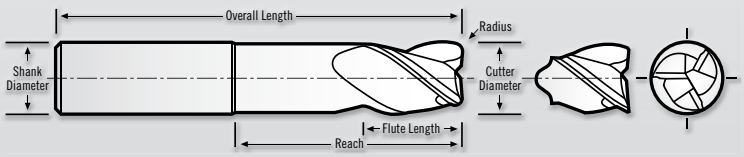
Characteristics: Square End, Corner Radius, Ball End, 3 Flute, 40° Helix, Feather Blend, Necked, Mirror Edge

Applications: Slotting, Side Milling, Helical Interpolation, Ramping, High Performance, Roughing, Semi-Finishing, Finishing, Wet

Materials: Aluminum, Copper, Magnesium, Brass

Coatings: Diamond-Like Carbon (DLC)

FM Series comes with Mirror Edge! for Chatter Reduction



FM Series Tolerances:

Cutting Dia. = –.001/–.0015"
Shank Dia. = –.0001/–.0002"
Flute Length = +.060/–.000"
OAL = ±.060"

Eliminate Tool Pull Out!
1/4"–5/16" h5 Shank Tolerance
3/8"–1" h4 Shank Tolerance
Tightest in the Industry!

NEW!

FM 3 Flute (Short to Long Reach)

	Cutting Diameter	Shank Diameter	Flute Length	Corner Radius	Reach Length*	Overall Length	Tool Number Uncoated	Tool Number DLC Coated	
SHORT	1/4"	1/4"	1/4"	Sq. End	0.625"	3"	FM-301-08	FM-301-08-**DLC**	1/4" DIAMETER
	1/4"	1/4"	1/4"	0.03"	0.625"	3"	FM-301-08-030	FM-301-08-030-**DLC**	
	1/4"	1/4"	1/4"	0.06"	0.625"	3"	FM-301-08-060	FM-301-08-060-**DLC**	
	1/4"	1/4"	1/4"	0.09"	0.625"	3"	FM-301-08-090	FM-301-08-090-**DLC**	
	1/4"	1/4"	1/4"	Ball End	0.625"	3"	FM-301-08-BN	FM-301-08-BN-**DLC**	
MEDIUM	1/4"	1/4"	1/4"	Sq. End	0.875"	3"	FM-302-08	FM-302-08-**DLC**	
	1/4"	1/4"	1/4"	0.03"	0.875"	3"	FM-302-08-030	FM-302-08-030-**DLC**	
	1/4"	1/4"	1/4"	0.06"	0.875"	3"	FM-302-08-060	FM-302-08-060-**DLC**	
	1/4"	1/4"	1/4"	0.09"	0.875"	3"	FM-302-08-090	FM-302-08-090-**DLC**	
	1/4"	1/4"	1/4"	Ball End	0.875"	3"	FM-302-08-BN	FM-302-08-BN-**DLC**	
LONG	1/4"	1/4"	1/4"	Sq. End	1.063"	3"	FM-304-08	FM-304-08-**DLC**	
	1/4"	1/4"	1/4"	0.03"	1.063"	3"	FM-304-08-030	FM-304-08-030-**DLC**	
	1/4"	1/4"	1/4"	0.06"	1.063"	3"	FM-304-08-060	FM-304-08-060-**DLC**	
	1/4"	1/4"	1/4"	0.09"	1.063"	3"	FM-304-08-090	FM-304-08-090-**DLC**	
	1/4"	1/4"	1/4"	Ball End	1.063"	3"	FM-304-08-BN	FM-304-08-BN-**DLC**	
EXTRA LONG	1/4"	1/4"	1/4"	Sq. End	1.500"	3"	FM-305-08	FM-305-08-**DLC**	
	1/4"	1/4"	1/4"	0.03"	1.500"	3"	FM-305-08-030	FM-305-08-030-**DLC**	
	1/4"	1/4"	1/4"	0.06"	1.500"	3"	FM-305-08-060	FM-305-08-060-**DLC**	
	1/4"	1/4"	1/4"	0.09"	1.500"	3"	FM-305-08-090	FM-305-08-090-**DLC**	
	1/4"	1/4"	1/4"	Ball End	1.500"	3"	FM-305-08-BN	FM-305-08-BN-**DLC**	
SHORT	5/16"	5/16"	5/16"	Sq. End	0.875"	3-1/8"	FM-301-10	FM-301-10-**DLC**	5/16" DIAMETER
	5/16"	5/16"	5/16"	0.03"	0.875"	3-1/8"	FM-301-10-030	FM-301-10-030-**DLC**	
	5/16"	5/16"	5/16"	0.06"	0.875"	3-1/8"	FM-301-10-060	FM-301-10-060-**DLC**	
	5/16"	5/16"	5/16"	0.09"	0.875"	3-1/8"	FM-301-10-090	FM-301-10-090-**DLC**	
	5/16"	5/16"	5/16"	0.12"	0.875"	3-1/8"	FM-301-10-120	FM-301-10-120-**DLC**	
	5/16"	5/16"	5/16"	Ball End	0.875"	3-1/8"	FM-301-10-BN	FM-301-10-BN-**DLC**	
MEDIUM	5/16"	5/16"	5/16"	Sq. End	1.094"	3-1/8"	FM-302-10	FM-302-10-**DLC**	
	5/16"	5/16"	5/16"	0.03"	1.094"	3-1/8"	FM-302-10-030	FM-302-10-030-**DLC**	
	5/16"	5/16"	5/16"	0.06"	1.094"	3-1/8"	FM-302-10-060	FM-302-10-060-**DLC**	
	5/16"	5/16"	5/16"	0.09"	1.094"	3-1/8"	FM-302-10-090	FM-302-10-090-**DLC**	
	5/16"	5/16"	5/16"	0.12"	1.094"	3-1/8"	FM-302-10-120	FM-302-10-120-**DLC**	
	5/16"	5/16"	5/16"	Ball End	1.094"	3-1/8"	FM-302-10-BN	FM-302-10-BN-**DLC**	

**Other Reach Lengths available on request.*

CONTINUED ON NEXT PAGE—

3 Flute High Performance Tools for Aluminum FM

NEW!

FM 3 Flute (Short to Long Reach) —CONTINUED FROM PREVIOUS

	Cutting Diameter	Shank Diameter	Flute Length	Corner Radius	Reach Length*	Overall Length	Tool Number Uncoated	Tool Number DLC Coated	
LONG	5/16"	5/16"	5/16"	Sq. End	1.313"	3-1/8"	FM-304-10	FM-304-10-**DLC**	5/16" DIAMETER
	5/16"	5/16"	5/16"	0.03"	1.313"	3-1/8"	FM-304-10-030	FM-304-10-030-**DLC**	
	5/16"	5/16"	5/16"	0.06"	1.313"	3-1/8"	FM-304-10-060	FM-304-10-060-**DLC**	
	5/16"	5/16"	5/16"	0.09"	1.313"	3-1/8"	FM-304-10-090	FM-304-10-090-**DLC**	
	5/16"	5/16"	5/16"	0.12"	1.313"	3-1/8"	FM-304-10-120	FM-304-10-120-**DLC**	
	5/16"	5/16"	5/16"	Ball End	1.313"	3-1/8"	FM-304-10-BN	FM-304-10-BN-**DLC**	
EXTRA LONG	5/16"	5/16"	5/16"	Sq. End	1.625"	3-1/8"	FM-305-10	FM-305-10-**DLC**	
	5/16"	5/16"	5/16"	0.03"	1.625"	3-1/8"	FM-305-10-030	FM-305-10-030-**DLC**	
	5/16"	5/16"	5/16"	0.06"	1.625"	3-1/8"	FM-305-10-060	FM-305-10-060-**DLC**	
	5/16"	5/16"	5/16"	0.09"	1.625"	3-1/8"	FM-305-10-090	FM-305-10-090-**DLC**	
	5/16"	5/16"	5/16"	0.12"	1.625"	3-1/8"	FM-305-10-120	FM-305-10-120-**DLC**	
	5/16"	5/16"	5/16"	Ball End	1.625"	3-1/8"	FM-305-10-BN	FM-305-10-BN-**DLC**	
SHORT	3/8"	3/8"	3/8"	Sq. End	1.000"	4"	FM-301-12	FM-301-12-**DLC**	3/8" DIAMETER
	3/8"	3/8"	3/8"	0.03"	1.000"	4"	FM-301-12-030	FM-301-12-030-**DLC**	
	3/8"	3/8"	3/8"	0.06"	1.000"	4"	FM-301-12-060	FM-301-12-060-**DLC**	
	3/8"	3/8"	3/8"	0.09"	1.000"	4"	FM-301-12-090	FM-301-12-090-**DLC**	
	3/8"	3/8"	3/8"	0.12"	1.000"	4"	FM-301-12-120	FM-301-12-120-**DLC**	
	3/8"	3/8"	3/8"	Ball End	1.000"	4"	FM-301-12-BN	FM-301-12-BN-**DLC**	
MEDIUM	3/8"	3/8"	3/8"	Sq. End	1.250"	4"	FM-302-12	FM-302-12-**DLC**	
	3/8"	3/8"	3/8"	0.03"	1.250"	4"	FM-302-12-030	FM-302-12-030-**DLC**	
	3/8"	3/8"	3/8"	0.06"	1.250"	4"	FM-302-12-060	FM-302-12-060-**DLC**	
	3/8"	3/8"	3/8"	0.09"	1.250"	4"	FM-302-12-090	FM-302-12-090-**DLC**	
	3/8"	3/8"	3/8"	0.12"	1.250"	4"	FM-302-12-120	FM-302-12-120-**DLC**	
	3/8"	3/8"	3/8"	Ball End	1.250"	4"	FM-302-12-BN	FM-302-12-BN-**DLC**	
LONG	3/8"	3/8"	3/8"	Sq. End	1.563"	4"	FM-304-12	FM-304-12-**DLC**	
	3/8"	3/8"	3/8"	0.03"	1.563"	4"	FM-304-12-030	FM-304-12-030-**DLC**	
	3/8"	3/8"	3/8"	0.06"	1.563"	4"	FM-304-12-060	FM-304-12-060-**DLC**	
	3/8"	3/8"	3/8"	0.09"	1.563"	4"	FM-304-12-090	FM-304-12-090-**DLC**	
	3/8"	3/8"	3/8"	0.12"	1.563"	4"	FM-304-12-120	FM-304-12-120-**DLC**	
	3/8"	3/8"	3/8"	Ball End	1.563"	4"	FM-304-12-BN	FM-304-12-BN-**DLC**	
EXTRA LONG	3/8"	3/8"	3/8"	Sq. End	2.125"	4"	FM-305-12	FM-305-12-**DLC**	
	3/8"	3/8"	3/8"	0.03"	2.125"	4"	FM-305-12-030	FM-305-12-030-**DLC**	
	3/8"	3/8"	3/8"	0.06"	2.125"	4"	FM-305-12-060	FM-305-12-060-**DLC**	
	3/8"	3/8"	3/8"	0.09"	2.125"	4"	FM-305-12-090	FM-305-12-090-**DLC**	
	3/8"	3/8"	3/8"	0.12"	2.125"	4"	FM-305-12-120	FM-305-12-120-**DLC**	
	3/8"	3/8"	3/8"	Ball End	2.125"	4"	FM-305-12-BN	FM-305-12-BN-**DLC**	
SHORT	1/2"	1/2"	1/2"	Sq. End	1.250"	5"	FM-301-16	FM-301-16-**DLC**	1/2" DIAMETER
	1/2"	1/2"	1/2"	0.03"	1.250"	5"	FM-301-16-030	FM-301-16-030-**DLC**	
	1/2"	1/2"	1/2"	0.06"	1.250"	5"	FM-301-16-060	FM-301-16-060-**DLC**	
	1/2"	1/2"	1/2"	0.09"	1.250"	5"	FM-301-16-090	FM-301-16-090-**DLC**	
	1/2"	1/2"	1/2"	0.12"	1.250"	5"	FM-301-16-120	FM-301-16-120-**DLC**	
	1/2"	1/2"	1/2"	Ball End	1.250"	5"	FM-301-16-BN	FM-301-16-BN-**DLC**	
MEDIUM	1/2"	1/2"	1/2"	Sq. End	1.625"	5"	FM-302-16	FM-302-16-**DLC**	
	1/2"	1/2"	1/2"	0.03"	1.625"	5"	FM-302-16-030	FM-302-16-030-**DLC**	
	1/2"	1/2"	1/2"	0.06"	1.625"	5"	FM-302-16-060	FM-302-16-060-**DLC**	
	1/2"	1/2"	1/2"	0.09"	1.625"	5"	FM-302-16-090	FM-302-16-090-**DLC**	
	1/2"	1/2"	1/2"	0.12"	1.625"	5"	FM-302-16-120	FM-302-16-120-**DLC**	
	1/2"	1/2"	1/2"	Ball End	1.625"	5"	FM-302-16-BN	FM-302-16-BN-**DLC**	
LONG	1/2"	1/2"	1/2"	Sq. End	2.125"	5"	FM-304-16	FM-304-16-**DLC**	
	1/2"	1/2"	1/2"	0.03"	2.125"	5"	FM-304-16-030	FM-304-16-030-**DLC**	
	1/2"	1/2"	1/2"	0.06"	2.125"	5"	FM-304-16-060	FM-304-16-060-**DLC**	
	1/2"	1/2"	1/2"	0.09"	2.125"	5"	FM-304-16-090	FM-304-16-090-**DLC**	
	1/2"	1/2"	1/2"	0.12"	2.125"	5"	FM-304-16-120	FM-304-16-120-**DLC**	
	1/2"	1/2"	1/2"	Ball End	2.125"	5"	FM-304-16-BN	FM-304-16-BN-**DLC**	

**Other Reach Lengths available upon request.*

CONTINUED ON NEXT PAGE—

FM 3 Flute High Performance Tools for Aluminum

NEW!

Eliminate Tool Pull Out!
1/4"–5/16" h5 Shank Tolerance
3/8"–1" h4 Shank Tolerance
Tightest in the Industry!

FM 3 Flute (Short to Long Reach) —CONTINUED FROM PREVIOUS

	Cutting Diameter	Shank Diameter	Flute Length	Corner Radius	Reach Length*	Overall Length	Tool Number Uncoated	Tool NumberCoated	
EXTRA LONG	1/2"	1/2"	1/2"	Sq. End	2.625"	5"	FM-305-16	FM-305-16-**DLC**	1/2" DIAMETER
	1/2"	1/2"	1/2"	0.03"	2.625"	5"	FM-305-16-030	FM-305-16-030-**DLC**	
	1/2"	1/2"	1/2"	0.06"	2.625"	5"	FM-305-16-060	FM-305-16-060-**DLC**	
	1/2"	1/2"	1/2"	0.09"	2.625"	5"	FM-305-16-090	FM-305-16-090-**DLC**	
	1/2"	1/2"	1/2"	0.12"	2.625"	5"	FM-305-16-120	FM-305-16-120-**DLC**	
	1/2"	1/2"	1/2"	Ball End	2.625"	5"	FM-305-16-BN	FM-305-16-BN-**DLC**	
SHORT	5/8"	5/8"	5/8"	Sq. End	1.500"	6"	FM-301-20	FM-301-20-**DLC**	5/8" DIAMETER
	5/8"	5/8"	5/8"	0.03"	1.500"	6"	FM-301-20-030	FM-301-20-030-**DLC**	
	5/8"	5/8"	5/8"	0.06"	1.500"	6"	FM-301-20-060	FM-301-20-060-**DLC**	
	5/8"	5/8"	5/8"	0.09"	1.500"	6"	FM-301-20-090	FM-301-20-090-**DLC**	
	5/8"	5/8"	5/8"	0.12"	1.500"	6"	FM-301-20-120	FM-301-20-120-**DLC**	
	5/8"	5/8"	5/8"	Ball End	1.500"	6"	FM-301-20-BN	FM-301-20-BN-**DLC**	
MEDIUM	5/8"	5/8"	5/8"	Sq. End	2.063"	6"	FM-302-20	FM-302-20-**DLC**	
	5/8"	5/8"	5/8"	0.03"	2.063"	6"	FM-302-20-030	FM-302-20-030-**DLC**	
	5/8"	5/8"	5/8"	0.06"	2.063"	6"	FM-302-20-060	FM-302-20-060-**DLC**	
	5/8"	5/8"	5/8"	0.09"	2.063"	6"	FM-302-20-090	FM-302-20-090-**DLC**	
	5/8"	5/8"	5/8"	0.12"	2.063"	6"	FM-302-20-120	FM-302-20-120-**DLC**	
	5/8"	5/8"	5/8"	Ball End	2.063"	6"	FM-302-20-BN	FM-302-20-BN-**DLC**	
LONG	5/8"	5/8"	5/8"	Sq. End	2.625"	6"	FM-304-20	FM-304-20-**DLC**	
	5/8"	5/8"	5/8"	0.03"	2.625"	6"	FM-304-20-030	FM-304-20-030-**DLC**	
	5/8"	5/8"	5/8"	0.06"	2.625"	6"	FM-304-20-060	FM-304-20-060-**DLC**	
	5/8"	5/8"	5/8"	0.09"	2.625"	6"	FM-304-20-090	FM-304-20-090-**DLC**	
	5/8"	5/8"	5/8"	0.12"	2.625"	6"	FM-304-20-120	FM-304-20-120-**DLC**	
	5/8"	5/8"	5/8"	Ball End	2.625"	6"	FM-304-20-BN	FM-304-20-BN-**DLC**	
EXTRA LONG	5/8"	5/8"	5/8"	Sq. End	3.125"	6"	FM-305-20	FM-305-20-**DLC**	
	5/8"	5/8"	5/8"	0.03"	3.125"	6"	FM-305-20-030	FM-305-20-030-**DLC**	
	5/8"	5/8"	5/8"	0.06"	3.125"	6"	FM-305-20-060	FM-305-20-060-**DLC**	
	5/8"	5/8"	5/8"	0.09"	3.125"	6"	FM-305-20-090	FM-305-20-090-**DLC**	
	5/8"	5/8"	5/8"	0.12"	3.125"	6"	FM-305-20-120	FM-305-20-120-**DLC**	
	5/8"	5/8"	5/8"	Ball End	3.125"	6"	FM-305-20-BN	FM-305-20-BN-**DLC**	
SHORT	3/4"	3/4"	3/4"	Sq. End	2.000"	6"	FM-301-24	FM-301-24-**DLC**	3/4" DIAMETER
	3/4"	3/4"	3/4"	0.03"	2.000"	6"	FM-301-24-030	FM-301-24-030-**DLC**	
	3/4"	3/4"	3/4"	0.06"	2.000"	6"	FM-301-24-060	FM-301-24-060-**DLC**	
	3/4"	3/4"	3/4"	0.09"	2.000"	6"	FM-301-24-090	FM-301-24-090-**DLC**	
	3/4"	3/4"	3/4"	0.12"	2.000"	6"	FM-301-24-120	FM-301-24-120-**DLC**	
	3/4"	3/4"	3/4"	Ball End	2.000"	6"	FM-301-24-BN	FM-301-24-BN-**DLC**	
MEDIUM	3/4"	3/4"	3/4"	Sq. End	2.563"	6"	FM-302-24	FM-302-24-**DLC**	
	3/4"	3/4"	3/4"	0.03"	2.563"	6"	FM-302-24-030	FM-302-24-030-**DLC**	
	3/4"	3/4"	3/4"	0.06"	2.563"	6"	FM-302-24-060	FM-302-24-060-**DLC**	
	3/4"	3/4"	3/4"	0.09"	2.563"	6"	FM-302-24-090	FM-302-24-090-**DLC**	
	3/4"	3/4"	3/4"	0.12"	2.563"	6"	FM-302-24-120	FM-302-24-120-**DLC**	
	3/4"	3/4"	3/4"	Ball End	2.563"	6"	FM-302-24-BN	FM-302-24-BN-**DLC**	
LONG	3/4"	3/4"	3/4"	Sq. End	3.125"	6"	FM-304-24	FM-304-24-**DLC**	
	3/4"	3/4"	3/4"	0.03"	3.125"	6"	FM-304-24-030	FM-304-24-030-**DLC**	
	3/4"	3/4"	3/4"	0.06"	3.125"	6"	FM-304-24-060	FM-304-24-060-**DLC**	
	3/4"	3/4"	3/4"	0.09"	3.125"	6"	FM-304-24-090	FM-304-24-090-**DLC**	
	3/4"	3/4"	3/4"	0.12"	3.125"	6"	FM-304-24-120	FM-304-24-120-**DLC**	
	3/4"	3/4"	3/4"	Ball End	3.125"	6"	FM-304-24-BN	FM-304-24-BN-**DLC**	
EXTRA LONG	3/4"	3/4"	3/4"	Sq. End	3.750"	6"	FM-305-24	FM-305-24-**DLC**	
	3/4"	3/4"	3/4"	0.03"	3.750"	6"	FM-305-24-030	FM-305-24-030-**DLC**	
	3/4"	3/4"	3/4"	0.06"	3.750"	6"	FM-305-24-060	FM-305-24-060-**DLC**	
	3/4"	3/4"	3/4"	0.09"	3.750"	6"	FM-305-24-090	FM-305-24-090-**DLC**	
	3/4"	3/4"	3/4"	0.12"	3.750"	6"	FM-305-24-120	FM-305-24-120-**DLC**	
	3/4"	3/4"	3/4"	Ball End	3.750"	6"	FM-305-24-BN	FM-304-24-BN-**DLC**	

**Other Reach Lengths available upon request.*

3 Flute High Performance Tools for Aluminum FM

NEW!

FM 3 Flute (Short to Long Reach) —CONTINUED FROM PREVIOUS

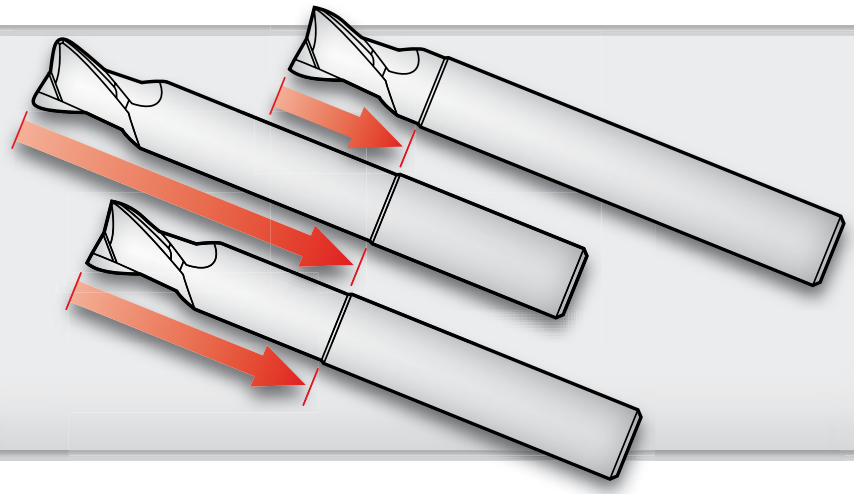
1" DIAMETER

	Cutting Diameter	Shank Diameter	Flute Length	Corner Radius	Reach Length*	Overall Length	Tool Number Uncoated	Tool Number DLC Coated
SHORT	1"	1"	1"	Sq. End	2.000"	6"	FM-301-32	FM-301-32-**DLC**
	1"	1"	1"	0.03"	2.000"	6"	FM-301-32-030	FM-301-32-030-**DLC**
	1"	1"	1"	0.06"	2.000"	6"	FM-301-32-060	FM-301-32-060-**DLC**
	1"	1"	1"	0.09"	2.000"	6"	FM-301-32-090	FM-301-32-090-**DLC**
	1"	1"	1"	0.12"	2.000"	6"	FM-301-32-120	FM-301-32-120-**DLC**
	1"	1"	1"	Ball End	2.000"	6"	FM-301-32-BN	FM-301-32-BN-**DLC**
MEDIUM	1"	1"	1"	Sq. End	3.000"	6"	FM-302-32	FM-302-32-**DLC**
	1"	1"	1"	0.03"	3.000"	6"	FM-302-32-030	FM-302-32-030-**DLC**
	1"	1"	1"	0.06"	3.000"	6"	FM-302-32-060	FM-302-32-060-**DLC**
	1"	1"	1"	0.09"	3.000"	6"	FM-302-32-090	FM-302-32-090-**DLC**
	1"	1"	1"	0.12"	3.000"	6"	FM-302-32-120	FM-302-32-120-**DLC**
	1"	1"	1"	Ball End	3.000"	6"	FM-302-32-BN	FM-302-32-BN-**DLC**
LONG	1"	1"	1"	Sq. End	3.500"	6"	FM-303-32	FM-303-32-**DLC**
	1"	1"	1"	0.03"	3.500"	6"	FM-303-32-030	FM-303-32-030-**DLC**
	1"	1"	1"	0.06"	3.500"	6"	FM-303-32-060	FM-303-32-060-**DLC**
	1"	1"	1"	0.09"	3.500"	6"	FM-303-32-090	FM-303-32-090-**DLC**
	1"	1"	1"	0.12"	3.500"	6"	FM-303-32-120	FM-303-32-120-**DLC**
	1"	1"	1"	Ball End	3.500"	6"	FM-303-32-BN	FM-303-32-BN-**DLC**
EXTRA LONG	1"	1"	1"	Sq. End	4.000"	6"	FM-304-32	FM-304-32-**DLC**
	1"	1"	1"	0.03"	4.000"	6"	FM-304-32-030	FM-304-32-030-**DLC**
	1"	1"	1"	0.06"	4.000"	6"	FM-304-32-060	FM-304-32-060-**DLC**
	1"	1"	1"	0.09"	4.000"	6"	FM-304-32-090	FM-304-32-090-**DLC**
	1"	1"	1"	0.12"	4.000"	6"	FM-304-32-120	FM-304-32-120-**DLC**
	1"	1"	1"	Ball End	4.000"	6"	FM-304-32-BN	FM-304-32-BN-**DLC**

**Other Reach Lengths available upon request.*

Need a Different Reach?

Any neck length available at same price!



FM SERIES SPEEDS & FEEDS

Tool Diameter	Typical Z-Depth	Aluminum 6061-T6		Aluminum 6061-T3		Aluminum 7075		Aluminum 2024	
		RPM	CLPT	RPM	CLPT	RPM	CLPT	RPM	CLPT
1/4"	0.1500"	Max	0.0040"	Max	0.0035"	Max	0.0040"	Max	0.0040"
5/16"	0.1500"	Max	0.0050"	Max	0.0044"	Max	0.0050"	Max	0.0050"
3/8"	0.1875"	Max	0.0060"	Max	0.0053"	Max	0.0060"	Max	0.0060"
1/2"	0.2000"	Max	0.0080"	Max	0.0070"	Max	0.0080"	Max	0.0080"
5/8"	0.2000"	Max	0.0100"	Max	0.0088"	Max	0.0100"	Max	0.0100"
3/4"	0.2500"	Max	0.0120"	Max	0.0105"	Max	0.0120"	Max	0.0120"
1"	0.2500"	Max	0.0160"	Max	0.0140"	Max	0.0160"	Max	0.0160"

Z-Depth of cut per pass should be deeper than the corner radius to help reduce chatter

MFM Metric 2 Flute High Performance Tools for Aluminum

Characteristics Corner Radius · 2 Flute · 40° Helix · Feather Blend · Necked · Mirror Edge

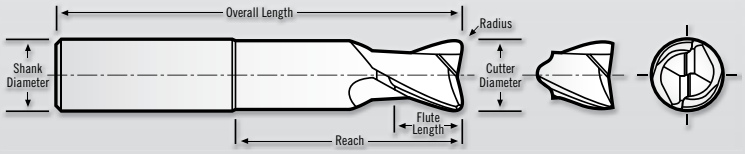
Applications Slotting · Side Milling · Helical Interpolation · Ramping · High Performance · 3-D · Roughing · Semi-Finishing · Finishing

Materials Aluminum · Copper · Magnesium · Brass

Coatings Diamond-Like Carbon (DLC)

MFM Series comes with Mirror Edge! for Chatter Reduction

Eliminate Tool Pull Out!
6–8mm h5 Shank Tolerance
10–25mm h4 Shank Tolerance
Tightest in the Industry!



MFM Series Tolerances:
Cutting Dia. = –0.025/–0.038 mm
Shank Dia. = –0.002/–0.005 mm
Flute Length (<10D) = +0.750/–.000 mm
(>10D) = +1.500/–.000 mm
OAL = +/– 1.000 mm

MFM 2 Flute Metric (Short to Long Reach) METRIC

	Cutting Diameter	Shank Diameter	Flute Length	Corner Radius	Reach Length*	Overall Length	Tool Number Uncoated	Tool Number DLC Coated	
S	6mm	6mm	7mm	Sq. End	12mm	75mm	MFM-201-06	MFM-201-06-**DLC**	6 mm DIAMETER
	6mm	6mm	7mm	0.5mm	12mm	75mm	MFM-201-06-050	MFM-201-06-050-**DLC**	
	6mm	6mm	7mm	1.0mm	12mm	75mm	MFM-201-06-100	MFM-201-06-100-**DLC**	
	6mm	6mm	7mm	Ball End	12mm	75mm	MFM-201-06-BN	MFM-201-06-BN-**DLC**	
M	6mm	6mm	7mm	Sq. End	18mm	75mm	MFM-202-06	MFM-202-06-**DLC**	
	6mm	6mm	7mm	0.5mm	18mm	75mm	MFM-202-06-050	MFM-202-06-050-**DLC**	
	6mm	6mm	7mm	1.0mm	18mm	75mm	MFM-202-06-100	MFM-202-06-100-**DLC**	
	6mm	6mm	7mm	Ball End	18mm	75mm	MFM-202-06-BN	MFM-202-06-BN-**DLC**	
L	6mm	6mm	7mm	Sq. End	24mm	75mm	MFM-203-06	MFM-203-06-**DLC**	
	6mm	6mm	7mm	0.5mm	24mm	75mm	MFM-203-06-050	MFM-203-06-050-**DLC**	
	6mm	6mm	7mm	1.0mm	24mm	75mm	MFM-203-06-100	MFM-203-06-100-**DLC**	
	6mm	6mm	7mm	Ball End	24mm	75mm	MFM-203-06-BN	MFM-203-06-BN-**DLC**	
XL	6mm	6mm	7mm	Sq. End	30mm	75mm	MFM-204-06	MFM-204-06-**DLC**	
	6mm	6mm	7mm	0.5mm	30mm	75mm	MFM-204-06-050	MFM-204-06-050-**DLC**	
	6mm	6mm	7mm	1.0mm	30mm	75mm	MFM-204-06-100	MFM-204-06-100-**DLC**	
	6mm	6mm	7mm	Ball End	30mm	75mm	MFM-204-06-BN	MFM-204-06-BN-**DLC**	
SHORT	8mm	8mm	9mm	Sq. End	16mm	80mm	MFM-201-08	MFM-201-08-**DLC**	8 mm DIAMETER
	8mm	8mm	9mm	1.0mm	16mm	80mm	MFM-201-08-100	MFM-201-08-100-**DLC**	
	8mm	8mm	9mm	2.0mm	16mm	80mm	MFM-201-08-200	MFM-201-08-200-**DLC**	
	8mm	8mm	9mm	2.5mm	16mm	80mm	MFM-201-08-250	MFM-201-08-250-**DLC**	
	8mm	8mm	9mm	Ball End	16mm	80mm	MFM-201-08-BN	MFM-201-08-BN-**DLC**	
MED	8mm	8mm	9mm	Sq. End	24mm	80mm	MFM-202-08	MFM-202-08-**DLC**	
	8mm	8mm	9mm	1.0mm	24mm	80mm	MFM-202-08-100	MFM-202-08-100-**DLC**	
	8mm	8mm	9mm	2.0mm	24mm	80mm	MFM-202-08-200	MFM-202-08-200-**DLC**	
	8mm	8mm	9mm	2.5mm	24mm	80mm	MFM-202-08-250	MFM-202-08-250-**DLC**	
	8mm	8mm	9mm	Ball End	24mm	80mm	MFM-202-08-BN	MFM-202-08-BN-**DLC**	
LONG	8mm	8mm	9mm	Sq. End	32mm	80mm	MFM-203-08	MFM-203-08-**DLC**	
	8mm	8mm	9mm	1.0mm	32mm	80mm	MFM-203-08-100	MFM-203-08-100-**DLC**	
	8mm	8mm	9mm	2.0mm	32mm	80mm	MFM-203-08-200	MFM-203-08-200-**DLC**	
	8mm	8mm	9mm	2.5mm	32mm	80mm	MFM-203-08-250	MFM-203-08-250-**DLC**	
	8mm	8mm	9mm	Ball End	32mm	80mm	MFM-203-08-BN	MFM-203-08-BN-**DLC**	
X LONG	8mm	8mm	9mm	Sq. End	40mm	80mm	MFM-204-08	MFM-204-08-**DLC**	
	8mm	8mm	9mm	1.0mm	40mm	80mm	MFM-204-08-100	MFM-204-08-100-**DLC**	
	8mm	8mm	9mm	2.0mm	40mm	80mm	MFM-204-08-200	MFM-204-08-200-**DLC**	
	8mm	8mm	9mm	2.5mm	40mm	80mm	MFM-204-08-250	MFM-204-08-250-**DLC**	
	8mm	8mm	9mm	Ball End	40mm	80mm	MFM-204-08-BN	MFM-204-08-BN-**DLC**	

**Other Reach Lengths available upon request.*

CONTINUED ON NEXT PAGE—

Metric 2 Flute High Performance Tools for Aluminum MFM

MFM 2 Flute Metric (Short to Long Reach) METRIC

	Cutting Diameter	Shank Diameter	Flute Length	Corner Radius	Reach Length*	Overall Length	Tool Number Uncoated	Tool Number DLC Coated	
S	10mm	10mm	11mm	Sq. End	20mm	100mm	MFM-201-10	MFM-201-10-**DLC**	10 mm DIAMETER
	10mm	10mm	11mm	1.5mm	20mm	100mm	MFM-201-10-150	MFM-201-10-150-**DLC**	
	10mm	10mm	11mm	2.5mm	20mm	100mm	MFM-201-10-250	MFM-201-10-250-**DLC**	
	10mm	10mm	11mm	Ball End	20mm	100mm	MFM-201-10-BN	MFM-201-10-BN-**DLC**	
M	10mm	10mm	11mm	Sq. End	30mm	100mm	MFM-202-10	MFM-202-10-**DLC**	
	10mm	10mm	11mm	1.5mm	30mm	100mm	MFM-202-10-150	MFM-202-10-150-**DLC**	
	10mm	10mm	11mm	2.5mm	30mm	100mm	MFM-202-10-250	MFM-202-10-250-**DLC**	
	10mm	10mm	11mm	Ball End	30mm	100mm	MFM-202-10-BN	MFM-202-10-BN-**DLC**	
L	10mm	10mm	11mm	Sq. End	40mm	100mm	MFM-203-10	MFM-203-10-**DLC**	
	10mm	10mm	11mm	1.5mm	40mm	100mm	MFM-203-10-150	MFM-203-10-150-**DLC**	
	10mm	10mm	11mm	2.5mm	40mm	100mm	MFM-203-10-250	MFM-203-10-250-**DLC**	
	10mm	10mm	11mm	Ball End	40mm	100mm	MFM-203-10-BN	MFM-203-10-BN-**DLC**	
XL	10mm	10mm	11mm	Sq. End	50mm	100mm	MFM-204-10	MFM-204-10-**DLC**	
	10mm	10mm	11mm	1.5mm	50mm	100mm	MFM-204-10-150	MFM-204-10-150-**DLC**	
	10mm	10mm	11mm	2.5mm	50mm	100mm	MFM-204-10-250	MFM-204-10-250-**DLC**	
	10mm	10mm	11mm	Ball End	50mm	100mm	MFM-204-10-BN	MFM-204-10-BN-**DLC**	
S	12mm	12mm	13mm	Sq. End	24mm	110mm	MFM-201-12	MFM-201-12-**DLC**	12 mm DIAMETER
	12mm	12mm	13mm	1.5mm	24mm	110mm	MFM-201-12-150	MFM-201-12-150-**DLC**	
	12mm	12mm	13mm	2.5mm	24mm	110mm	MFM-201-12-250	MFM-201-12-250-**DLC**	
	12mm	12mm	13mm	4.0mm	24mm	110mm	MFM-201-12-400	MFM-201-12-400-**DLC**	
	12mm	12mm	13mm	Ball End	24mm	110mm	MFM-201-12-BN	MFM-201-12-BN-**DLC**	
M	12mm	12mm	13mm	Sq. End	36mm	110mm	MFM-202-12	MFM-202-12-**DLC**	
	12mm	12mm	13mm	1.5mm	36mm	110mm	MFM-202-12-150	MFM-202-12-150-**DLC**	
	12mm	12mm	13mm	2.5mm	36mm	110mm	MFM-202-12-250	MFM-202-12-250-**DLC**	
	12mm	12mm	13mm	4.0mm	36mm	110mm	MFM-202-12-400	MFM-202-12-400-**DLC**	
	12mm	12mm	13mm	Ball End	36mm	110mm	MFM-202-12-BN	MFM-202-12-BN-**DLC**	
L	12mm	12mm	13mm	Sq. End	48mm	110mm	MFM-203-12	MFM-203-12-**DLC**	
	12mm	12mm	13mm	1.5mm	48mm	110mm	MFM-203-12-150	MFM-203-12-150-**DLC**	
	12mm	12mm	13mm	2.5mm	48mm	110mm	MFM-203-12-250	MFM-203-12-250-**DLC**	
	12mm	12mm	13mm	4.0mm	48mm	110mm	MFM-203-12-400	MFM-203-12-400-**DLC**	
	12mm	12mm	13mm	Ball End	48mm	110mm	MFM-203-12-BN	MFM-203-12-BN-**DLC**	
XL	12mm	12mm	13mm	Sq. End	60mm	110mm	MFM-204-12	MFM-204-12-**DLC**	
	12mm	12mm	13mm	1.5mm	60mm	110mm	MFM-204-12-150	MFM-204-12-150-**DLC**	
	12mm	12mm	13mm	2.5mm	60mm	110mm	MFM-204-12-250	MFM-204-12-250-**DLC**	
	12mm	12mm	13mm	4.0mm	60mm	110mm	MFM-204-12-400	MFM-204-12-400-**DLC**	
	12mm	12mm	13mm	Ball End	60mm	110mm	MFM-204-12-BN	MFM-204-12-BN-**DLC**	
SHORT	16mm	16mm	17mm	Sq. End	32mm	130mm	MFM-201-16	MFM-201-16-**DLC**	16 mm DIAMETER
	16mm	16mm	17mm	2.0mm	32mm	130mm	MFM-201-16-200	MFM-201-16-200-**DLC**	
	16mm	16mm	17mm	2.5mm	32mm	130mm	MFM-201-16-250	MFM-201-16-250-**DLC**	
	16mm	16mm	17mm	3.0mm	32mm	130mm	MFM-201-16-300	MFM-201-16-300-**DLC**	
	16mm	16mm	17mm	4.0mm	32mm	130mm	MFM-201-16-400	MFM-201-16-400-**DLC**	
	16mm	16mm	17mm	Ball End	32mm	130mm	MFM-201-16-BN	MFM-201-16-BN-**DLC**	
MEDIUM	16mm	16mm	17mm	Sq. End	48mm	130mm	MFM-202-16	MFM-202-16-**DLC**	
	16mm	16mm	17mm	2.0mm	48mm	130mm	MFM-202-16-200	MFM-202-16-200-**DLC**	
	16mm	16mm	17mm	2.5mm	48mm	130mm	MFM-202-16-250	MFM-202-16-250-**DLC**	
	16mm	16mm	17mm	3.0mm	48mm	130mm	MFM-202-16-300	MFM-202-16-300-**DLC**	
	16mm	16mm	17mm	4.0mm	48mm	130mm	MFM-202-16-400	MFM-202-16-400-**DLC**	
	16mm	16mm	17mm	Ball End	48mm	130mm	MFM-202-16-BN	MFM-202-16-BN-**DLC**	
LONG	16mm	16mm	17mm	Sq. End	64mm	130mm	MFM-203-16	MFM-203-16-**DLC**	
	16mm	16mm	17mm	2.0mm	64mm	130mm	MFM-203-16-200	MFM-203-16-200-**DLC**	
	16mm	16mm	17mm	2.5mm	64mm	130mm	MFM-203-16-250	MFM-203-16-250-**DLC**	
	16mm	16mm	17mm	3.0mm	64mm	130mm	MFM-203-16-300	MFM-203-16-300-**DLC**	
	16mm	16mm	17mm	4.0mm	64mm	130mm	MFM-203-16-400	MFM-203-16-400-**DLC**	
	16mm	16mm	17mm	Ball End	64mm	130mm	MFM-203-16-BN	MFM-203-16-BN-**DLC**	

Other Reach Lengths available upon request.

CONTINUED ON NEXT PAGE—

MFM Metric 2 Flute High Performance Tools for Aluminum

MFM 2 Flute Metric (Short to Long Reach) METRIC

—CONTINUED FROM PREVIOUS

	Cutting Diameter	Shank Diameter	Flute Length	Corner Radius	Reach Length*	Overall Length	Tool Number Uncoated	Tool Number DLC Coated	
X LONG	16mm	16mm	17mm	Sq. End	80mm	130mm	MFM-204-16	MFM-204-16-**DLC**	16 mm DIAMETER
	16mm	16mm	17mm	2.0mm	80mm	130mm	MFM-204-16-200	MFM-204-16-200-**DLC**	
	16mm	16mm	17mm	2.5mm	80mm	130mm	MFM-204-16-250	MFM-204-16-250-**DLC**	
	16mm	16mm	17mm	3.0mm	80mm	130mm	MFM-204-16-300	MFM-204-16-300-**DLC**	
	16mm	16mm	17mm	4.0mm	80mm	130mm	MFM-204-16-400	MFM-204-16-400-**DLC**	
	16mm	16mm	17mm	Ball End	80mm	130mm	MFM-204-16-BN	MFM-204-16-BN-**DLC**	
SHORT	20mm	20mm	21mm	Sq. End	40mm	150mm	MFM-201-20	MFM-201-20-**DLC**	20 mm DIAMETER
	20mm	20mm	21mm	2.0mm	40mm	150mm	MFM-201-20-200	MFM-201-20-200-**DLC**	
	20mm	20mm	21mm	2.5mm	40mm	150mm	MFM-201-20-250	MFM-201-20-250-**DLC**	
	20mm	20mm	21mm	3.0mm	40mm	150mm	MFM-201-20-300	MFM-201-20-300-**DLC**	
	20mm	20mm	21mm	4.0mm	40mm	150mm	MFM-201-20-400	MFM-201-20-400-**DLC**	
	20mm	20mm	21mm	Ball End	40mm	150mm	MFM-201-20-BN	MFM-201-20-BN-**DLC**	
MEDIUM	20mm	20mm	21mm	Sq. End	60mm	150mm	MFM-202-20	MFM-202-20-**DLC**	
	20mm	20mm	21mm	2.0mm	60mm	150mm	MFM-202-20-200	MFM-202-20-200-**DLC**	
	20mm	20mm	21mm	2.5mm	60mm	150mm	MFM-202-20-250	MFM-202-20-250-**DLC**	
	20mm	20mm	21mm	3.0mm	60mm	150mm	MFM-202-20-300	MFM-202-20-300-**DLC**	
	20mm	20mm	21mm	4.0mm	60mm	150mm	MFM-202-20-400	MFM-202-20-400-**DLC**	
	20mm	20mm	21mm	Ball End	60mm	150mm	MFM-202-20-BN	MFM-202-20-BN-**DLC**	
LONG	20mm	20mm	21mm	Sq. End	80mm	150mm	MFM-203-20	MFM-203-20-**DLC**	
	20mm	20mm	21mm	2.0mm	80mm	150mm	MFM-203-20-200	MFM-203-20-200-**DLC**	
	20mm	20mm	21mm	2.5mm	80mm	150mm	MFM-203-20-250	MFM-203-20-250-**DLC**	
	20mm	20mm	21mm	3.0mm	80mm	150mm	MFM-203-20-300	MFM-203-20-300-**DLC**	
	20mm	20mm	21mm	4.0mm	80mm	150mm	MFM-203-20-400	MFM-203-20-400-**DLC**	
	20mm	20mm	21mm	Ball End	80mm	150mm	MFM-203-20-BN	MFM-203-20-BN-**DLC**	
X LONG	20mm	20mm	21mm	Sq. End	100mm	150mm	MFM-204-20	MFM-204-20-**DLC**	
	20mm	20mm	21mm	2.0mm	100mm	150mm	MFM-204-20-200	MFM-204-20-200-**DLC**	
	20mm	20mm	21mm	2.5mm	100mm	150mm	MFM-204-20-250	MFM-204-20-250-**DLC**	
	20mm	20mm	21mm	3.0mm	100mm	150mm	MFM-204-20-300	MFM-204-20-300-**DLC**	
	20mm	20mm	21mm	4.0mm	100mm	150mm	MFM-204-20-400	MFM-204-20-400-**DLC**	
	20mm	20mm	21mm	Ball End	100mm	150mm	MFM-204-20-BN	MFM-204-20-BN-**DLC**	
S	25mm	25mm	26mm	Sq. End	50mm	165mm	MFM-201-25	MFM-201-25-**DLC**	25 mm DIAMETER
	25mm	25mm	26mm	2.5mm	50mm	165mm	MFM-201-25-250	MFM-201-25-250-**DLC**	
	25mm	25mm	26mm	4.0mm	50mm	165mm	MFM-201-25-400	MFM-201-25-400-**DLC**	
	25mm	25mm	26mm	Ball End	50mm	165mm	MFM-201-25-BN	MFM-201-25-BN-**DLC**	
M	25mm	25mm	26mm	Sq. End	75mm	165mm	MFM-202-25	MFM-202-25-**DLC**	
	25mm	25mm	26mm	2.5mm	75mm	165mm	MFM-202-25-250	MFM-202-25-250-**DLC**	
	25mm	25mm	26mm	4.0mm	75mm	165mm	MFM-202-25-400	MFM-202-25-400-**DLC**	
	25mm	25mm	26mm	Ball End	75mm	165mm	MFM-202-25-BN	MFM-202-25-BN-**DLC**	
XL	25mm	25mm	26mm	Sq. End	100mm	165mm	MFM-204-25	MFM-204-25-**DLC**	
	25mm	25mm	26mm	2.5mm	100mm	165mm	MFM-204-25-250	MFM-204-25-250-**DLC**	
	25mm	25mm	26mm	4.0mm	100mm	165mm	MFM-204-25-400	MFM-204-25-400-**DLC**	
	25mm	25mm	26mm	Ball End	100mm	165mm	MFM-204-25-BN	MFM-204-25-BN-**DLC**	

MFM SERIES SPEEDS & FEEDS

Tool Diameter	Typical Z-Depth	Aluminum 6061-T6		Aluminum 6061-T3		Aluminum 7075		Aluminum 2024	
		RPM	CLPT	RPM	CLPT	RPM	CLPT	RPM	CLPT
6mm	4mm	Max	0.096mm	Max	0.084mm	Max	0.096mm	Max	0.096mm
8mm	4mm	Max	0.128mm	Max	0.112mm	Max	0.128mm	Max	0.128mm
10mm	5mm	Max	0.16mm	Max	0.14mm	Max	0.16mm	Max	0.16mm
12mm	5mm	Max	0.192mm	Max	0.168mm	Max	0.192mm	Max	0.192mm
16mm	5mm	Max	0.256mm	Max	0.224mm	Max	0.256mm	Max	0.256mm
20mm	6.5mm	Max	0.32mm	Max	0.28mm	Max	0.32mm	Max	0.32mm
25mm	6.5mm	Max	0.4mm	Max	0.35mm	Max	0.4mm	Max	0.4mm

Z-Depth of cut per pass should be deeper than the corner radius to help reduce chatter

Metric 3 Flute High Performance Tools for Aluminum MFM

Characteristics: Corner Radius, 3 Flute, 40° Helix, Feather Blend, Necked, Mirror Edge

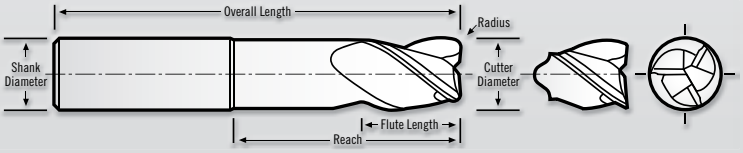
Applications: Slotting, Side Milling, Helical Interpolation, Ramping, High Performance, 3-D, Roughing (Chatter Reduction), Semi-Finishing, Finishing, Wet

Materials: Aluminum, Copper, Magnesium, Brass

Coatings: Diamond-Like Carbon (DLC)

MFM Series comes with Mirror Edge for Chatter Reduction

Eliminate Tool Pull Out!
6–8mm h5 Shank Tolerance
10–25mm h4 Shank Tolerance
Tightest in the Industry!



MFM Series Tolerances:
Cutting Dia. = –0,025/–0,038 mm
Shank Dia. = –0,002/–0,005 mm
Flute Length (<10D) = +0,750/–,000 mm
(>10D) = +1,500/–,000 mm
OAL = +/– 1,000 mm

MFM 3 Flute Metric (Short to Long Reach)

	Cutting Diameter	Shank Diameter	Flute Length	Corner Radius	Reach Length*	Overall Length	Tool Number Uncoated	Tool Number DLC Coated	
S	6mm	6mm	7mm	Sq. End	12mm	75mm	MFM-301-06	MFM-301-06-**DLC**	6 mm DIAMETER
	6mm	6mm	7mm	0,5mm	12mm	75mm	MFM-301-06-050	MFM-301-06-050-**DLC**	
	6mm	6mm	7mm	1,0mm	12mm	75mm	MFM-301-06-100	MFM-301-06-100-**DLC**	
	6mm	6mm	7mm	Ball End	12mm	75mm	MFM-301-06-BN	MFM-301-06-BN-**DLC**	
M	6mm	6mm	7mm	Sq. End	18mm	75mm	MFM-302-06	MFM-302-06-**DLC**	
	6mm	6mm	7mm	0,5mm	18mm	75mm	MFM-302-06-050	MFM-302-06-050-**DLC**	
	6mm	6mm	7mm	1,0mm	18mm	75mm	MFM-302-06-100	MFM-302-06-100-**DLC**	
	6mm	6mm	7mm	Ball End	18mm	75mm	MFM-302-06-BN	MFM-302-06-BN-**DLC**	
L	6mm	6mm	7mm	Sq. End	24mm	75mm	MFM-303-06	MFM-303-06-**DLC**	
	6mm	6mm	7mm	0,5mm	24mm	75mm	MFM-303-06-050	MFM-303-06-050-**DLC**	
	6mm	6mm	7mm	1,0mm	24mm	75mm	MFM-303-06-100	MFM-303-06-100-**DLC**	
	6mm	6mm	7mm	Ball End	24mm	75mm	MFM-303-06-BN	MFM-303-06-BN-**DLC**	
XL	6mm	6mm	7mm	Sq. End	30mm	75mm	MFM-304-06	MFM-304-06-**DLC**	
	6mm	6mm	7mm	0,5mm	30mm	75mm	MFM-304-06-050	MFM-304-06-050-**DLC**	
	6mm	6mm	7mm	1,0mm	30mm	75mm	MFM-304-06-100	MFM-304-06-100-**DLC**	
	6mm	6mm	7mm	Ball End	30mm	75mm	MFM-304-06-BN	MFM-304-06-BN-**DLC**	
SHORT	8mm	8mm	9mm	Sq. End	16mm	80mm	MFM-301-08	MFM-301-08-**DLC**	8 mm DIAMETER
	8mm	8mm	9mm	1,0mm	16mm	80mm	MFM-301-08-100	MFM-301-08-100-**DLC**	
	8mm	8mm	9mm	2,0mm	16mm	80mm	MFM-301-08-200	MFM-301-08-200-**DLC**	
	8mm	8mm	9mm	2,5mm	16mm	80mm	MFM-301-08-250	MFM-301-08-250-**DLC**	
	8mm	8mm	9mm	Ball End	16mm	80mm	MFM-301-08-BN	MFM-301-08-BN-**DLC**	
MED	8mm	8mm	9mm	Sq. End	24mm	80mm	MFM-302-08	MFM-302-08-**DLC**	
	8mm	8mm	9mm	1,0mm	24mm	80mm	MFM-302-08-100	MFM-302-08-100-**DLC**	
	8mm	8mm	9mm	2,0mm	24mm	80mm	MFM-302-08-200	MFM-302-08-200-**DLC**	
	8mm	8mm	9mm	2,5mm	24mm	80mm	MFM-302-08-250	MFM-302-08-250-**DLC**	
	8mm	8mm	9mm	Ball End	24mm	80mm	MFM-302-08-BN	MFM-302-08-BN-**DLC**	
LONG	8mm	8mm	9mm	Sq. End	32mm	80mm	MFM-303-08	MFM-303-08-**DLC**	
	8mm	8mm	9mm	1,0mm	32mm	80mm	MFM-303-08-100	MFM-303-08-100-**DLC**	
	8mm	8mm	9mm	2,0mm	32mm	80mm	MFM-303-08-200	MFM-303-08-200-**DLC**	
	8mm	8mm	9mm	2,5mm	32mm	80mm	MFM-303-08-250	MFM-303-08-250-**DLC**	
	8mm	8mm	9mm	Ball End	32mm	80mm	MFM-303-08-BN	MFM-303-08-BN-**DLC**	

**Other Reach Lengths available upon request.*

CONTINUED ON NEXT PAGE—

MFM Metric 3 Flute High Performance Tools for Aluminum

MFM 3 Flute (Short to Long Reach)

—CONTINUED FROM PREVIOUS

	Cutting Diameter	Shank Diameter	Flute Length	Corner Radius	Reach Length*	Overall Length	Tool Number Uncoated	Tool Number DLC Coated	
X LONG	8mm	8mm	9mm	Sq. End	40mm	80mm	MFM-304-08	MFM-304-08-**DLC**	8 mm DIAMETER
	8mm	8mm	9mm	1,0mm	40mm	80mm	MFM-304-08-100	MFM-304-08-100-**DLC**	
	8mm	8mm	9mm	2,0mm	40mm	80mm	MFM-304-08-200	MFM-304-08-200-**DLC**	
	8mm	8mm	9mm	2,5mm	40mm	80mm	MFM-304-08-250	MFM-304-08-250-**DLC**	
	8mm	8mm	9mm	Ball End	40mm	80mm	MFM-304-08-BN	MFM-304-08-BN-**DLC**	
S	10mm	10mm	11mm	Sq. End	20mm		MFM-301-10	MFM-301-10-**DLC**	10 mm DIAMETER
	10mm	10mm	11mm	1,5mm	20mm	100mm	MFM-301-10-150	MFM-301-10-150-**DLC**	
	10mm	10mm	11mm	2,5mm	20mm	100mm	MFM-301-10-250	MFM-301-10-250-**DLC**	
	10mm	10mm	11mm	Ball End	20mm	100mm	MFM-301-10-BN	MFM-301-10-BN-**DLC**	
M	10mm	10mm	11mm	Sq. End	30mm	100mm	MFM-302-10	MFM-302-10-**DLC**	
	10mm	10mm	11mm	1,5mm	30mm	100mm	MFM-302-10-150	MFM-302-10-150-**DLC**	
	10mm	10mm	11mm	2,5mm	30mm	100mm	MFM-302-10-250	MFM-302-10-250-**DLC**	
	10mm	10mm	11mm	Ball End	30mm	100mm	MFM-302-10-BN	MFM-302-10-BN-**DLC**	
L	10mm	10mm	11mm	Sq. End	40mm	100mm	MFM-303-10	MFM-303-10-**DLC**	
	10mm	10mm	11mm	1,5mm	40mm	100mm	MFM-303-10-150	MFM-303-10-150-**DLC**	
	10mm	10mm	11mm	2,5mm	40mm	100mm	MFM-303-10-250	MFM-303-10-250-**DLC**	
	10mm	10mm	11mm	Ball End	40mm	100mm	MFM-303-10-BN	MFM-303-10-BN-**DLC**	
XL	10mm	10mm	11mm	Sq. End	50mm	100mm	MFM-304-10	MFM-304-10-**DLC**	
	10mm	10mm	11mm	1,5mm	50mm	100mm	MFM-304-10-150	MFM-304-10-150-**DLC**	
	10mm	10mm	11mm	2,5mm	50mm	100mm	MFM-204-10-250	MFM-304-10-250-**DLC**	
	10mm	10mm	11mm	Ball End	50mm	100mm	MFM-304-10-BN	MFM-304-10-BN-**DLC**	
S	12mm	12mm	13mm	Sq. End	24mm	110mm	MFM-301-12	MFM-301-12-**DLC**	12 mm DIAMETER
	12mm	12mm	13mm	1,5mm	24mm	110mm	MFM-301-12-150	MFM-301-12-150-**DLC**	
	12mm	12mm	13mm	2,5mm	24mm	110mm	MFM-301-12-250	MFM-301-12-250-**DLC**	
	12mm	12mm	13mm	4,0mm	24mm	110mm	MFM-301-12-400	MFM-301-12-400-**DLC**	
	12mm	12mm	13mm	Ball End	24mm	110mm	MFM-301-12-BN	MFM-301-12-BN-**DLC**	
M	12mm	12mm	13mm	Sq. End	36mm	110mm	MFM-302-12	MFM-302-12-**DLC**	
	12mm	12mm	13mm	1,5mm	36mm	110mm	MFM-302-12-150	MFM-302-12-150-**DLC**	
	12mm	12mm	13mm	2,5mm	36mm	110mm	MFM-302-12-250	MFM-302-12-250-**DLC**	
	12mm	12mm	13mm	4,0mm	36mm	110mm	MFM-302-12-400	MFM-302-12-400-**DLC**	
	12mm	12mm	13mm	Ball End	36mm	110mm	MFM-302-12-BN	MFM-302-12-BN-**DLC**	
L	12mm	12mm	13mm	Sq. End	48mm	110mm	MFM-303-12	MFM-303-12-**DLC**	
	12mm	12mm	13mm	1,5mm	48mm	110mm	MFM-303-12-150	MFM-303-12-150-**DLC**	
	12mm	12mm	13mm	2,5mm	48mm	110mm	MFM-303-12-250	MFM-303-12-250-**DLC**	
	12mm	12mm	13mm	4,0mm	48mm	110mm	MFM-303-12-400	MFM-303-12-400-**DLC**	
	12mm	12mm	13mm	Ball End	48mm	110mm	MFM-303-12-BN	MFM-303-12-BN-**DLC**	
XL	12mm	12mm	13mm	Sq. End	60mm	110mm	MFM-304-12	MFM-304-12-**DLC**	
	12mm	12mm	13mm	1,5mm	60mm	110mm	MFM-304-12-150	MFM-304-12-150-**DLC**	
	12mm	12mm	13mm	2,5mm	60mm	110mm	MFM-304-12-250	MFM-304-12-250-**DLC**	
	12mm	12mm	13mm	4,0mm	60mm	110mm	MFM-304-12-400	MFM-304-12-400-**DLC**	
	12mm	12mm	13mm	Ball End	60mm	110mm	MFM-304-12-BN	MFM-304-12-BN-**DLC**	
SHORT	16mm	16mm	17mm	Sq. End	32mm	130mm	MFM-301-16	MFM-301-16-**DLC**	16 mm DIAMETER
	16mm	16mm	17mm	2,0mm	32mm	130mm	MFM-301-16-200	MFM-301-16-200-**DLC**	
	16mm	16mm	17mm	2,5mm	32mm	130mm	MFM-301-16-250	MFM-301-16-250-**DLC**	
	16mm	16mm	17mm	3,0mm	32mm	130mm	MFM-301-16-300	MFM-301-16-300-**DLC**	
	16mm	16mm	17mm	4,0mm	32mm	130mm	MFM-301-16-400	MFM-301-16-400-**DLC**	
	16mm	16mm	17mm	Ball End	32mm	130mm	MFM-301-16-BN	MFM-301-16-BN-**DLC**	
MEDIUM	16mm	16mm	17mm	Sq. End	48mm	130mm	MFM-302-16	MFM-302-16-**DLC**	
	16mm	16mm	17mm	2,0mm	48mm	130mm	MFM-302-16-200	MFM-302-16-200-**DLC**	
	16mm	16mm	17mm	2,5mm	48mm	130mm	MFM-302-16-250	MFM-302-16-250-**DLC**	
	16mm	16mm	17mm	3,0mm	48mm	130mm	MFM-302-16-300	MFM-302-16-300-**DLC**	
	16mm	16mm	17mm	4,0mm	48mm	130mm	MFM-302-16-400	MFM-302-16-400-**DLC**	
	16mm	16mm	17mm	Ball End	48mm	130mm	MFM-302-16-BN	MFM-302-16-BN-**DLC**	
LONG	16mm	16mm	17mm	Sq. End	64mm	130mm	MFM-303-16	MFM-303-16**DLC**	
	16mm	16mm	17mm	2,0mm	64mm	130mm	MFM-303-16-200	MFM-303-16-200-**DLC**	
	16mm	16mm	17mm	2,5mm	64mm	130mm	MFM-303-16-250	MFM-303-16-250-**DLC**	

**Other Reach Lengths available upon request.*

CONTINUED ON NEXT PAGE—

Metric 3 Flute High Performance Tools for Aluminum MFM

MFM 3 Flute (Short to Long Reach) —CONTINUED FROM PREVIOUS

	Cutting Diameter	Shank Diameter	Flute Length	Corner Radius	Reach Length*	Overall Length	Tool Number Uncoated	Tool Number DLC Coated	
LONG	16mm	16mm	17mm	3,0mm	64mm	130mm	MFM-303-16-300	MFM-303-16-300-**DLC**	16 mm DIAMETER
	16mm	16mm	17mm	4,0mm	64mm	130mm	MFM-303-16-400	MFM-303-16-400-**DLC**	
	16mm	16mm	17mm	Ball End	64mm	130mm	MFM-303-16-BN	MFM-303-16-BN-**DLC**	
X LONG	16mm	16mm	17mm	Sq. End	80mm	130mm	MFM-304-16	MFM-304-16-**DLC**	
	16mm	16mm	17mm	2,0mm	80mm	130mm	MFM-304-16-200	MFM-304-16-200-**DLC**	
	16mm	16mm	17mm	2,5mm	80mm	130mm	MFM-304-16-250	MFM-304-16-250-**DLC**	
	16mm	16mm	17mm	3,0mm	80mm	130mm	MFM-304-16-300	MFM-304-16-300-**DLC**	
	16mm	16mm	17mm	4,0mm	80mm	130mm	MFM-304-16-400	MFM-304-16-400-**DLC**	
	16mm	16mm	17mm	Ball End	80mm	130mm	MFM-304-16-BN	MFM-304-16-BN-**DLC**	
SHORT	20mm	20mm	21mm	Sq. End	40mm	150mm	MFM-301-20	MFM-301-20-**DLC**	20 mm DIAMETER
	20mm	20mm	21mm	2,0mm	40mm	150mm	MFM-301-20-200	MFM-301-20-200-**DLC**	
	20mm	20mm	21mm	2,5mm	40mm	150mm	MFM-301-20-250	MFM-301-20-250-**DLC**	
	20mm	20mm	21mm	3,0mm	40mm	150mm	MFM-301-20-300	MFM-301-20-300-**DLC**	
	20mm	20mm	21mm	4,0mm	40mm	150mm	MFM-301-20-400	MFM-301-20-400-**DLC**	
	20mm	20mm	21mm	Ball End	40mm	150mm	MFM-301-20-BN	MFM-301-20-BN-**DLC**	
MEDIUM	20mm	20mm	21mm	Sq. End	60mm	150mm	MFM-302-20	MFM-302-20-**DLC**	
	20mm	20mm	21mm	2,0mm	60mm	150mm	MFM-302-20-200	MFM-302-20-200-**DLC**	
	20mm	20mm	21mm	2,5mm	60mm	150mm	MFM-302-20-250	MFM-302-20-250-**DLC**	
	20mm	20mm	21mm	3,0mm	60mm	150mm	MFM-302-20-300	MFM-302-20-300-**DLC**	
	20mm	20mm	21mm	4,0mm	60mm	150mm	MFM-302-20-400	MFM-302-20-400-**DLC**	
	20mm	20mm	21mm	Ball End	60mm	150mm	MFM-302-20-BN	MFM-302-20-BN-**DLC**	
LONG	20mm	20mm	21mm	Sq. End	80mm	150mm	MFM-303-20	MFM-303-20-**DLC**	
	20mm	20mm	21mm	2,0mm	80mm	150mm	MFM-303-20-200	MFM-303-20-200-**DLC**	
	20mm	20mm	21mm	2,5mm	80mm	150mm	MFM-303-20-250	MFM-303-20-250-**DLC**	
	20mm	20mm	21mm	3,0mm	80mm	150mm	MFM-303-20-300	MFM-303-20-300-**DLC**	
	20mm	20mm	21mm	4,0mm	80mm	150mm	MFM-303-20-400	MFM-303-20-400-**DLC**	
	20mm	20mm	21mm	Ball End	80mm	150mm	MFM-303-20-BN	MFM-303-20-BN-**DLC**	
X LONG	20mm	20mm	21mm	Sq. End	100mm	150mm	MFM-304-20	MFM-304-20-**DLC**	
	20mm	20mm	21mm	2,0mm	100mm	150mm	MFM-304-20-200	MFM-304-20-200-**DLC**	
	20mm	20mm	21mm	2,5mm	100mm	150mm	MFM-304-20-250	MFM-304-20-250-**DLC**	
	20mm	20mm	21mm	3,0mm	100mm	150mm	MFM-304-20-300	MFM-304-20-300-**DLC**	
	20mm	20mm	21mm	4,0mm	100mm	150mm	MFM-304-20-400	MFM-304-20-400-**DLC**	
	20mm	20mm	21mm	Ball End	100mm	150mm	MFM-304-20-BN	MFM-304-20-BN-**DLC**	
S	25mm	25mm	26mm	Sq. End	50mm	165mm	MFM-301-25	MFM-301-25-**DLC**	25 mm DIAMETER
	25mm	25mm	26mm	2,5mm	50mm	165mm	MFM-301-25-250	MFM-301-25-250-**DLC**	
	25mm	25mm	26mm	4,0mm	50mm	165mm	MFM-301-25-400	MFM-301-25-400-**DLC**	
	25mm	25mm	26mm	Ball End	50mm	165mm	MFM-301-25-BN	MFM-301-25-BN-**DLC**	
M	25mm	25mm	26mm	Sq. End	75mm	165mm	MFM-302-25	MFM-302-25-**DLC**	
	25mm	25mm	26mm	2,5mm	75mm	165mm	MFM-302-25-250	MFM-302-25-250-**DLC**	
	25mm	25mm	26mm	4,0mm	75mm	165mm	MFM-302-25-400	MFM-302-25-400-**DLC**	
	25mm	25mm	26mm	Ball End	75mm	165mm	MFM-302-25-BN	MFM-302-25-BN-**DLC**	
XL	25mm	25mm	26mm	Sq. End	100mm	165mm	MFM-304-25	MFM-304-25-**DLC**	
	25mm	25mm	26mm	2,5mm	100mm	165mm	MFM-304-25-250	MFM-304-25-250-**DLC**	
	25mm	25mm	26mm	4,0mm	100mm	165mm	MFM-304-25-400	MFM-304-25-400-**DLC**	
	25mm	25mm	26mm	Ball End	100mm	165mm	MFM-304-25-BN	MFM-304-25-BN-**DLC**	

**Other Reach Lengths available upon request.*

MFM SERIES SPEEDS & FEEDS

Tool Diameter	Typical Z-Depth	Aluminum 6061-T6		Aluminum 6061-T3		Aluminum 7075		Aluminum 2024	
		RPM	Chip Load per Tooth	RPM	Chip Load per Tooth	RPM	Chip Load per Tooth	RPM	Chip Load per Tooth
6mm	4mm	Max	0,096mm	Max	0,084mm	Max	0,096mm	Max	0,096mm
8mm	4mm	Max	0,128mm	Max	0,112mm	Max	0,128mm	Max	0,128mm
10mm	5mm	Max	0,16mm	Max	0,14mm	Max	0,16mm	Max	0,16mm
12mm	5mm	Max	0,192mm	Max	0,168mm	Max	0,192mm	Max	0,192mm
16mm	5mm	Max	0,256mm	Max	0,224mm	Max	0,256mm	Max	0,256mm
20mm	6,5mm	Max	0,32mm	Max	0,28mm	Max	0,32mm	Max	0,32mm
25mm	6,5mm	Max	0,4mm	Max	0,35mm	Max	0,4mm	Max	0,4mm

Z-Depth of cut per pass should be deeper than the corner radius to help reduce chatter

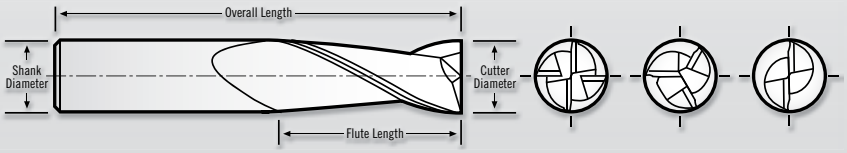
S1/MS1 C-2 Grade Carbide End Mills

Characteristics Square End, 2 Flute, 3 Flute, 4 Flute, 30° Helix

Applications Slotting, Side Milling, High Performance, Roughing, Semi-Finishing, Finishing, Dry, Wet, Cold Air, Spray Mist

Materials Aluminum, Copper, Magnesium, Plastics, Composites, Brass

Coatings Diamond-Like Carbon (DLC)



S1 Tolerances
Cutting Dia. (1/16" to 1/4") = +.000/–.002"
(9/32" to 3/4") = +.000/–.003"
Shank Dia. = –.0001/–.0002"
Flute Length (1/16" to 5/16") = +.030/–.000"
(3/8" to 3/4") = +.060/–.000"
OAL = ±.060"

MS1 Tolerances
Cutting Dia. = +.000/–.075mm
Shank Dia. = –.002/–.005mm
Flute Length = +0.500/+1.500mm
OAL = ±1.000mm

Slotting, Side Milling, Helical Interpolation

S1-201 2 Flute C-2 Grade Stub Length

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number DLC Coated
1/16"	1/8"	1/8"	1-1/2"	S1-201-02	S1-201-02-**DLC**
3/32"	1/8"	3/16"	1-1/2"	S1-201-03	S1-201-03-**DLC**
1/8"	1/8"	1/4"	1-1/2"	S1-201-04	S1-201-04-**DLC**
3/16"	3/16"	3/8"	2"	S1-201-06	S1-201-06-**DLC**
1/4"	1/4"	1/2"	2"	S1-201-08	S1-201-08-**DLC**
5/16"	5/16"	1/2"	2-1/2"	S1-201-10	S1-201-10-**DLC**
3/8"	3/8"	5/8"	2-1/2"	S1-201-12	S1-201-12-**DLC**
7/16"	7/16"	5/8"	2-3/4"	S1-201-14	S1-201-14-**DLC**
1/2"	1/2"	5/8"	3"	S1-201-16	S1-201-16-**DLC**
5/8"	5/8"	7/8"	3-1/2"	S1-201-20	S1-201-20-**DLC**
3/4"	3/4"	1"	3-1/2"	S1-201-24	S1-201-24-**DLC**

MS1-201 Metric 2 Flute C-2 Grade Stub Length METRIC

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number DLC Coated
2mm	3mm	5mm	38mm	MS1-201-02	MS1-201-02-**DLC**
3mm	3mm	6mm	38mm	MS1-201-03	MS1-201-03-**DLC**
4mm	4mm	8mm	50mm	MS1-201-04	MS1-201-04-**DLC**
5mm	5mm	8mm	50mm	MS1-201-05	MS1-201-05-**DLC**
6mm	6mm	8mm	50mm	MS1-201-06	MS1-201-06-**DLC**
8mm	8mm	12mm	58mm	MS1-201-08	MS1-201-08-**DLC**
10mm	10mm	14mm	66mm	MS1-201-10	MS1-201-10-**DLC**
12mm	12mm	16mm	73mm	MS1-201-12	MS1-201-12-**DLC**
16mm	16mm	20mm	82mm	MS1-201-16	MS1-201-16-**DLC**
20mm	20mm	25mm	92mm	MS1-201-20	MS1-201-20-**DLC**

C-2 Grade Carbide End Mills S1/MS1

Side Milling

S1-301 3 Flute C-2 Grade Stub Length

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number DLC Coated
1/16"	1/8"	1/8"	1-1/2"	S1-301-02	S1-301-02-**DLC**
3/32"	1/8"	3/16"	1-1/2"	S1-301-03	S1-301-03-**DLC**
1/8"	1/8"	1/4"	1-1/2"	S1-301-04	S1-301-04-**DLC**
3/16"	3/16"	3/8"	2"	S1-301-06	S1-301-06-**DLC**
1/4"	1/4"	1/2"	2"	S1-301-08	S1-301-08-**DLC**
5/16"	5/16"	1/2"	2-1/2"	S1-301-10	S1-301-10-**DLC**
3/8"	3/8"	5/8"	2-1/2"	S1-301-12	S1-301-12-**DLC**
7/16"	7/16"	5/8"	2-3/4"	S1-301-14	S1-301-14-**DLC**
1/2"	1/2"	5/8"	3"	S1-301-16	S1-301-16-**DLC**

Side Milling

S1-401 4 Flute C-2 Grade Stub Length

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number DLC Coated
1/16"	1/8"	1/8"	1-1/2"	S1-401-02	S1-401-02-**DLC**
3/32"	1/8"	3/16"	1-1/2"	S1-401-03	S1-401-03-**DLC**
1/8"	1/8"	1/4"	1-1/2"	S1-401-04	S1-401-04-**DLC**
3/16"	3/16"	3/8"	2"	S1-401-06	S1-401-06-**DLC**
1/4"	1/4"	1/2"	2"	S1-401-08	S1-401-08-**DLC**
5/16"	5/16"	1/2"	2-1/2"	S1-401-10	S1-401-10-**DLC**
3/8"	3/8"	5/8"	2-1/2"	S1-401-12	S1-401-12-**DLC**
7/16"	7/16"	5/8"	2-3/4"	S1-401-14	S1-401-14-**DLC**
1/2"	1/2"	5/8"	3"	S1-401-16	S1-401-16-**DLC**
5/8"	5/8"	7/8"	3-1/2"	S1-401-20	S1-401-20-**DLC**
3/4"	3/4"	1"	3-1/2"	S1-401-24	S1-401-24-**DLC**

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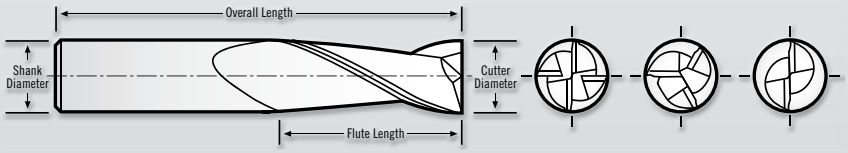
C1/MC1 C-2 Grade Carbide End Mills

Characteristics Square End · 2 Flute · 3 Flute · 4 Flute · 30° Helix

Applications Slotting · Side Milling · Conventional · High Performance · Roughing · Semi-Finishing · Finishing · Dry · Wet · Cold Air · Spray Mist

Materials Aluminum · Copper · Magnesium · Plastics · Composites · Brass

Coatings Diamond-Like Carbon (DLC)



C1 Tolerances

Cutting Dia. (1/16" to 1/4") = +.000/–.002"
(9/32" to 3/4") = +.000/–.003"
Shank Dia. = –.0001/–.0002"
Flute length (1/16" to 5/16") = +.030/–.000"
(3/8" to 3/4") = +.060/–.000"
OAL = ±.060"

MC1 Tolerances

Cutting Dia. = +.000/–.075mm
Shank Dia. = –.002/–.005mm
Flute Length = +0.500/+1.500mm
OAL = ±1.000mm

Slotting · Side Milling · Helical Interpolation

C1-201 2 Flute C-2 Grade Standard Length

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number DLC Coated
1/16"	1/8"	3/16"	1-1/2"	C1-201-02	C1-201-02-**DLC**
3/32"	1/8"	3/8"	1-1/2"	C1-201-03	C1-201-03-**DLC**
1/8"	1/8"	1/2"	1-1/2"	C1-201-04	C1-201-04-**DLC**
5/32"	3/16"	9/16"	2"	C1-201-05	C1-201-05-**DLC**
3/16"	3/16"	5/8"	2"	C1-201-06	C1-201-06-**DLC**
7/32"	1/4"	5/8"	2-1/2"	C1-201-07	C1-201-07-**DLC**
1/4"	1/4"	3/4"	2-1/2"	C1-201-08	C1-201-08-**DLC**
9/32"	5/16"	3/4"	2-1/2"	C1-201-09	C1-201-09-**DLC**
5/16"	5/16"	13/16"	2-1/2"	C1-201-10	C1-201-10-**DLC**
3/8"	3/8"	7/8"	2-1/2"	C1-201-12	C1-201-12-**DLC**
7/16"	7/16"	1"	2-3/4"	C1-201-14	C1-201-14-**DLC**
1/2"	1/2"	1"	3"	C1-201-16	C1-201-16-**DLC**
9/16"	9/16"	1-1/4"	3-1/2"	C1-201-18	C1-201-18-**DLC**
5/8"	5/8"	1-1/4"	3-1/2"	C1-201-20	C1-201-20-**DLC**
3/4"	3/4"	1-1/2"	4"	C1-201-24	C1-201-24-**DLC**

MC1-201 Metric 2 Flute C-2 Grade Standard Length METRIC

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number	Tool Number DLC Coated
2mm	3mm	8mm	38mm	MC1-201-02	MC1-201-02-**DLC**
3mm	3mm	12mm	38mm	MC1-201-03	MC1-201-03-**DLC**
4mm	4mm	12mm	50mm	MC1-201-04	MC1-201-04-**DLC**
5mm	5mm	14mm	50mm	MC1-201-05	MC1-201-05-**DLC**
6mm	6mm	14mm	57mm	MC1-201-06	MC1-201-06-**DLC**
8mm	8mm	16mm	63mm	MC1-201-08	MC1-201-08-**DLC**
10mm	10mm	20mm	72mm	MC1-201-10	MC1-201-10-**DLC**
12mm	12mm	25mm	83mm	MC1-201-12	MC1-201-12-**DLC**
16mm	16mm	32mm	92mm	MC1-201-16	MC1-201-16-**DLC**
20mm	20mm	38mm	104mm	MC1-201-20	MC1-201-20-**DLC**
25mm	25mm	38mm	104mm	MC1-201-25	MC1-201-25-**DLC**

C-2 Grade Carbide End Mills C1/MC1

Side Milling

C1-301 3 Flute C-2 Grade Standard Length

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number DLC Coated
1/16"	1/8"	3/16"	1-1/2"	C1-301-02	C1-301-02-**DLC**
3/32"	1/8"	3/8"	1-1/2"	C1-301-03	C1-301-03-**DLC**
1/8"	1/8"	1/2"	1-1/2"	C1-301-04	C1-301-04-**DLC**
5/32"	3/16"	9/16"	2"	C1-301-05	C1-301-05-**DLC**
3/16"	3/16"	5/8"	2"	C1-301-06	C1-301-06-**DLC**
7/32"	1/4"	5/8"	2-1/2"	C1-301-07	C1-301-07-**DLC**
1/4"	1/4"	3/4"	2-1/2"	C1-301-08	C1-301-08-**DLC**
9/32"	5/16"	3/4"	2-1/2"	C1-301-09	C1-301-09-**DLC**
5/16"	5/16"	13/16"	2-1/2"	C1-301-10	C1-301-10-**DLC**
3/8"	3/8"	7/8"	2-1/2"	C1-301-12	C1-301-12-**DLC**
7/16"	7/16"	1"	2-3/4"	C1-301-14	C1-301-14-**DLC**
1/2"	1/2"	1"	3"	C1-301-16	C1-301-16-**DLC**
9/16"	9/16"	1-1/4"	3-1/2"	C1-301-18	C1-301-18-**DLC**
5/8"	5/8"	1-1/4"	3-1/2"	C1-301-20	C1-301-20-**DLC**
3/4"	3/4"	1-1/2"	4"	C1-301-24	C1-301-24-**DLC**

MC1-301 Metric 3 Flute C-2 Grade Standard Length METRIC

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number	Tool Number DLC Coated
2mm	3mm	8mm	38mm	MC1-301-02	MC1-301-02-**DLC**
3mm	3mm	12mm	38mm	MC1-301-03	MC1-301-03-**DLC**
4mm	4mm	12mm	50mm	MC1-301-04	MC1-301-04-**DLC**
5mm	5mm	14mm	50mm	MC1-301-05	MC1-301-05-**DLC**
6mm	6mm	14mm	57mm	MC1-301-06	MC1-301-06-**DLC**
8mm	8mm	16mm	63mm	MC1-301-08	MC1-301-08-**DLC**
10mm	10mm	20mm	72mm	MC1-301-10	MC1-301-10-**DLC**
12mm	12mm	25mm	83mm	MC1-301-12	MC1-301-12-**DLC**
16mm	16mm	32mm	92mm	MC1-301-16	MC1-301-16-**DLC**
20mm	20mm	38mm	104mm	MC1-301-20	MC1-301-20-**DLC**
25mm	25mm	38mm	104mm	MC1-301-25	MC1-301-25-**DLC**

Side Milling

C1-401 4 Flute C-2 Grade Standard Length

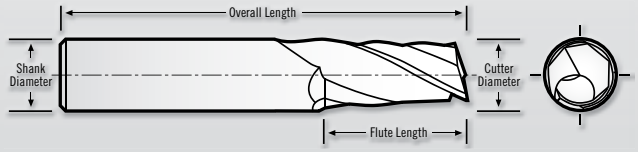
Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number DLC Coated
1/16"	1/8"	3/16"	1-1/2"	C1-401-02	C1-401-02-**DLC**
3/32"	1/8"	3/8"	1-1/2"	C1-401-03	C1-401-03-**DLC**
1/8"	1/8"	1/2"	1-1/2"	C1-401-04	C1-401-04-**DLC**
5/32"	3/16"	9/16"	2"	C1-401-05	C1-401-05-**DLC**
3/16"	3/16"	5/8"	2"	C1-401-06	C1-401-06-**DLC**
7/32"	1/4"	5/8"	2-1/2"	C1-401-07	C1-401-07-**DLC**
1/4"	1/4"	3/4"	2-1/2"	C1-401-08	C1-401-08-**DLC**
9/32"	5/16"	3/4"	2-1/2"	C1-401-09	C1-401-09-**DLC**
5/16"	5/16"	13/16"	2-1/2"	C1-401-10	C1-401-10-**DLC**
3/8"	3/8"	7/8"	2-1/2"	C1-401-12	C1-401-12-**DLC**
7/16"	7/16"	1"	2-3/4"	C1-401-14	C1-401-14-**DLC**
1/2"	1/2"	1"	3"	C1-401-16	C1-401-16-**DLC**
9/16"	9/16"	1-1/4"	3-1/2"	C1-401-18	C1-401-18-**DLC**
5/8"	5/8"	1-1/4"	3-1/2"	C1-401-20	C1-401-20-**DLC**
3/4"	3/4"	1-1/2"	4"	C1-401-24	C1-401-24-**DLC**

PM/MPM/PMD Tuffy Grade Carbide Router Bits

Characteristics Square End · 1 Flute · Polished

Applications Slotting · Side Milling · Helical Interpolation · Ramping · Roughing · Semi-Finishing · Finishing · Dry · Wet · Cold Air · Spray Mist

Materials Aluminum · Plastics · Wood



PM/PMD Series Tolerances
Cutting Dia. = +0.000/–0.002"
Shank Dia. = –0.0001/–0.0002"
Flute Length = +0.060/ –0.000"
OAL = ±0.060"

MPM Tolerances
Cutting Dia. = +.000/–.075mm
Shank Dia. = –.002/–.005mm
Flute Length = +0.500/+1.500mm
OAL = ±1.000mm

1 Flute · Polished · UP Shear

PM Up Shear 1 Flute Tuffy Grade

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number
1/8"	1/8"	1/2"	2"	PM-104-04
1/8"	1/4"	1/2"	2"	PM-108-04
3/16"	3/16"	5/8"	2"	PM-106-06
3/16"	1/4"	5/8"	2"	PM-108-06
3/16"	1/4"	1-1/4"	3"	PM-108-06L
1/4"	1/4"	3/4"	2"	PM-108-08
1/4"	1/4"	1-1/2"	3"	PM-108-08L
3/8"	3/8"	1-1/4"	3"	PM-112-12
1/2"	1/2"	1-1/2"	4"	PM-116-16

1 Flute · Polished · Shear DN

PMD Down Shear 1 Flute Tuffy Grade

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number
1/8"	1/4"	1/2"	2"	PMD-108-04
3/16"	1/4"	5/8"	2"	PMD-108-06
1/4"	1/4"	3/4"	2"	PMD-108-08

1 Flute · Polished · UP Shear

MPM Up Shear 1 Flute Tuffy Grade METRIC

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number
4mm	3mm	12mm	50mm	MPM-104-04
6mm	4mm	12mm	50mm	MPM-106-04
6mm	6mm	14mm	50mm	MPM-106-05
6mm	6mm	14mm	57mm	MPM-106-06
8mm	8mm	22mm	63mm	MPM-108-08
10mm	10mm	25mm	72mm	MPM-110-10
12mm	12mm	25mm	83mm	MPM-112-12

NEW

Polished

Best Tool for Gummy/Soft Aluminum

Reduces Material Sticking to Tool

Router for Aluminum Aircraft Skins WU1/WD1

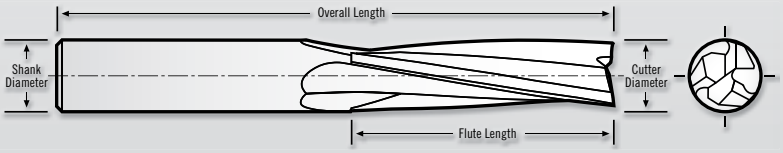
Characteristics: Square End, 3 Flute, 10° Helix

Applications: Slotting, Side Milling, Roughing, Semi-Finishing, Finishing, Dry, Wet, Cold Air, Spray Mist

Materials: Aluminum, Copper, Magnesium, Plastics

Available with Chatter Reduction with Mirror Edge!

See Page 6



WU1/WD1 Tolerances

Cutting Dia. = .001/–.002"
Shank Dia. = –.0001/–.0002"
Flute Length (<5/16") = +.020/+.030"
(>5/16") = +.030/+.060"
OAL = ±.060"

UP Shear

WU1-310 Up Shear 3 Flute Standard Length (10° Helix)

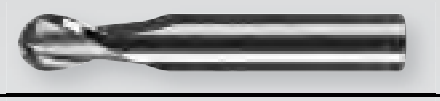
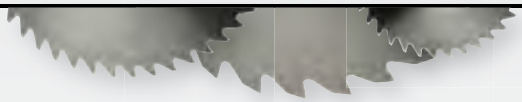
Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number
1/2"	1/2"	1-3/4"	4"	WU1-310-16
5/8"	5/8"	2"	4-5/8"	WU1-310-20
3/4"	3/4"	2-1/2"	5-1/4"	WU1-310-24

Shear DN

WD1-310 Down Shear 3 Flute Standard Length (10° Helix)

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number
1/2"	1/2"	1-3/4"	4"	WD1-310-16
5/8"	5/8"	2"	4-5/8"	WD1-310-20
3/4"	3/4"	2-1/2"	5-1/4"	WD1-310-24

Aluminum Tools in Other Sections

SB / B 201/203 **MSB / MB** 201/203	2 Flute Ball End (See Multiple Applications)		110
C8 201/203/301/303	2 & 3 Flute on ¼" Shank (See Multiple Applications)		105
NR / MNR 204/303/404	2, 3 and 4 Flute (See Multiple Applications)		115
PCD 203 Routers	2 Flute PCD Diamond (See Composites & Plastics)		71
PCD-BN 201 Routers	2 Flute PCD Diamond, Ball End (See Composites & Plastics)		71
MINIATURES	(See Miniatures Applications)		89
SAWS	(See Saws Applications)		121

TOOLS FOR

Titanium, Steel & High-Temp Alloys

Titanium Machining at 75 ipm!
Scan this code to:

- See How to Cut Titanium at 75 ipm
- Watch Videos
- See How to High-Speed Machine Steel
- And More...

Featured Tools:

NS Series – Machine Steel with Ease!

NEW!

Page 44

- 500% Increase in Metal Removal Rates
- Reduced Cycle Time from 45 minutes to 9 minutes
- Speeds and Feeds up to 5X Those of Traditional Steel CuttingTools
- Available in Inch and Metric Sizes

XG Series – The Highest Performing Tool in Steel, Stainless & Other Difficult Alloys

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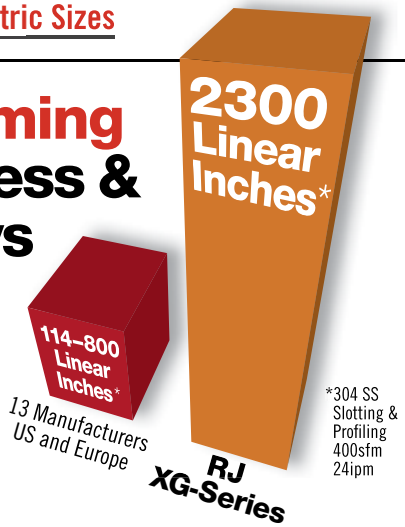

*304 SS Slotting & Profiling 400sfm 24ipm

XF Series – Best Tool for High-Speed Machining

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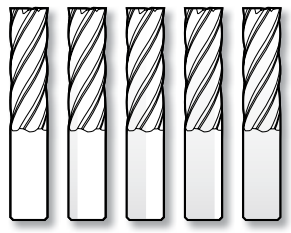

Other High-Performance Tools

= 6Al4V Titanium Flap Trac for Airplane Wing

vs.

RJ XF-Series

= 6Al4V Titanium Flap Trac for Airplane Wing

RJ XF-Series
15X LIFE!
of Comparable Tools!

Titanium, Steel & High-Temp Alloys Tools

NS / MNS 402	4 Flute Tuffy Grade	NEW! Variable Helix	44
XG / MXG 400/402	4 Flute Tuffy Grade	Variable Helix	46
XG / MXG 500/502	5 Flute Tuffy Grade	Variable Helix	47
XG-BN / MXG-BN	4 Flute Tuffy Grade, Ball End	Variable Helix	48
XF / MXF	6 and 8 Flute Tuffy Grade		49
ST / MST 341/343	3 Flute Super Tuffy Grade		52
STR / MSTR 301/303	3 Flute Super Tuffy Grade		54
STR / MSTR 401/404	4 Flute Super Tuffy Grade		56
B / MB 300/330	3 Flute Tuffy Grade		58
B / MB 440	4 Flute Tuffy Grade		59
ST / MST 360/646/630	3 and 6 Flute Super Tuffy Grade		60
ST / MST 430/434	3 and 6 Flute Super Tuffy Grade		62
TS / MTS 201/301/401	2, 3 and 4 Flute (See Multiple Applications)		106
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MINIATURES	(See Miniatures Applications)		89
SAWS	(See Saws Applications)		121

NS/MNS Tuffy Grade Carbide End Mills

Characteristics Square End, 4 Flute, Variable Helix, Flats

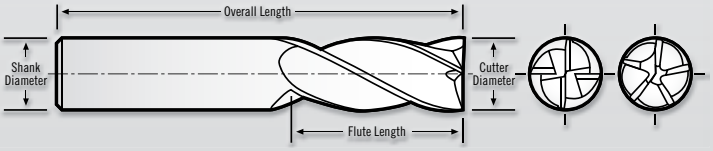
Applications Slotting, Side Milling, Helical Interpolation, Ramping, High Performance, Roughing, Semi-Finishing, Finishing, Dry, Wet

Materials Cast Iron, Steel, 40 HRc Hardness

Coatings Aluminum Titan. Nitride

NEW

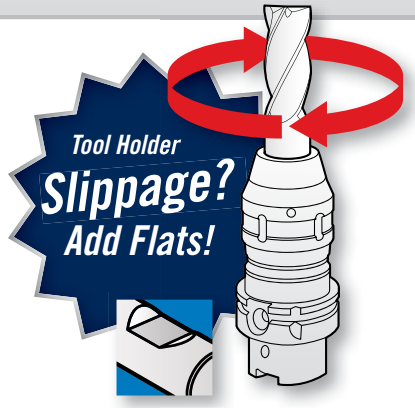
Variable Helix a≠b



NS Tolerances
Cutting Dia. = –.001/–.002"
Shank Dia. = –.0001/–.0002"
Flute Length = +.060/–.000"
OAL = +/–.060"

MNS Tolerances
Cutting Dia. = –0.025/–0.050mm
Shank Dia. = –0.002/–0.005mm
Flute Length = +0.50/+1.50mm
OAL = +/– 1.00mm

Add Flats for High Torque Cuts!



NS-401 4 Flute Stub Length

Cutting Diameter	Chamfer	Shank Diameter	Flute Length	Overall Length	Tool number Flats, AlTiN Coated	Tool number No Flats, AlTiN Coated
3/16"	0.008	3/16"	3/8"	2-1/2"	NS-401-06-**FL**	NS-401-06
1/4"	0.008	1/4"	1/2"	2-1/2"	NS-401-08-**FL**	NS-401-08
5/16"	0.01	5/16"	1/2"	2-1/2"	NS-401-10-**FL**	NS-401-10
3/8"	0.01	3/8"	5/8"	2-1/2"	NS-401-12-**FL**	NS-401-12
1/2"	0.01	1/2"	3/4"	3"	NS-401-16-**FL**	NS-401-16
5/8"	0.015	5/8"	7/8"	3-1/2"	NS-401-20-**FL**	NS-401-20
3/4"	0.015	3/4"	1"	4"	NS-401-24-**FL**	NS-401-24
1"	0.02	1"	1"	5"	NS-401-32-**FL**	NS-401-32

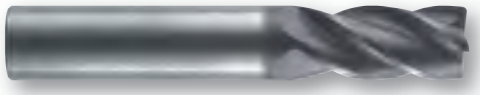
NS-402 4 Flute Standard Length

Cutting Diameter	Chamfer	Shank Diameter	Flute Length	Overall Length	Tool number Flats, AlTiN Coated	Tool number No Flats, AlTiN Coated
3/16"	0.008	3/16"	5/8"	2-1/2"	NS-402-06-**FL**	NS-402-06
1/4"	0.008	1/4"	3/4"	2-1/2"	NS-402-08-**FL**	NS-402-08
5/16"	0.01	5/16"	7/8"	2-1/2"	NS-402-10-**FL**	NS-402-10
3/8"	0.01	3/8"	1"	2-1/2"	NS-402-12-**FL**	NS-402-12
1/2"	0.01	1/2"	1-1/8"	3"	NS-402-16-**FL**	NS-402-16
5/8"	0.015	5/8"	1-1/4"	3-1/2"	NS-402-20-**FL**	NS-402-20
3/4"	0.015	3/4"	1-1/2"	4"	NS-402-24-**FL**	NS-402-24
1"	0.02	1"	1-3/4"	5"	NS-402-32-**FL**	NS-402-32

NS-403 4 Flute Long Length

Cutting Diameter	Chamfer	Shank Diameter	Flute Length	Overall Length	Tool number Flats, AlTiN Coated	Tool number No Flats, AlTiN Coated
3/16"	0.008	3/16"	7/8"	2-1/2"	NS-403-06-**FL**	NS-403-06
1/4"	0.008	1/4"	1"	2-1/2"	NS-403-08-**FL**	NS-403-08
5/16"	0.01	5/16"	1-1/8"	2-1/2"	NS-403-10-**FL**	NS-403-10
3/8"	0.01	3/8"	1-1/4"	3"	NS-403-12-**FL**	NS-403-12
1/2"	0.01	1/2"	1-1/2"	4"	NS-403-16-**FL**	NS-403-16
5/8"	0.015	5/8"	1-3/4"	4"	NS-403-20-**FL**	NS-403-20
3/4"	0.015	3/4"	2"	5"	NS-403-24-**FL**	NS-403-24
1"	0.02	1"	2-1/2"	6"	NS-403-32-**FL**	NS-403-32

Tuffy Grade Carbide End Mills NS/MNS



Add Flats for High Torque Cuts!

MNS-402 4 Flute Standard Length METRIC

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Flats, AlTiN Coated	Tool Number No Flats, AlTiN Coated
6mm	6mm	14mm	58mm	MNS-402-06-**FL**	MNS-402-06
8mm	8mm	16mm	64mm	MNS-402-08-**FL**	MNS-402-08
10mm	10mm	20mm	73mm	MNS-402-10-**FL**	MNS-402-10
12mm	12mm	25mm	84mm	MNS-402-12-**FL**	MNS-402-12
16mm	16mm	32mm	93mm	MNS-402-16-**FL**	MNS-402-16
20mm	20mm	38mm	105mm	MNS-402-20-**FL**	MNS-402-20
25mm	25mm	45mm	121mm	MNS-402-25-**FL**	MNS-402-25

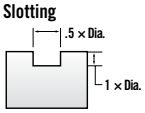
NS SERIES SPEEDS & FEEDS

Material	Surface Footage	3/16"		1/4"		5/16"		3/8"		1/2"		5/8"		3/4"		1"	
		RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min
CAST IRON																	
Ductile	400	8149	20	6112	20	4890	24	4075	28	3056	31	2445	28	2037	24	1528	21
Gray	525	10696	42	8022	42	6418	51	5348	58	4011	64	3209	58	2674	51	2006	45
STEEL																	
1018/1020	500	10187	32	7640	32	6112	39	5093	44	3820	49	3056	44	2547	39	1910	34
4130	400	8149	20	6112	20	4890	24	4075	28	3056	31	2445	28	2037	24	1528	21
4140	400	8149	20	6112	20	4890	24	4075	28	3056	31	2445	28	2037	24	1528	21
4340	415	8455	21	6341	21	5073	25	4227	29	3171	32	2536	29	2114	25	1585	22
TOOL STEEL (ANNEALED)																	
A2	400	8149	17	6112	17	4890	22	4075	24	3056	27	2445	24	2037	22	1528	19
D2	360	7334	16	5501	16	4401	19	3667	22	2750	24	2200	22	1834	19	1375	17
H13	400	8149	17	6112	17	4890	22	4075	24	3056	27	2445	24	2037	22	1528	19
P20	400	8149	23	6112	23	4890	28	4075	31	3056	35	2445	31	2037	28	1528	24

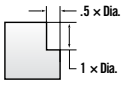
Speeds and feeds are based on applications with very rigid machine tools, toolholders, and fixturing. Speeds and feeds will vary dramatically depending on the application. Extreme forces can be generated and can cause damage, if not appropriate for the cutting conditions.

Helical interpolation or ramping should be used to enter pockets. For the highest material removal rates and longest tool life profile milling is preferred over slotting. (See diagrams below)

Slotting



Profiling



MNS SERIES SPEEDS & FEEDS METRIC

Material	Surface Meters/min	6mm		8mm		10mm		12mm		16mm		20mm		25mm	
		RPM	mm/min	RPM	mm/min	RPM	mm/min	RPM	mm/min	RPM	mm/min	RPM	mm/min	RPM	mm/min
CAST IRON															
Ductile	400	6475	505	4851	505	3881	621	3234	699	2426	776	1941	699	1552	543
Gray	525	8498	1060	6367	1060	5094	1304	4245	1467	3184	1630	2547	1467	2038	1141
STEEL															
1018/1020	500	8093	807	6064	807	4851	994	4043	1118	3032	1242	2426	1118	1941	869
4130	400	6475	505	4851	505	3881	621	3234	699	2426	776	1941	699	1552	543
4140	400	6475	505	4851	505	3881	621	3234	699	2426	776	1941	699	1552	543
4340	415	6717	523	5033	523	4027	644	3356	725	2517	805	2013	725	1611	564
TOOL STEEL (ANNEALED)															
A2	400	6475	444	4851	444	3881	546	3234	615	2426	683	1941	615	1552	478
D2	360	5827	400	4366	400	3493	492	2911	553	2183	615	1747	553	1397	430
H13	400	6475	444	4851	444	3881	546	3234	615	2426	683	1941	615	1552	478
P20	400	6475	575	4851	575	3881	708	3234	796	2426	885	1941	796	1552	619

XG/MXG Tuffy Grade Carbide End Mills

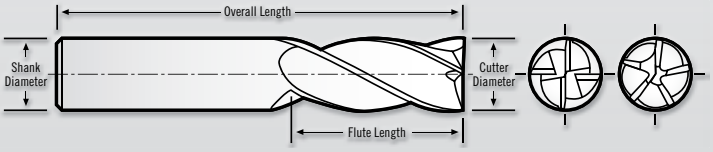
Characteristics: Square End, Corner Radius, 4 Flute, 5 Flute, Variable Helix, Flats

Applications: Slotting, Side Milling, Helical Interpolation, Ramping, High Performance, Roughing, Semi-Finishing, Finishing, Dry, Wet, Cold Air, Spray Mist

Materials: Titanium, Cast Iron, Steel, Stainless Steel, Super Alloys, 40 HRc Hardness

Coatings: Aluminum Titan. Nitride

Variable Helix a≠b



XG Tolerances
Cutting Dia. = –.001/–.002"
Shank Dia. = –.0001/–.0002"
Flute Length = +.060/–.000"
OAL = +/–.060"

MXG Tolerances
Cutting Dia. = –.025/–.050mm
Shank Dia. = –.002/–.005mm
Flute Length = +0.50/+1.50mm
OAL = +/– 1.00mm

4 Flute

Add Flats for High Torque Cuts!

XG-400 4 Flute Stub Length

Cutting Diameter	Corner Radius	Shank Diameter	Flute Length	Overall Length	Tool Number Flats, AlTiN Coated	Tool Number No Flats, AlTiN Coated
1/4"	.017–.019"	1/4"	3/8"	2-1/2"	XG-400-08-**FL**	XG-400-08
5/16"	.020–.022"	5/16"	7/16"	2-1/2"	XG-400-10-**FL**	XG-400-10
3/8"	.023–.025"	3/8"	1/2"	2-1/2"	XG-400-12-**FL**	XG-400-12
1/2"	.025–.027"	1/2"	5/8"	3"	XG-400-16-**FL**	XG-400-16
5/8"	.027–.029"	5/8"	3/4"	3-1/2"	XG-400-20-**FL**	XG-400-20
3/4"	.028–.030"	3/4"	1"	4"	XG-400-24-**FL**	XG-400-24
1"	.028–.030"	1"	1-1/8"	5"	XG-400-32-**FL**	XG-400-32

Eliminate Tool Pull Out!
1/4"–5/16" h5 Shank Tolerance
3/8"–1" h4 Shank Tolerance
Tightest in the Industry!

XG-402 4 Flute Standard Length

Cutting Diameter	Corner Radius	Shank Diameter	Flute Length	Overall Length	Tool Number Flats, AlTiN Coated	Tool Number No Flats, AlTiN Coated
1/4"	.017–.019"	1/4"	3/4"	2-1/2"	XG-402-08-**FL**	XG-402-08
5/16"	.020–.022"	5/16"	13/16"	2-1/2"	XG-402-10-**FL**	XG-402-10
3/8"	.023–.025"	3/8"	7/8"	2-1/2"	XG-402-12-**FL**	XG-402-12
1/2"	.025–.027"	1/2"	1"	3"	XG-402-16-**FL**	XG-402-16
5/8"	.027–.029"	5/8"	1-1/4"	3-1/2"	XG-402-20-**FL**	XG-402-20
3/4"	.028–.030"	3/4"	1-1/2"	4"	XG-402-24-**FL**	XG-402-24
1"	.028–.030"	1"	2"	5"	XG-402-32-**FL**	XG-402-32

MXG-402 Metric 4 Flute Standard Length METRIC

Cutting Diameter	Corner Radius	Shank Diameter	Flute Length	Overall Length	Tool Number Flats, AlTiN Coated	Tool Number No Flats, AlTiN Coated
6mm	.50–.55mm	6mm	14mm	57mm	MXG-402-06-**FL**	MXG-402-06
8mm	.55–.60mm	8mm	16mm	63mm	MXG-402-08-**FL**	MXG-402-08
10mm	.60–.65mm	10mm	20mm	72mm	MXG-402-10-**FL**	MXG-402-10
12mm	.65–.70mm	12mm	25mm	83mm	MXG-402-12-**FL**	MXG-402-12
16mm	.70–.75mm	16mm	32mm	92mm	MXG-402-16-**FL**	MXG-402-16
20mm	.90–1.0mm	20mm	38mm	104mm	MXG-402-20-**FL**	MXG-402-20

NOTE: Metric tools do not have flats.

Tuffy Grade Carbide End Mills XG/MXG

5 Flute

Add Flats for High Torque Cuts!

XG-500 5 Flute Stub Length

Cutting Diameter	Corner Radius	Shank Diameter	Flute Length	Overall Length	Tool Number Flats, AlTiN Coated	Tool Number No Flats, AlTiN Coated
1/4"	.017–.019"	1/4"	3/8"	2-1/2"	XG-500-08-**FL**	XG-500-08
5/16"	.020–.022"	5/16"	7/16"	2-1/2"	XG-500-10-**FL**	XG-500-10
3/8"	.023–.025"	3/8"	1/2"	2-1/2"	XG-500-12-**FL**	XG-500-12
1/2"	.025–.027"	1/2"	5/8"	3"	XG-500-16-**FL**	XG-500-16
5/8"	.027–.029"	5/8"	3/4"	3-1/2"	XG-500-20-**FL**	XG-500-20
3/4"	.028–.030"	3/4"	1"	4"	XG-500-24-**FL**	XG-500-24
1"	.028–.030"	1"	1-1/8"	5"	XG-500-32-**FL**	XG-500-32

XG-502 5 Flute Standard Length

Cutting Diameter	Corner Radius	Shank Diameter	Flute Length	Overall Length	Tool Number Flats, AlTiN Coated	Tool Number No Flats, AlTiN Coated
1/4"	.017–.019"	1/4"	3/4"	2-1/2"	XG-502-08-**FL**	XG-502-08
5/16"	.020–.022"	5/16"	13/16"	2-1/2"	XG-502-10-**FL**	XG-502-10
3/8"	.023–.025"	3/8"	7/8"	2-1/2"	XG-502-12-**FL**	XG-502-12
1/2"	.025–.027"	1/2"	1"	3"	XG-502-16-**FL**	XG-502-16
5/8"	.027–.029"	5/8"	1-1/4"	3-1/2"	XG-502-20-**FL**	XG-502-20
3/4"	.028–.030"	3/4"	1-1/2"	4"	XG-502-24-**FL**	XG-502-24
1"	.028–.030"	1"	2"	5"	XG-502-32-**FL**	XG-502-32

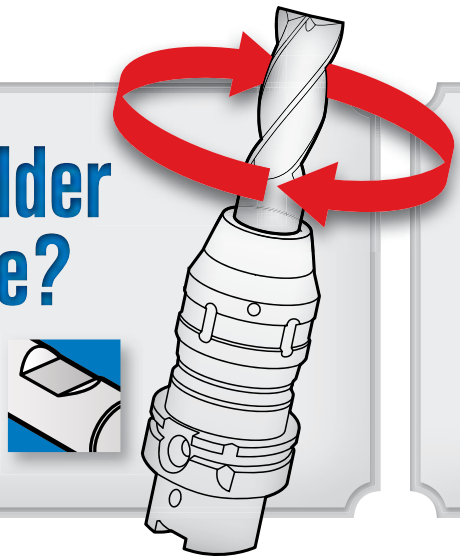
MXG-502 Metric 5 Flute Standard Length METRIC

Cutting Diameter	Corner Radius	Shank Diameter	Flute Length	Overall Length	Tool Number Flats, AlTiN Coated	Tool Number No Flats, AlTiN Coated
6mm	.50–.55mm	6mm	14mm	57mm	MXG-502-06-**FL**	MXG-502-06
8mm	.55–.60mm	8mm	16mm	63mm	MXG-502-08-**FL**	MXG-502-08
10mm	.60–.65mm	10mm	20mm	72mm	MXG-502-10-**FL**	MXG-502-10
12mm	.65–.70mm	12mm	25mm	83mm	MXG-502-12-**FL**	MXG-502-12
16mm	.70–.75mm	16mm	32mm	92mm	MXG-502-16-**FL**	MXG-502-16
20mm	.90–1.0mm	20mm	38mm	104mm	MXG-502-20-**FL**	MXG-502-20

NOTE: Metric tools do not have flats.

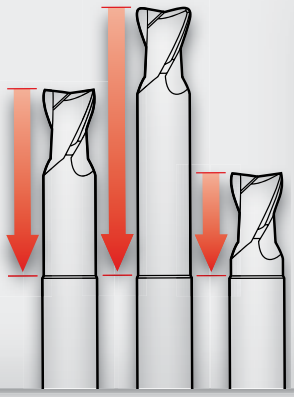
Tool Holder Slippage?

Add Flats! Use shrink fit or equivalent gripping force. If not, use flats.



Need Reach?

See End Mill Modifications (page 14)



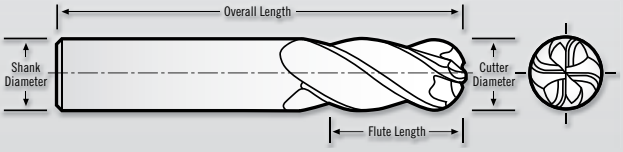
XG/MXG Tuffy Grade Carbide End Mills

Characteristics: Ball End, 4 Flute, Variable Helix, Flats

Applications: Slotting, Side Milling, Helical Interpolation, Ramping, High Performance, Roughing, Semi-Finishing, Finishing, Dry, Wet

Materials: Titanium, Cast Iron, Steel, Stainless Steel, Super Alloys, 40 HRc Hardness

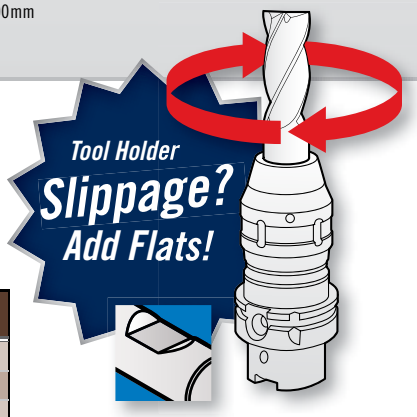
Coatings: Aluminum Titan. Nitride



XG-BN Tolerances
Cutting Dia. = –.001/–.002"
Shank Dia. = –.0001/–.0002"
Flute Length = +.060/–.000"
OAL = +/–.060"

MXG-BN Tolerances
Cutting Dia. = –.025/–.050mm
Shank Dia. = –.002/–.005mm
Flute Length = +0.50/+1.50mm
OAL = +/– 1.00mm

Add Flats for High Torque Cuts!



XG-402BN 4 Flute Ball End Standard Length

Cutting Diameter	Corner Radius	Shank Diameter	Flute Length	Overall Length	Tool Number Flats, AlTiN Coated	Tool Number No Flats, AlTiN Coated
1/4"	–	1/4"	3/4"	2-1/2"	XG-402-08-**BN-FL**	XG-402-08-**BN**
5/16"	–	5/16"	13/16"	2-1/2"	XG-402-10-**BN-FL**	XG-402-10-**BN**
3/8"	–	3/8"	7/8"	2-1/2"	XG-402-12-**BN-FL**	XG-402-12-**BN**
1/2"	–	1/2"	1"	3"	XG-402-16-**BN-FL**	XG-402-16-**BN**
5/8"	–	5/8"	1-1/4"	3-1/2"	XG-402-20-**BN-FL**	XG-402-20-**BN**
3/4"	–	3/4"	1-1/2"	4"	XG-402-24-**BN-FL**	XG-402-24-**BN**
1"	–	1"	2"	5"	XG-402-32-**BN-FL**	XG-402-32-**BN**

Add Flats for High Torque Cuts!

MXG-402BN Metric 4 Flute Ball End Standard Length METRIC

Cutting Diameter	Corner Radius	Shank Diameter	Flute Length	Overall Length	Tool Number Flats, AlTiN Coated	Tool Number No Flats, AlTiN Coated
6mm	–	6mm	14mm	57mm	MXG-402-06-**BN-FL**	MXG-402-06-**BN**
8mm	–	8mm	16mm	63mm	MXG-402-08-**BN-FL**	MXG-402-08-**BN**
10mm	–	10mm	20mm	72mm	MXG-402-10-**BN-FL**	MXG-402-10-**BN**
12mm	–	12mm	25mm	83mm	MXG-402-12-**BN-FL**	MXG-402-12-**BN**
16mm	–	16mm	32mm	92mm	MXG-402-16-**BN-FL**	MXG-402-16-**BN**
20mm	–	20mm	38mm	104mm	MXG-402-20-**BN-FL**	MXG-402-20-**BN**

NOTE: Metric tools do not have flats.

Tuffy Grade Carbide End Mills XF/MXF

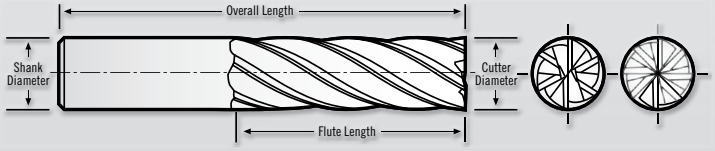
Characteristics Square End, Corner Radius, 6 Flute, 8 Flute, 45° Helix, Flats

Applications Side Milling, High Performance, Semi-Finishing, Finishing, Dry, Wet, Cold Air, Spray Mist

Materials Titanium, Cast Iron, Steel, Stainless Steel, Super Alloys, 40 HRc Hardness

Coatings Aluminum Titan. Nitride

Eliminate Tool Pull Out!
1/4"–5/16" h5 Shank Tolerance
3/8"–1" h4 Shank Tolerance
Tightest in the Industry!



XF Tolerances
Cutting Dia. = –.001/–.002"
Shank Dia. = –.0001/–.0002"
Flute Length = +.060/–.000"
OAL = +/–.060"

MXF Tolerances
Cutting Dia. = –.025/–.050mm
Shank Dia. = –.002/–.005mm
Flute Length = +0.500/+1.500mm
OAL = ±1.000mm

XF-602/802 6/8 Flute Standard Length

Cutting Diameter	Corner Radius	Shank Diameter	Flute Length	Overall Length	Tool Number Flats, AlTiN Coated	Tool Number No Flats, AlTiN Coated
3/8"	0.030"	3/8"	7/8"	2-1/2"	XF-602-12-030-**FL**	XF-602-12-030
3/8"	0.060"	3/8"	7/8"	2-1/2"	XF-602-12-060-**FL**	XF-602-12-060
3/8"	0.090"	3/8"	7/8"	2-1/2"	XF-602-12-090-**FL**	XF-602-12-090
1/2"	0.030"	1/2"	1"	3"	XF-602-16-030-**FL**	XF-602-16-030
1/2"	0.060"	1/2"	1"	3"	XF-602-16-060-**FL**	XF-602-16-060
1/2"	0.090"	1/2"	1"	3"	XF-602-16-090-**FL**	XF-602-16-090
1/2"	0.120"	1/2"	1"	3"	XF-602-16-120-**FL**	XF-602-16-120
5/8"	0.030"	5/8"	1-1/4"	3-1/2"	XF-602-20-030-**FL**	XF-602-20-030
5/8"	0.060"	5/8"	1-1/4"	3-1/2"	XF-602-20-060-**FL**	XF-602-20-060
5/8"	0.090"	5/8"	1-1/4"	3-1/2"	XF-602-20-090-**FL**	XF-602-20-090
5/8"	0.120"	5/8"	1-1/4"	3-1/2"	XF-602-20-120-**FL**	XF-602-20-120
3/4"	0.060"	3/4"	1-1/2"	4"	XF-802-24-060-**FL**	XF-802-24-060
3/4"	0.090"	3/4"	1-1/2"	4"	XF-802-24-090-**FL**	XF-802-24-090
3/4"	0.120"	3/4"	1-1/2"	4"	XF-802-24-120-**FL**	XF-802-24-120
1"	0.060"	1"	2"	5"	XF-802-32-060-**FL**	XF-802-32-060
1"	0.090"	1"	2"	5"	XF-802-32-090-**FL**	XF-802-32-090
1"	0.120"	1"	2"	5"	XF-802-32-120-**FL**	XF-802-32-120

MXF-602/802 6/8 Flute Standard Length METRIC

Cutting Diameter	Corner Radius	Shank Diameter	Flute Length	Overall Length	Tool Number Flats, AlTiN Coated	Tool Number No Flats, AlTiN Coated
10mm	2.0mm	10mm	20mm	72mm	MXF-602-10-020-**FL**	MXF-602-10-020
10mm	2.5mm	10mm	20mm	72mm	MXF-602-10-025-**FL**	MXF-602-10-025
10mm	3.0mm	10mm	20mm	72mm	MXF-602-10-030-**FL**	MXF-602-10-030
12mm	2.0mm	12mm	25mm	83mm	MXF-602-12-020-**FL**	MXF-602-12-020
12mm	2.5mm	12mm	25mm	83mm	MXF-602-12-025-**FL**	MXF-602-12-025
12mm	3.0mm	12mm	25mm	83mm	MXF-602-12-030-**FL**	MXF-602-12-030
16mm	2.0mm	16mm	32mm	92mm	MXF-602-16-020-**FL**	MXF-602-16-020
16mm	2.5mm	16mm	32mm	92mm	MXF-602-16-025-**FL**	MXF-602-16-025
16mm	3.0mm	16mm	32mm	92mm	MXF-602-16-030-**FL**	MXF-602-16-030
20mm	2.0mm	20mm	38mm	104mm	MXF-802-20-020-**FL**	MXF-802-20-020
20mm	2.5mm	20mm	38mm	104mm	MXF-802-20-025-**FL**	MXF-802-20-025
20mm	3.0mm	20mm	38mm	104mm	MXF-802-20-030-**FL**	MXF-802-20-030
25mm	2.0mm	25mm	38mm	104mm	MXF-802-25-020-**FL**	MXF-802-25-020
25mm	2.5mm	25mm	38mm	104mm	MXF-802-25-025-**FL**	MXF-802-25-025
25mm	3.0mm	25mm	38mm	104mm	MXF-802-25-030-**FL**	MXF-802-25-030

NOTE: Metric tools do not have flats.

See New Trochoidal Tool Paths
www.robbjack.com/videos

Cut Titanium up to 75 inches/minute 1905 mm/minute

Eliminate Tool Pull Out!
6–8mm h5 Shank Tolerances
10–25mm h4 Shank Tolerances
Tightest in the Industry!

XG/MXG Speeds & Feeds

XG-402 SPEEDS & FEEDS

Material	Surface Feet	1/4"		5/16"		3/8"		1/2"		5/8"		3/4"		1"	
		RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min
CAST IRON															
Ductile	400	6112	28	4890	34	4075	39	3056	43	2445	39	2037	34	1528	30
Gray	525	8022	42	6418	51	5348	58	4011	64	3209	58	2674	51	2006	45
INCONEL															
625/718	100	1528	4	1222	5	1019	6	764	7	611	6	509	5	382	5
STEEL															
1018/1020	500	7640	32	6112	39	5093	44	3820	49	3056	44	2547	39	1910	34
4130	400	6112	20	4890	24	4075	28	3056	31	2445	28	2037	24	1528	21
4140	400	6112	20	4890	24	4075	28	3056	31	2445	28	2037	24	1528	21
4340	415	6341	21	5073	25	4227	29	3171	32	2536	29	2114	25	1585	22
STAINLESS STEEL															
303	550	8404	31	6723	38	5603	43	4202	48	3362	43	2801	38	2101	34
304	400	6112	17	4890	22	4075	24	3056	27	2445	24	2037	22	1528	19
316	400	6112	17	4890	22	4075	24	3056	27	2445	24	2037	22	1528	19
15-5/17-4	300	4584	13	3667	16	3056	18	2292	20	1834	18	1528	16	1146	14
13-8	300	4584	13	3667	16	3056	18	2292	20	1834	18	1528	16	1146	14
440C	300	4584	13	3667	16	3056	18	2292	20	1834	18	1528	16	1146	14
TOOL STEEL (ANNEALED)															
A2	400	6112	17	4890	22	4075	24	3056	27	2445	24	2037	22	1528	19
D2	360	5501	16	4401	19	3667	22	2750	24	2200	22	1834	19	1375	17
H13	400	6112	17	4890	22	4075	24	3056	27	2445	24	2037	22	1528	19
P20	400	6112	23	4890	28	4075	31	3056	35	2445	31	2037	28	1528	24
TITANIUM															
Com. pure	300	4584	17	3667	21	3056	24	2292	26	1834	24	1528	21	1146	18
6AL-4V	200	3056	9	2445	11	2037	12	1528	13	1222	12	1019	11	764	9
6AL-6V	175	2674	8	2139	9	1783	11	1337	12	1070	11	891	9	669	8

MXG-402 SPEEDS & FEEDS METRIC

Material	Surface Meters	6 mm		8 mm		10 mm		12 mm		16 mm		20 mm	
		RPM	mm/min	RPM	mm/min	RPM	mm/min	RPM	mm/min	RPM	mm/min	RPM	mm/min
CAST IRON													
Ductile	122	6475	706	4851	869	3881	978	3235	1087	2426	978	1941	869
Gray	160	8498	1060	6367	1304	5094	1467	4245	1630	3184	1467	2547	1304
INCONEL													
625/718	30	1619	108	1213	134	970	150	809	167	606	150	485	134
STEEL													
1018/1020	152	8093	807	6063	994	4851	1118	4043	1242	3032	1118	2426	994
4130	122	6475	505	4851	621	3881	699	3235	776	2426	699	1941	621
4140	122	6475	505	4851	621	3881	699	3235	776	2426	699	1941	621
4340	126	6717	523	5033	644	4027	725	3356	805	2517	725	2013	644
STAINLESS STEEL													
303	168	8903	791	6670	973	5337	1095	4448	1217	3335	1095	2668	973
304	122	6475	444	4851	546	3881	615	3235	683	2426	615	1941	546
316	122	6475	444	4851	546	3881	615	3235	683	2426	615	1941	546
15-5/17-4	91	4856	333	3638	410	2911	461	2426	512	1819	461	1455	410
13-8	91	4856	333	3638	410	2911	461	2426	512	1819	461	1455	410
440C	91	4856	333	3638	410	2911	461	2426	512	1819	461	1455	410

CONTINUED ON NEXT PAGE—

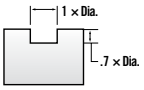
MXG-402 SPEEDS & FEEDS METRIC —CONTINUED FROM PREVIOUS

Material	Surface Meters	6 mm		8 mm		10 mm		12 mm		16 mm		20 mm	
		RPM	mm/min	RPM	mm/min	RPM	mm/min	RPM	mm/min	RPM	mm/min	RPM	mm/min
TOOL STEEL (ANNEALED)													
A2	122	6475	444	4851	546	3881	615	3235	683	2426	615	1941	546
D2	110	5827	400	4366	492	3493	553	2911	615	2183	553	1747	492
H13	122	6475	444	4851	546	3881	615	3235	683	2426	615	1941	546
P20	122	6475	575	4851	708	3881	796	3235	885	2426	796	1941	708
TITANIUM													
Com. pure	91	4856	431	3638	531	2911	597	2426	664	1819	597	1455	531
6AL-4V	61	3237	222	2425	273	1941	307	1617	342	1213	307	970	273
6AL-6V	53	2833	194	2122	239	1698	269	1415	299	1061	269	849	239

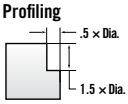
General Guidelines for XG-402 and MXG-402

- Speeds and feeds are based on applications with very rigid machine tools, toolholders, and fixturing. Speeds and feeds will vary dramatically depending on the application. Extreme forces can be generated and can cause damage, if not appropriate for the cutting conditions.
- Helical interpolation or ramping should be used to enter pockets.
- For the highest material removal rates and longest tool life profile milling is preferred over slotting (See diagrams at right).
- Use shrink fit or equivalent tool holder. If not, use flats to eliminate slippage in the tool holder!
- Climb milling is recommended.
- For ball end tools reduce feed rate by 10%.

Slotting



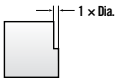
Profiling



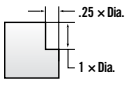
XG-502 AND XF SERIES SPEEDS & FEEDS

Material	Surface Feet	3/8"		1/2"		5/8"		3/4"		1"	
		RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min
CAST IRON											
Ductile	400	4075	58	3056	64	2445	58	2037	68	1528	60
Gray	525	5348	86	4011	96	3209	86	2674	102	2006	90
INCONEL											
625/718	150	1528	12	1146	14	917	12	764	16	573	14
STEEL											
1018/1020	500	5093	62	3820	68	3056	62	2547	74	1910	32
4130	400	4075	42	3056	46	2445	42	2037	48	1528	42
4140	400	4075	42	3056	46	2445	42	2037	48	1528	42
4340	415	4227	42	3171	48	2536	42	2114	50	1585	44
STAINLESS STEEL											
303	550	5603	62	4202	68	3362	62	2801	72	2101	64
304	400	4075	36	3056	40	2445	36	2037	44	1528	38
316	400	4075	36	3056	40	2445	36	2037	44	1528	38
15-5/17-4	300	3056	28	2292	30	1834	28	1528	32	1146	28
13-8	300	3056	28	2292	30	1834	28	1528	32	1146	28
440C	300	3056	28	2292	30	1834	28	1528	32	1146	28
TOOL STEEL (ANNEALED)											
A2	400	4075	36	3056	40	2445	36	2037	44	1528	38
D2	360	3667	32	2750	36	2200	32	1834	38	1375	34
H13	400	4075	36	3056	40	2445	36	2037	44	1528	38
P20	400	4075	44	3056	50	2445	44	2037	52	1528	46
TITANIUM											
Com. pure	300	3056	34	2292	38	1834	34	1528	40	1146	34
6AL-4V	380	3871	42	2903	48	2323	42	1935	50	1452	44
6AL-6V	175	1783	20	1337	22	1070	20	891	24	669	20

XF Finish Profiling



XG-502 Profiling



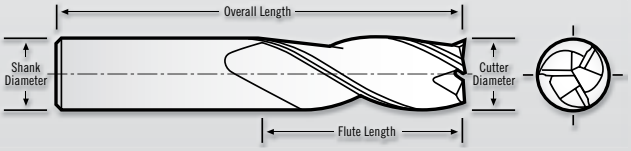
ST/MST Super Tuffy Grade Carbide End Mills

Characteristics: Square End, Corner Radius, 3 Flute, 40° Helix, T-Process Hone

Applications: Slotting, Side Milling, Helical Interpolation, Ramping, High Performance, Roughing, Semi-Finishing, Finishing, Dry, Wet, Cold Air, Spray Mist

Materials: Cast Iron, Steel, Stainless Steel, Super Alloys

Coatings: Titanium Nitride, Titanium Carbo-Nitride, Aluminum Titan. Nitride



ST-341 and ST-343 Tolerances

Cutting Dia. (1/8" to 1/4") = +.000/–.002"
(5/16" to 3/4") = +.000/–.003"
Shank Dia. = –.0001/–.0002"
Flute Length (1/8" to 5/16") = +.030/–.000"
(3/8" to 3/4") = +.060/–.000"
OAL = ±.060"

MST-341 Tolerances

Cutting Dia. = +.000/–.075mm
Shank Dia. = –.002/–.005mm
Flute Length = +0.500/+1.500mm
OAL = ±1.000mm

HONED EDGE!

ST-341 3 Flute Super Tuffy Carbide Stub Length

Cutting Diameter	Shank Diameter	Flute Length	Corner Break Size	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated
1/8"	1/8"	1/4"	.003"/.005"	1-1/2"	ST-341-04	ST-341-04-**T**	ST-341-04-**C**	ST-341-04-**A**
3/16"	3/16"	3/8"	.003"/.005"	2"	ST-341-06	ST-341-06-**T**	ST-341-06-**C**	ST-341-06-**A**
1/4"	1/4"	1/2"	.003"/.005"	2-1/2"	ST-341-08	ST-341-08-**T**	ST-341-08-**C**	ST-341-08-**A**
5/16"	5/16"	1/2"	.004"/.006"	2-1/2"	ST-341-10	ST-341-10-**T**	ST-341-10-**C**	ST-341-10-**A**
3/8"	3/8"	5/8"	.005"/.007"	2-1/2"	ST-341-12	ST-341-12-**T**	ST-341-12-**C**	ST-341-12-**A**
1/2"	1/2"	5/8"	.006"/.009"	3"	ST-341-16	ST-341-16-**T**	ST-341-16-**C**	ST-341-16-**A**
5/8"	5/8"	3/4"	.009"/.011"	3-1/2"	ST-341-20	ST-341-20-**T**	ST-341-20-**C**	ST-341-20-**A**
3/4"	3/4"	1"	.011"/.014"	4"	ST-341-24	ST-341-24-**T**	ST-341-24-**C**	ST-341-24-**A**

MST-341 Metric 3 Flute Super Tuffy Carbide Stub Length METRIC

Cutting Diameter	Shank Diameter	Flute Length	Corner Break Size	Overall Length	Tool Number Uncoated	Tool Number Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated
3mm	3mm	6mm	.075/.125mm	38mm	MST-341-03	MST-341-03-**T**	MST-341-03-**C**	MST-341-03-**A**
4mm	4mm	8mm	.075/.125mm	50mm	MST-341-04	MST-341-04-**T**	MST-341-04-**C**	MST-341-04-**A**
5mm	5mm	8mm	.075/.125mm	50mm	MST-341-05	MST-341-05-**T**	MST-341-05-**C**	MST-341-05-**A**
6mm	6mm	8mm	.075/.125mm	57mm	MST-341-06	MST-341-06-**T**	MST-341-06-**C**	MST-341-06-**A**
8mm	8mm	12mm	.100/.150mm	63mm	MST-341-08	MST-341-08-**T**	MST-341-08-**C**	MST-341-08-**A**
10mm	10mm	14mm	.125/.175mm	72mm	MST-341-10	MST-341-10-**T**	MST-341-10-**C**	MST-341-10-**A**
12mm	12mm	16mm	.150/.130mm	83mm	MST-341-12	MST-341-12-**T**	MST-341-12-**C**	MST-341-12-**A**
16mm	16mm	20mm	.230/.280mm	92mm	MST-341-16	MST-341-16-**T**	MST-341-16-**C**	MST-341-16-**A**
20mm	20mm	25mm	.280/.360mm	104mm	MST-341-20	MST-341-20-**T**	MST-341-20-**C**	MST-341-20-**A**

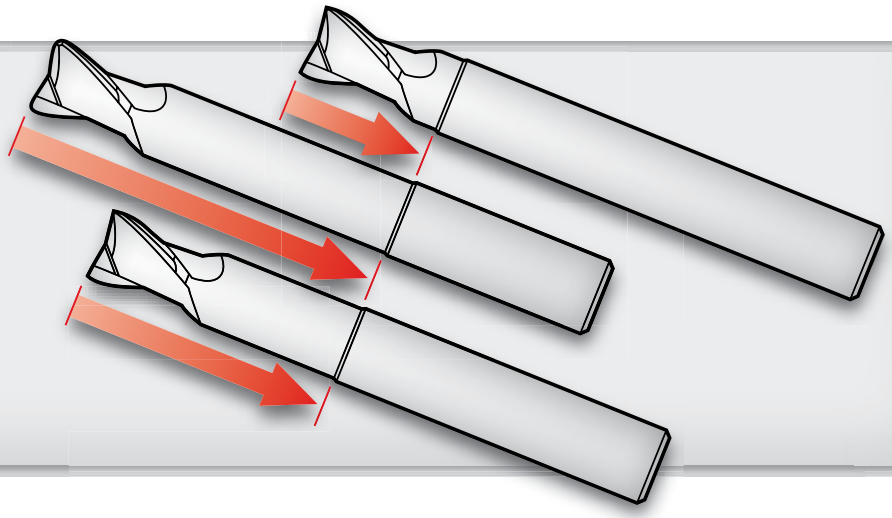
HONED EDGE!

ST-343 3 Flute Super Tuffy Carbide Standard Length

Cutting Diameter	Shank Diameter	Flute Length	Corner Break Size	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated
1/8"	1/8"	1/2"	.003"/.005"	1-1/2"	ST-343-04	ST-343-04-**T**	ST-343-04-**C**	ST-343-04-**A**
3/16"	3/16"	5/8"	.003"/.005"	2"	ST-343-06	ST-343-06-**T**	ST-343-06-**C**	ST-343-06-**A**
1/4"	1/4"	3/4"	.003"/.005"	2-1/2"	ST-343-08	ST-343-08-**T**	ST-343-08-**C**	ST-343-08-**A**
5/16"	5/16"	13/16"	.004"/.006"	2-1/2"	ST-343-10	ST-343-10-**T**	ST-343-10-**C**	ST-343-10-**A**
3/8"	3/8"	7/8"	.005"/.007"	2-1/2"	ST-343-12	ST-343-12-**T**	ST-343-12-**C**	ST-343-12-**A**
1/2"	1/2"	1"	.006"/.009"	3"	ST-343-16	ST-343-16-**T**	ST-343-16-**C**	ST-343-16-**A**
5/8"	5/8"	1-1/4"	.009"/.011"	3-1/2"	ST-343-20	ST-343-20-**T**	ST-343-20-**C**	ST-343-20-**A**
3/4"	3/4"	1-1/2"	.011"/.014"	4"	ST-343-24	ST-343-24-**T**	ST-343-24-**C**	ST-343-24-**A**

Need Reach?

See End Mill Modifications (page 14)



STR/MSTR 3 Flute Super Tuffy Grade Carbide Ruffers

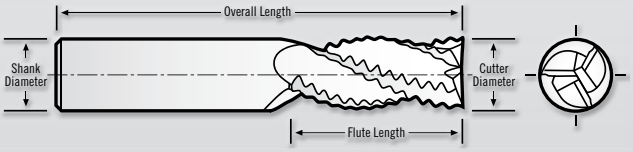
Characteristics Square End, Corner Break, 3 Flute, 30° Helix, T-Process Hone, Flats

Applications Slotting, Side Milling, Ramping, Roughing, Dry, Wet, Cold Air, Spray Mist

Materials Cast Iron, Steel, Stainless Steel

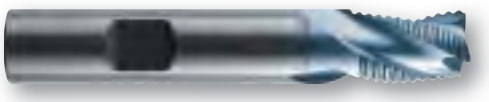
Coatings Titanium Nitride, Titanium Carbo-Nitride, Aluminum Titan. Nitride

STR Series comes with T-Process Honed Edges



STR Series Tolerances
Cutting Dia. = –.003/–.007"
Shank Dia. = –.0001/–.0002"
Flute Length (1/4" to 5/16") = +.030/–.000"
(3/8" to 3/4") = +.060/–.000"
OAL = ±.060"

MSTR Tolerances
Cutting Dia. = –.075/–.180mm
Shank Dia. = –.002/–.005mm
Flute Length = +0.500/+1.500mm
OAL = ±1.000mm



HONED EDGE!

STR-301 3 Flute Super Tuffy Carbide Ruffer Stub Length

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated
1/4"	1/4"	1/2"	2-1/2"	STR-301-08*	STR-301-08-**T***	STR-301-08-**C***	STR-301-08-**A***
5/16"	5/16"	1/2"	2-1/2"	STR-301-10*	STR-301-10-**T***	STR-301-10-**C***	STR-301-10-**A***
3/8"	3/8"	5/8"	2-1/2"	STR-301-12	STR-301-12-**T**	STR-301-12-**C**	STR-301-12-**A**
7/16"	7/16"	5/8"	2-3/4"	STR-301-14*	STR-301-14-**T***	STR-301-14-**C***	STR-301-14-**A***
1/2"	1/2"	5/8"	3"	STR-301-16	STR-301-16-**T**	STR-301-16-**C**	STR-301-16-**A**
5/8"	5/8"	7/8"	3-1/2"	STR-301-20	STR-301-20-**T**	STR-301-20-**C**	STR-301-20-**A**
3/4"	3/4"	1"	4"	STR-301-24	STR-301-24-**T**	STR-301-24-**C**	STR-301-24-**A**

**Does not come with flats.*

MSTR-301 3 Flute Super Tuffy Carbide Ruffer Stub Length METRIC

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated
6mm	6mm	8mm	57mm	MSTR-301-06	MSTR-301-06-**T**	MSTR-301-06-**C**	MSTR-301-06-**A**
8mm	8mm	12mm	63mm	MSTR-301-08	MSTR-301-08-**T**	MSTR-301-08-**C**	MSTR-301-08-**A**
10mm	10mm	14mm	72mm	MSTR-301-10	MSTR-301-10-**T**	MSTR-301-10-**C**	MSTR-301-10-**A**
12mm	12mm	16mm	83mm	MSTR-301-12	MSTR-301-12-**T**	MSTR-301-12-**C**	MSTR-301-12-**A**
16mm	16mm	20mm	92mm	MSTR-301-16	MSTR-301-16-**T**	MSTR-301-16-**C**	MSTR-301-16-**A**
20mm	20mm	25mm	104mm	MSTR-301-20	MSTR-301-20-**T**	MSTR-301-20-**C**	MSTR-301-20-**A**

NOTE: Metric tools do not have flats.

3 Flute Super Tuffy Grade Carbide Ruffers STR/MSTR

HONED EDGE!

STR-303 3 Flute Super Tuffy Carbide Ruffer Standard Length

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool NumberCoated
1/4"	1/4"	3/4"	2-1/2"	STR-303-08*	STR-303-08-**T***	STR-303-08-**C***	STR-303-08-**A***
9/32"	5/16"	3/4"	2-1/2"	STR-303-09*	STR-303-09-**T***	STR-303-09-**C***	STR-303-09-**A***
5/16"	5/16"	13/16"	2-1/2"	STR-303-10*	STR-303-10-**T***	STR-303-10-**C***	STR-303-10-**A***
3/8"	3/8"	7/8"	2-1/2"	STR-303-12	STR-303-12-**T**	STR-303-12-**C**	STR-303-12-**A**
7/16"	7/16"	1"	2-3/4"	STR-303-14*	STR-303-14-**T***	STR-303-14-**C***	STR-303-14-**A***
1/2"	1/2"	1"	3"	STR-303-16	STR-303-16-**T**	STR-303-16-**C**	STR-303-16-**A**
9/16"	9/16"	1-1/4"	3-1/2"	STR-303-18*	STR-303-18-**T***	STR-303-18-**C***	STR-303-18-**A***
5/8"	5/8"	1-1/4"	3-1/2"	STR-303-20	STR-303-20-**T**	STR-303-20-**C**	STR-303-20-**A**
3/4"	3/4"	1-1/2"	4"	STR-303-24	STR-303-24-**T**	STR-303-24-**C**	STR-303-24-**A**
1"	1"	2-1/2"	5"	STR-303-32	STR-303-32-**T**	STR-303-32-**C**	STR-303-32-**A**

**Does not come with flats.*

MSTR-303 Flute Super Tuffy Carbide Ruffer Standard Length METRIC

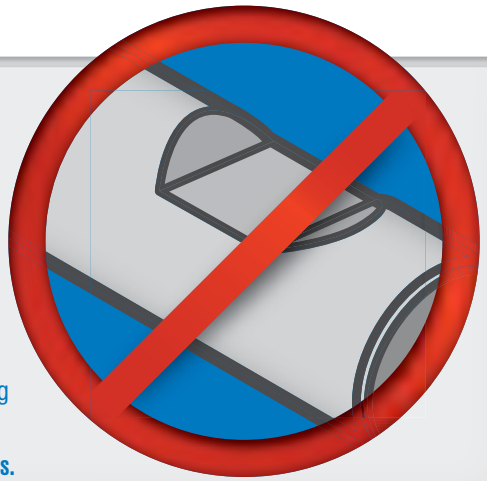
Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated
6mm	6mm	14mm	57mm	MSTR-303-06	MSTR-303-06-**T**	MSTR-303-06-**C**	MSTR-303-06-**A**
8mm	8mm	16mm	63mm	MSTR-303-08	MSTR-303-08-**T**	MSTR-303-08-**C**	MSTR-303-08-**A**
10mm	10mm	20mm	72mm	MSTR-303-10	MSTR-303-10-**T**	MSTR-303-10-**C**	MSTR-303-10-**A**
12mm	12mm	25mm	83mm	MSTR-303-12	MSTR-303-12-**T**	MSTR-303-12-**C**	MSTR-303-12-**A**
16mm	16mm	32mm	92mm	MSTR-303-16	MSTR-303-16-**T**	MSTR-303-16-**C**	MSTR-303-16-**A**
20mm	20mm	38mm	104mm	MSTR-303-20	MSTR-303-20-**T**	MSTR-303-20-**C**	MSTR-303-20-**A**

NOTE: Metric tools do not have flats.

Need Without Flats?

Order any tool without flats by adding **"–NF"** to end of Tool Number!

NOTE: Metric sizes do not come with flats.



STR/MSTR 4 Flute Super Tuffy Grade Carbide Ruffers

Characteristics Square End, Corner Break, 4 Flute, 30° Helix, T-Process Hone, Flats

Applications Side Milling, Ramping, Roughing, Dry, Wet, Cold Air, Spray Mist

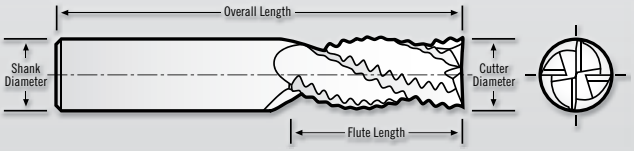
Materials Cast Iron, Steel, Stainless Steel

Coatings Titanium Nitride, Titanium Carbo-Nitride, Aluminum Titan. Nitride

Need WITHOUT Flats?

Order any tool without flats by adding "NF" to the end of the tool number.

Note: Metric tools DO NOT come with flats.

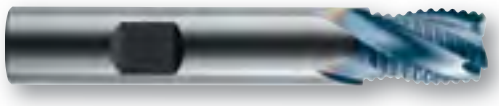


STR Series Tolerances

Cutting Dia. = –.003/–.007"
Shank Dia. = –.0001/–.0002"
Flute length (1/4" to 5/16") = +.030/–.000"
(3/8" to 3/4") = +.060/–.000"
OAL = ±.060"

MSTR Tolerances

Cutting Dia. = –.075/–.180mm
Shank Dia. = –.002/–.005mm
Flute Length = +0.500/+1.500mm
OAL = ±1.000mm



HONED EDGE!

STR-401 4 Flute Super Tuffy Carbide Ruffer Stub Length

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated
1/4"	1/4"	1/2"	2-1/2"	STR-401-08*	STR-401-08-**T***	STR-401-08-**C***	STR-401-08-**A***
5/16"	5/16"	1/2"	2-1/2"	STR-401-10*	STR-401-10-**T***	STR-401-10-**C***	STR-401-10-**A***
3/8"	3/8"	5/8"	2-1/2"	STR-401-12	STR-401-12-**T**	STR-401-12-**C**	STR-401-12-**A**
7/16"	7/16"	5/8"	2-3/4"	STR-401-14*	STR-401-14-**T***	STR-401-14-**C***	STR-401-14-**A***
1/2"	1/2"	5/8"	3"	STR-401-16	STR-401-16-**T**	STR-401-16-**C**	STR-401-16-**A**
5/8"	5/8"	7/8"	3-1/2"	STR-401-20	STR-401-20-**T**	STR-401-20-**C**	STR-401-20-**A**
3/4"	3/4"	1"	4"	STR-401-24	STR-401-24-**T**	STR-401-24-**C**	STR-401-24-**A**
1"	1"	1-1/2"	5"	STR-401-32	STR-401-32-**T**	STR-401-32-**C**	STR-401-32-**A**

**Does not come with flats.*

MSTR-401 4 Flute Super Tuffy Carbide Ruffer Stub Length METRIC

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated
6mm	6mm	8mm	57mm	MSTR-401-06	MSTR-401-06-**T**	MSTR-401-06-**C**	MSTR-401-06-**A**
8mm	8mm	12mm	63mm	MSTR-401-08	MSTR-401-08-**T**	MSTR-401-08-**C**	MSTR-401-08-**A**
10mm	10mm	14mm	72mm	MSTR-401-10	MSTR-401-10-**T**	MSTR-401-10-**C**	MSTR-401-10-**A**
12mm	12mm	16mm	83mm	MSTR-401-12	MSTR-401-12-**T**	MSTR-401-12-**C**	MSTR-401-12-**A**
16mm	16mm	20mm	92mm	MSTR-401-16	MSTR-401-16-**T**	MSTR-401-16-**C**	MSTR-401-16-**A**
20mm	20mm	25mm	104mm	MSTR-401-20	MSTR-401-20-**T**	MSTR-401-20-**C**	MSTR-401-20-**A**

NOTE: Metric tools do not have flats.

4 Flute Super Tuffy Grade Carbide Ruffers STR/MSTR

HONED EDGE!

STR-404 4 Flute Super Tuffy Carbide Ruffer Standard Length

TiN TiCN AlTiN

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated
1/4"	1/4"	3/4"	2-1/2"	STR-404-08*	STR-404-08-**T***	STR-404-08-**C***	STR-404-08-**A***
9/32"	5/16"	3/4"	2-1/2"	STR-404-09*	STR-404-09-**T***	STR-404-09-**C***	STR-404-09-**A***
5/16"	5/16"	13/16"	2-1/2"	STR-404-10*	STR-404-10-**T***	STR-404-10-**C***	STR-404-10-**A***
3/8"	3/8"	7/8"	2-1/2"	STR-404-12	STR-404-12-**T**	STR-404-12-**C**	STR-404-12-**A**
7/16"	7/16"	1"	2-3/4"	STR-404-14*	STR-404-14-**T***	STR-404-14-**C***	STR-404-14-**A***
1/2"	1/2"	1"	3"	STR-404-16	STR-404-16-**T**	STR-404-16-**C**	STR-404-16-**A**
9/16"	9/16"	1-1/4"	3-1/2"	STR-404-18*	STR-404-18-**T***	STR-404-18-**C***	STR-404-18-**A***
5/8"	5/8"	1-1/4"	3-1/2"	STR-404-20	STR-404-20-**T**	STR-404-20-**C**	STR-404-20-**A**
3/4"	3/4"	1-1/2"	4"	STR-404-24	STR-404-24-**T**	STR-404-24-**C**	STR-404-24-**A**
1"	1"	2-1/2"	5"	STR-404-32	STR-404-32-**T**	STR-404-32-**C**	STR-404-32-**A**

**Does not come with flats.*

MSTR-404 4 Flute Super Tuffy Carbide Ruffer Standard Length METRIC

TiN TiCN AlTiN

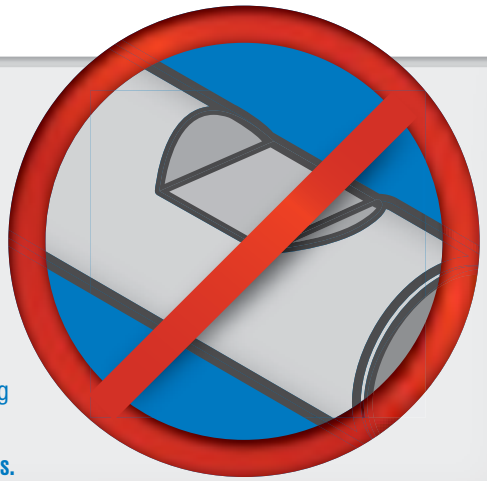
Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated
6mm	6mm	14mm	57mm	MSTR-404-06	MSTR-404-06-**T**	MSTR-404-06-**C**	MSTR-404-06-**A**
8mm	8mm	16mm	63mm	MSTR-404-08	MSTR-404-08-**T**	MSTR-404-08-**C**	MSTR-404-08-**A**
10mm	10mm	20mm	72mm	MSTR-404-10	MSTR-404-10-**T**	MSTR-404-10-**C**	MSTR-404-10-**A**
12mm	12mm	25mm	83mm	MSTR-404-12	MSTR-404-12-**T**	MSTR-404-12-**C**	MSTR-404-12-**A**
16mm	16mm	32mm	92mm	MSTR-404-16	MSTR-404-16-**T**	MSTR-404-16-**C**	MSTR-404-16-**A**
20mm	20mm	38mm	104mm	MSTR-404-20	MSTR-404-20-**T**	MSTR-404-20-**C**	MSTR-404-20-**A**

NOTE: Metric tools do not have flats.

Need Without Flats?

Order any tool without flats by adding **"–NF"** to end of Tool Number!

NOTE: Metric sizes do not come with flats.



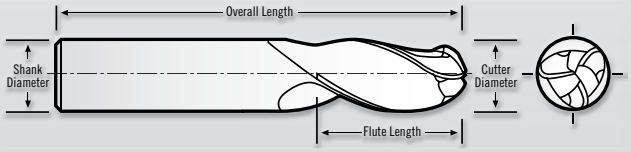
B 3 Flute Tuffy Grade Carbide Ball End Mills

Characteristics Ball End · 3 Flute · 30° Helix · T-Process Hone

Applications Slotting · Side Milling · Helical Interpolation · Conventional · Ramping · High Performance · 3-D · Roughing · Semi-Finishing · Finishing

Materials Cast Iron · Steel · Stainless Steel · Super Alloys

Coatings Titanium Nitride · Titanium Carbo-Nitride · Aluminum Titan. Nitride



B Series Tolerances

Cutting Dia. (1/16" to 1/4") = +.000/–.002"
(9/32" to 3/4") = +.000/–.003"
Shank Dia. = –.0001/–.0002"
Flute Length (1/16" to 5/16") = +.030/–.000"
(3/8" to 1") = +.060/–.000"
OAL = ±.060"

HONED EDGE!

B-300 3 Flute Tuffy Ball End Stub Length

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated
1/8"	1/8"	1/4"	1-1/2"	B-300-04	B-300-04-**T**	B-300-04-**C**	B-300-04-**A**
3/16"	3/16"	5/16"	2"	B-300-06	B-300-06-**T**	B-300-06-**C**	B-300-06-**A**
1/4"	1/4"	5/16"	2-1/2"	B-300-08	B-300-08-**T**	B-300-08-**C**	B-300-08-**A**
5/16"	5/16"	7/16"	2-1/2"	B-300-10	B-300-10-**T**	B-300-10-**C**	B-300-10-**A**
3/8"	3/8"	1/2"	2-1/2"	B-300-12	B-300-12-**T**	B-300-12-**C**	B-300-12-**A**
1/2"	1/2"	5/8"	3"	B-300-16	B-300-16-**T**	B-300-16-**C**	B-300-16-**A**
5/8"	5/8"	7/8"	3-1/2"	B-300-20	B-300-20-**T**	B-300-20-**C**	B-300-20-**A**
3/4"	3/4"	1"	4"	B-300-24	B-300-24-**T**	B-300-24-**C**	B-300-24-**A**

HONED EDGE!

B-330 3 Flute Tuffy Ball End Standard Length

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated
1/8"	1/8"	1/2"	1-1/2"	B-330-04	B-330-04-**T**	B-330-04-**C**	B-330-04-**A**
3/16"	3/16"	5/8"	2"	B-330-06	B-330-06-**T**	B-330-06-**C**	B-330-06-**A**
1/4"	1/4"	3/4"	2-1/2"	B-330-08	B-330-08-**T**	B-330-08-**C**	B-330-08-**A**
5/16"	5/16"	13/16"	2-1/2"	B-330-10	B-330-10-**T**	B-330-10-**C**	B-330-10-**A**
3/8"	3/8"	7/8"	2-1/2"	B-330-12	B-330-12-**T**	B-330-12-**C**	B-330-12-**A**
1/2"	1/2"	1"	3"	B-330-16	B-330-16-**T**	B-330-16-**C**	B-330-16-**A**
5/8"	5/8"	1-1/4"	3-1/2"	B-330-20	B-330-20-**T**	B-330-20-**C**	B-330-20-**A**
3/4"	3/4"	1-1/2"	4"	B-330-24	B-330-24-**T**	B-330-24-**C**	B-330-24-**A**

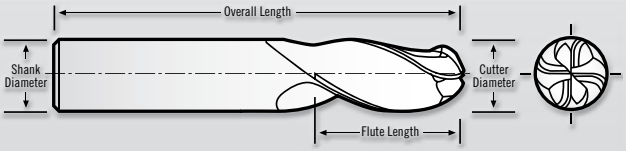
4 Flute Tuffy Grade Carbide Ball End Mills B/MB

Characteristics: Ball End, 4 Flute, 40° Helix, T-Process Hone

Applications: Slotting, Side Milling, Helical Interpolation, Conventional, Ramping, High Performance, 3-D, Roughing, Semi-Finishing, Finishing

Materials: Cast Iron, Steel, Stainless Steel, Super Alloys

Coatings: Titanium Nitride, Titanium Carbo-Nitride, Aluminum Titan. Nitride

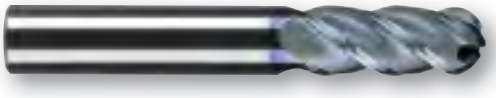


B Series Tolerances

Cutting Dia. (1/16" to 1/4") = +.000/–.002"
(9/32" to 3/4") = +.000/–.003"
Shank Dia. = –.0001/–.0002"
Flute Length (1/16" to 5/16") = +.030/–.000"
(3/8" to 1") = +.060/–.000"
OAL = ±.060"

MB Tolerances

Cutting Dia. = +.000/–.075mm
Shank Dia. = –.002/–.005mm
Flute Length = +0.500/+1.500mm
OAL = ±1.000mm



HONED EDGE!

B-440 4 Flute Tuffy Ball End Standard Length 40° Helix

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated
1/8"	1/8"	1/2"	1-1/2"	B-440-04	B-440-04-**T**	B-440-04-**C**	B-440-04-**A**
3/16"	3/16"	5/8"	2"	B-440-06	B-440-06-**T**	B-440-06-**C**	B-440-06-**A**
1/4"	1/4"	3/4"	2-1/2"	B-440-08	B-440-08-**T**	B-440-08-**C**	B-440-08-**A**
5/16"	5/16"	13/16"	2-1/2"	B-440-10	B-440-10-**T**	B-440-10-**C**	B-440-10-**A**
3/8"	3/8"	7/8"	2-1/2"	B-440-12	B-440-12-**T**	B-440-12-**C**	B-440-12-**A**
1/2"	1/2"	1"	3"	B-440-16	B-440-16-**T**	B-440-16-**C**	B-440-16-**A**
5/8"	5/8"	1-1/4"	3-1/2"	B-440-20	B-440-20-**T**	B-440-20-**C**	B-440-20-**A**
3/4"	3/4"	1-1/2"	4"	B-440-24	B-440-24-**T**	B-440-24-**C**	B-440-24-**A**

MB-440

4 Flute Tuffy Ball End Standard Length 40° Helix METRIC

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated
3mm	3mm	12mm	38mm	MB-440-03	MB-440-03-**T**	MB-440-03-**C**	MB-440-03-**A**
4mm	4mm	12mm	50mm	MB-440-04	MB-440-04-**T**	MB-440-04-**C**	MB-440-04-**A**
5mm	5mm	14mm	50mm	MB-440-05	MB-440-05-**T**	MB-440-05-**C**	MB-440-05-**A**
6mm	6mm	14mm	57mm	MB-440-06	MB-440-06-**T**	MB-440-06-**C**	MB-440-06-**A**
8mm	8mm	16mm	63mm	MB-440-08	MB-440-08-**T**	MB-440-08-**C**	MB-440-08-**A**
10mm	10mm	20mm	72mm	MB-440-10	MB-440-10-**T**	MB-440-10-**C**	MB-440-10-**A**
12mm	12mm	25mm	83mm	MB-440-12	MB-440-12-**T**	MB-440-12-**C**	MB-440-12-**A**
16mm	16mm	32mm	92mm	MB-440-16	MB-440-16-**T**	MB-440-16-**C**	MB-440-16-**A**
20mm	20mm	38mm	104mm	MB-440-20	MB-440-20-**T**	MB-440-20-**C**	MB-440-20-**A**

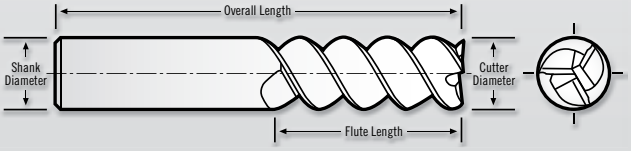
ST/MST 3 Flute Super Tuffy Grade Carbide End Mills

Characteristics Square End · 3 Flute · 60° Helix

Applications Side Milling · Finishing · Dry · Wet · Cold Air · Spray Mist

Materials Cast Iron · Steel · Stainless Steel · Super Alloys

Coatings Titanium Nitride · Titanium Carbo-Nitride · Aluminum Titan. Nitride



ST-360 Tolerances
Cutting Dia. = +.000/–.003"
Shank Dia. = –.0001/–.0002"
Flute Length (1/8" to 1/4") = +.030/–.002"
(5/16" to 3/4") = +.060/–.003"
OAL = ±.060"

MST-360 Tolerances
Cutting Dia. = +.000/–.075mm
Shank Dia. = –.002/–.005mm
Flute Length = +0.500/+1.500mm
OAL = ±1.000mm

ST-360 3 Flute Super Tuffy Carbide Standard Length

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated
1/8"	1/8"	1/2"	1-1/2"	ST-360-04	ST-360-04-**T**	ST-360-04-**C**	ST-360-04-**A**
3/16"	3/16"	5/8"	2"	ST-360-06	ST-360-06-**T**	ST-360-06-**C**	ST-360-06-**A**
1/4"	1/4"	3/4"	2-1/2"	ST-360-08	ST-360-08-**T**	ST-360-08-**C**	ST-360-08-**A**
5/16"	5/16"	13/16"	2-1/2"	ST-360-10	ST-360-10-**T**	ST-360-10-**C**	ST-360-10-**A**
3/8"	3/8"	7/8"	2-1/2"	ST-360-12	ST-360-12-**T**	ST-360-12-**C**	ST-360-12-**A**
7/16"	7/16"	1"	2-3/4"	ST-360-14	ST-360-14-**T**	ST-360-14-**C**	ST-360-14-**A**
1/2"	1/2"	1"	3"	ST-360-16	ST-360-16-**T**	ST-360-16-**C**	ST-360-16-**A**
9/16"	9/16"	1-1/4"	3-1/2"	ST-360-18	ST-360-18-**T**	ST-360-18-**C**	ST-360-18-**A**
5/8"	5/8"	1-1/4"	3-1/2"	ST-360-20	ST-360-20-**T**	ST-360-20-**C**	ST-360-20-**A**
3/4"	3/4"	1-1/2"	4"	ST-360-24	ST-360-24-**T**	ST-360-24-**C**	ST-360-24-**A**

MST-360 3 Flute Super Tuffy Carbide Standard Length METRIC

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated
3mm	3mm	12mm	38mm	MST-360-03	MST-360-03-**T**	MST-360-03-**C**	MST-360-03-**A**
4mm	4mm	12mm	50mm	MST-360-04	MST-360-04-**T**	MST-360-04-**C**	MST-360-04-**A**
5mm	5mm	14mm	50mm	MST-360-05	MST-360-05-**T**	MST-360-05-**C**	MST-360-05-**A**
6mm	6mm	14mm	57mm	MST-360-06	MST-360-06-**T**	MST-360-06-**C**	MST-360-06-**A**
8mm	8mm	16mm	63mm	MST-360-08	MST-360-08-**T**	MST-360-08-**C**	MST-360-08-**A**
10mm	10mm	20mm	72mm	MST-360-10	MST-360-10-**T**	MST-360-10-**C**	MST-360-10-**A**
12mm	12mm	25mm	83mm	MST-360-12	MST-360-12-**T**	MST-360-12-**C**	MST-360-12-**A**
16mm	16mm	32mm	92mm	MST-360-16	MST-360-16-**T**	MST-360-16-**C**	MST-360-16-**A**
20mm	20mm	38mm	104mm	MST-360-20	MST-360-20-**T**	MST-360-20-**C**	MST-360-20-**A**

6 Flute Super Tuffy Grade Carbide End Mills ST/MST

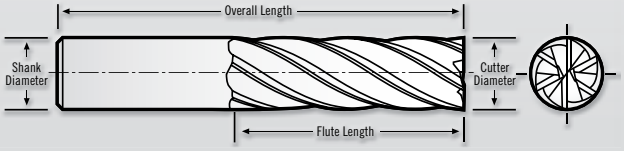
Characteristics: Square End, Corner Radius, 6 Flute, 30° Helix, 40° Helix

Applications: Side Milling, Semi-Finishing, Finishing, Dry, Wet, Cold Air, Spray Mist

Materials: Cast Iron, Steel, Stainless Steel, Super Alloys

Coatings: Titanium Nitride, Titanium Carbo-Nitride, Aluminum Titan. Nitride

Available with Coolant Grooves See Page 13



ST-630/ST-646 Tolerances
Cutting Dia. = +.001/–.000"
Shank Dia. = –.0001/–.0002"
Flute Length = +.060/–.000"
OAL = ±.060"

MST-646 Tolerances
Cutting Dia. = +.025/–.000mm
Shank Dia. = –.002/–.005mm
Flute Length = +0.500/+1.500mm
OAL = ±1.000mm

Corner Radius, 40° Helix

+ Tolerances

Honed Radius

ST-646 6 Flute Super Tuffy Carbide Standard Length

Cutting Diameter	Shank Diameter	Flute Length	Corner Radius	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated
3/8"	3/8"	7/8"	.005"/.007"	2-1/2"	ST-646-12	ST-646-12-**T**	ST-646-12-**C**	ST-646-12-**A**
1/2"	1/2"	1"	.006"/.009"	3"	ST-646-16	ST-646-16-**T**	ST-646-16-**C**	ST-646-16-**A**
5/8"	5/8"	1-1/4"	.009"/.011"	3-1/2"	ST-646-20	ST-646-20-**T**	ST-646-20-**C**	ST-646-20-**A**
3/4"	3/4"	1-1/2"	.011"/.014"	4"	ST-646-24	ST-646-24-**T**	ST-646-24-**C**	ST-646-24-**A**
1"	1"	2-1/2	.012"/.015"	5"	ST-646-32	ST-646-32-**T**	ST-646-32-**C**	ST-646-32-**A**

MST-646 6 Flute Super Tuffy Carbide Standard Length METRIC

Cutting Diameter	Shank Diameter	Flute Length	Corner Radius	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated
10mm	10mm	20mm	.125/.180mm	72mm	MST-646-10	MST-646-10-**T**	MST-646-10-**C**	MST-646-10-**A**
12mm	12mm	25mm	.150/.230mm	83mm	MST-646-12	MST-646-12-**T**	MST-646-12-**C**	MST-646-12-**A**
16mm	16mm	32mm	.230/.280mm	92mm	MST-646-16	MST-646-16-**T**	MST-646-16-**C**	MST-646-16-**A**
20mm	20mm	38mm	.280/.355mm	104mm	MST-646-20	MST-646-20-**T**	MST-646-20-**C**	MST-646-20-**A**

Square End, 30° Helix

+ Tolerances

ST-630 6 Flute Super Tuffy Carbide Standard Length

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated
3/8"	3/8"	7/8"	2-1/2"	ST-630-12	ST-630-12-**T**	ST-630-12-**C**	ST-630-12-**A**
1/2"	1/2"	1"	3"	ST-630-16	ST-630-16-**T**	ST-630-16-**C**	ST-630-16-**A**
5/8"	5/8"	1-1/4"	3-1/2"	ST-630-20	ST-630-20-**T**	ST-630-20-**C**	ST-630-20-**A**
3/4"	3/4"	1-1/2"	4"	ST-630-24	ST-630-24-**T**	ST-630-24-**C**	ST-630-24-**A**
1"	1"	2-1/2"	5"	ST-630-32	ST-630-32-**T**	ST-630-32-**C**	ST-630-32-**A**

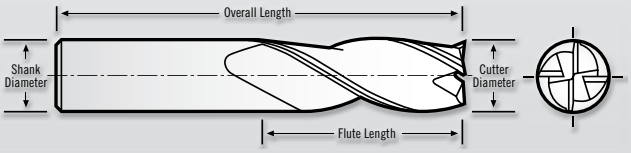
ST/MST 4 Flute Super Tuffy Grade Carbide End Mills

Characteristics: Square End, 4 Flute, 30° Helix

Applications: Side Milling, Roughing, Semi-Finishing, Finishing, Dry, Wet, Cold Air, Spray Mist

Materials: Cast Iron, Steel, Stainless Steel, Super Alloys

Coatings: Titanium Nitride, Titanium Carbo-Nitride, Aluminum Titan. Nitride



ST-430/434 Tolerances
Cutting Dia. = +.001/–.000"
Shank Dia. = –.0001/–.0002"
Flute Length (1/8" to 5/16") = +.030/–.000"
(3/8" to 1") = +.060/–.000"
OAL = ±.060"

MST-430 and MST-434 Tolerances
Cutting Dia. = +.025/–.000mm
Shank Dia. = –.002/–.005mm
Flute Length = +0.500/+1.500mm
OAL = ±1.000mm

Sharp Edges + Tolerances

ST-430 4 Flute Super Tuffy Carbide Standard Length

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated
1/8"	1/8"	1/2"	1-1/2"	ST-430-04	ST-430-04-**T**	ST-430-04-**C**	ST-430-04-**A**
5/32"	3/16"	9/16"	2"	ST-430-05	ST-430-05-**T**	ST-430-05-**C**	ST-430-05-**A**
3/16"	3/16"	5/8"	2"	ST-430-06	ST-430-06-**T**	ST-430-06-**C**	ST-430-06-**A**
7/32"	1/4"	5/8"	2-1/2"	ST-430-07	ST-430-07-**T**	ST-430-07-**C**	ST-430-07-**A**
1/4"	1/4"	3/4"	2-1/2"	ST-430-08	ST-430-08-**T**	ST-430-08-**C**	ST-430-08-**A**
9/32"	5/16"	3/4"	2-1/2"	ST-430-09	ST-430-09-**T**	ST-430-09-**C**	ST-430-09-**A**
5/16"	5/16"	13/16"	2-1/2"	ST-430-10	ST-430-10-**T**	ST-430-10-**C**	ST-430-10-**A**
3/8"	3/8"	7/8"	2-1/2"	ST-430-12	ST-430-12-**T**	ST-430-12-**C**	ST-430-12-**A**
7/16"	7/16"	1"	2-3/4"	ST-430-14	ST-430-14-**T**	ST-430-14-**C**	ST-430-14-**A**
1/2"	1/2"	1"	3"	ST-430-16	ST-430-16-**T**	ST-430-16-**C**	ST-430-16-**A**
9/16"	9/16"	1-1/4"	3-1/2"	ST-430-18	ST-430-18-**T**	ST-430-18-**C**	ST-430-18-**A**
5/8"	5/8"	1-1/4"	3-1/2"	ST-430-20	ST-430-20-**T**	ST-430-20-**C**	ST-430-20-**A**
3/4"	3/4"	1-1/2"	4"	ST-430-24	ST-430-24-**T**	ST-430-24-**C**	ST-430-24-**A**

MST-430 4 Flute Super Tuffy Carbide Standard Length METRIC

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated
3mm	3mm	12mm	38mm	MST-430-03	MST-430-03-**T**	MST-430-03-**C**	MST-430-03-**A**
4mm	4mm	12mm	50mm	MST-430-04	MST-430-04-**T**	MST-430-04-**C**	MST-430-04-**A**
5mm	5mm	14mm	50mm	MST-430-05	MST-430-05-**T**	MST-430-05-**C**	MST-430-05-**A**
6mm	6mm	14mm	57mm	MST-430-06	MST-430-06-**T**	MST-430-06-**C**	MST-430-06-**A**
8mm	8mm	16mm	63mm	MST-430-08	MST-430-08-**T**	MST-430-08-**C**	MST-430-08-**A**
10mm	10mm	20mm	72mm	MST-430-10	MST-430-10-**T**	MST-430-10-**C**	MST-430-10-**A**
12mm	12mm	25mm	83mm	MST-430-12	MST-430-12-**T**	MST-430-12-**C**	MST-430-12-**A**
16mm	16mm	32mm	92mm	MST-430-16	MST-430-16-**T**	MST-430-16-**C**	MST-430-16-**A**
20mm	20mm	38mm	104mm	MST-430-20	MST-430-20-**T**	MST-430-20-**C**	MST-430-20-**A**

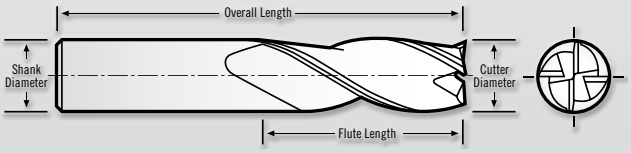
4 Flute Super Tuffy Grade Carbide End Mills ST/MST

Characteristics Corner Break · 4 Flute · 30° Helix · T-Process Hone

Applications Side Milling · Roughing · Semi-Finishing · Finishing · Dry · Wet · Cold Air · Spray Mist

Materials Cast Iron · Steel · Stainless Steel · Super Alloys

Coatings Titanium Nitride · Titanium Carbo-Nitride · Aluminum Titan. Nitride



ST-430/434 Tolerances
Cutting Dia. = +.001/–.000"
Shank Dia. = –.0001/–.0002"
Flute Length (1/8" to 5/16") = +.030/–.000"
(3/8" to 1") = +.060/–.000"
OAL = ±.060"

MST-430 and MST-434 Tolerances
Cutting Dia. = +.025/–.000mm
Shank Dia. = –.002/–.005mm
Flute Length = +0.500/+1.500mm
OAL = ±1.000mm

+ Tolerances

HONED EDGE!

ST-434 4 Flute Super Tuffy Carbide Standard Length

Cutting Diameter	Shank Diameter	Flute Length	Corner Break Size	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated
1/8"	1/8"	1/2"	.003"/.005"	1-1/2"	ST-434-04	ST-434-04-**T**	ST-434-04-**C**	ST-434-04-**A**
3/16"	3/16"	5/8"	.003"/.005"	2"	ST-434-06	ST-434-06-**T**	ST-434-06-**C**	ST-434-06-**A**
1/4"	1/4"	3/4"	.003"/.005"	2-1/2"	ST-434-08	ST-434-08-**T**	ST-434-08-**C**	ST-434-08-**A**
5/16"	5/16"	13/16"	.004"/.006"	2-1/2"	ST-434-10	ST-434-10-**T**	ST-434-10-**C**	ST-434-10-**A**
3/8"	3/8"	7/8"	.005"/.007"	2-1/2"	ST-434-12	ST-434-12-**T**	ST-434-12-**C**	ST-434-12-**A**
1/2"	1/2"	1"	.006"/.009"	3"	ST-434-16	ST-434-16-**T**	ST-434-16-**C**	ST-434-16-**A**
5/8"	5/8"	1-1/4"	.009"/.011"	3-1/2"	ST-434-20	ST-434-20-**T**	ST-434-20-**C**	ST-434-20-**A**
3/4"	3/4"	1-1/2"	.011"/.014"	4"	ST-434-24	ST-434-24-**T**	ST-434-24-**C**	ST-434-24-**A**

MST-434 4 Flute Super Tuffy Carbide Standard Length METRIC

Cutting Diameter	Shank Diameter	Flute Length	Corner Break Size	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated
3mm	3mm	12mm	.075/.125mm	38mm	MST-434-03	MST-434-03-**T**	MST-434-03-**C**	MST-434-03-**A**
4mm	4mm	12mm	.075/.125mm	50mm	MST-434-04	MST-434-04-**T**	MST-434-04-**C**	MST-434-04-**A**
5mm	5mm	14mm	.075/.125mm	50mm	MST-434-05	MST-434-05-**T**	MST-434-05-**C**	MST-434-05-**A**
6mm	6mm	14mm	.075/.125mm	57mm	MST-434-06	MST-434-06-**T**	MST-434-06-**C**	MST-434-06-**A**
8mm	8mm	16mm	.100/.150mm	63mm	MST-434-08	MST-434-08-**T**	MST-434-08-**C**	MST-434-08-**A**
10mm	10mm	20mm	.125/.175mm	72mm	MST-434-10	MST-434-10-**T**	MST-434-10-**C**	MST-434-10-**A**
12mm	12mm	25mm	.150/.130mm	83mm	MST-434-12	MST-434-12-**T**	MST-434-12-**C**	MST-434-12-**A**
16mm	16mm	32mm	.230/.280mm	92mm	MST-434-16	MST-434-16-**T**	MST-434-16-**C**	MST-434-16-**A**
20mm	20mm	38mm	.280/.360mm	104mm	MST-434-20	MST-434-20-**T**	MST-434-20-**C**	MST-434-20-**A**

Hi-Temp Alloys Tools in Other Sections

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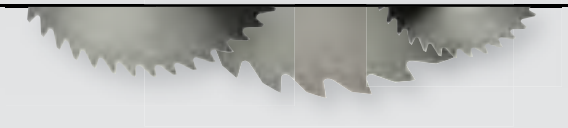
SAWS	(See Saws Applications)		**121**

TOOLS FOR Composites

TOOLS FOR

Composites

Composite Solutions

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- Videos on Trimming
- Tips and Tricks to Machine CFRP and Other Composites Made Easy!
- And More...

Featured Tools:

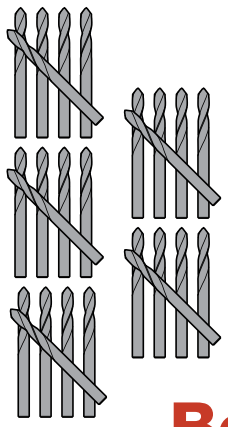
Solid PCD W-Point

Page 69

- No Delamination
- No Uncut Fibers
- No Fiber Pull Out
- Can be Resharpened

NEW!

SOLID PCD



= Wing Spars Complete Ship Set

Before

VS.

= Wing Spars Complete Ship Set

After

CPCD-203 – Best Trimming Tool for Composites

Page 71

View the CPD-203 in action on our web site!

Features:

- Drill point for plunging into the part without blowing out the back side of the part
- Over **13,000 linear inches** in Aircraft CFRP material

Composites Tools

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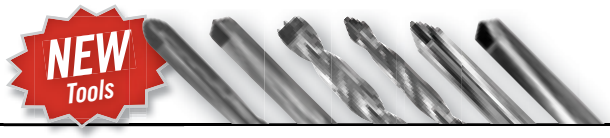
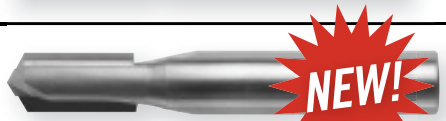
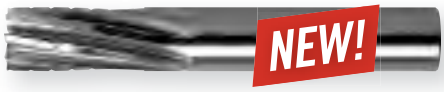
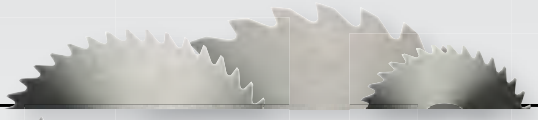
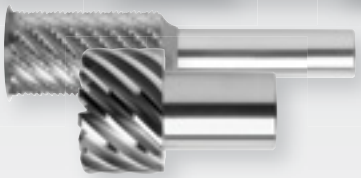




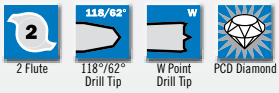






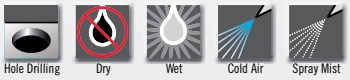
PCD PCD-Tipped Diamond Drills

Characteristics



2 Flute | 118°/62° Drill Tip | W Point Drill Tip | PCD Diamond

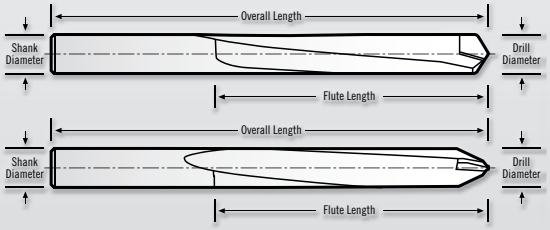
Applications



Hole Drilling | Dry | Wet | Cold Air | Spray Mist

Materials

Aluminum | Copper | Magnesium | Plastics | Composites | Brass



PCD-Tipped Drills Tolerances

Drill Dia. = +0.0000/–0.0005"
+0.0000/–0.0013mm
Shank Dia. = –0.0001/–0.0002"
–0.002/–0.005mm
Flute Length = +0.030"
+0.762mm
OAL = +0.060"
+1.5mm

NEW!

Composite Taper Tip

NEW!

Solid Tipped PCD

PCD CTT Point 118/62° PCD-Tipped Std. Length – 8 Facet

Tool Diameter	Flute Length	Overall Length	Tool Number
.1655"	1.4"	2.7"	PCD-11862-166
.1915"	1.4"	2.7"	PCD-11862-192
.2210"	1.4"	2.7"	PCD-11862-221
.2510"	1.4"	2.7"	PCD-11862-251
.3125"	1.5"	2.7"	PCD-11862-313
.3765"	1.5"	2.7"	PCD-11862-377

PCD W Point PCD-Tipped Standard Length – Solid Tip

Tool Diameter	Flute Length	Overall Length	Tool Number
.1655"	1.4"	2.7"	PCD-11987-166
.1915"	1.4"	2.7"	PCD-11987-192
.2210"	1.4"	2.7"	PCD-11987-221
.2510"	1.4"	2.7"	PCD-11987-251
.3125"	1.5"	2.7"	PCD-11987-313
.3765"	1.5"	2.7"	PCD-11987-377

10-20X *Tool Life Over Carbide!*

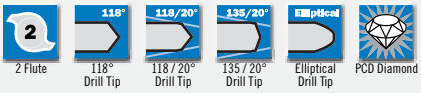
New Solid Tipped PCD!

Get the advantage of geometries that used to be only available in carbide. Get the wear resistance of Diamond and the ability to re-sharpen PCD drills.

See RobbJack Videos at
www.robbjack.com/videos

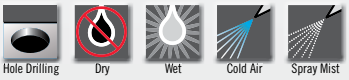
PCD-Tipped Diamond Drills PCD

Characteristics



2 Flute | 118° Drill Tip | 118 / 20° Drill Tip | 135 / 20° Drill Tip | Elliptical Drill Tip | PCD Diamond

Applications

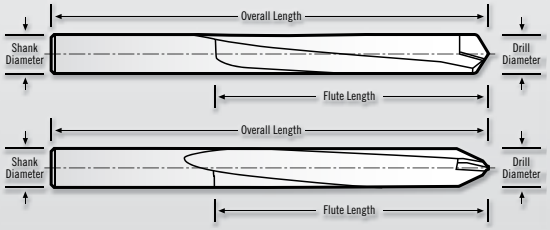


Hole Drilling | Dry | Wet | Cold Air | Spray Mist

Materials

Aluminum | Copper | Magnesium | Plastics | Composites | Brass

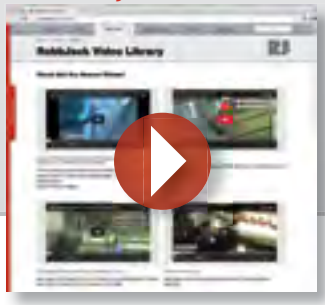
10-20X Tool Life Over Carbide!



PCD-Tipped Drills Tolerances

Drill Dia. = +0.0000/–0.0005"
+0.0000/–0.0013mm
Shank Dia. = –0.0001/–0.0002"
–0.002/–0.005mm
Flute Length = +0.030"
+0.762mm
OAL = +0.060"
+1.5mm

See RobbJack Videos at
www.robbjack.com/videos



PCD 118° PCD-Tipped Standard Length – 4 Facet

Tool Diameter	Flute Length	Overall Length	Tool Number
.1655"	1.4"	2.7"	PCD-118-166
.1915"	1.4"	2.7"	PCD-118-192
.2210"	1.4"	2.7"	PCD-118-221
.2510"	1.4"	2.7"	PCD-118-251
.3125"	1.5"	2.7"	PCD-118-313
.3765"	1.5"	2.7"	PCD-118-377

PCD 135/20° PCD-Tipped Standard Length – 8 Facet

Tool Diameter	Flute Length	Overall Length	Tool Number
.1655"	1.4"	2.7"	PCD-13520-166
.1915"	1.4"	2.7"	PCD-13520-192
.2210"	1.4"	2.7"	PCD-13520-221
.2510"	1.4"	2.7"	PCD-13520-251
.3125"	1.5"	2.7"	PCD-13520-313
.3765"	1.5"	2.7"	PCD-13520-377

PCD 118/20° PCD-Tipped Standard Length – 8 Facet

Tool Diameter	Flute Length	Overall Length	Tool Number
.1655"	1.4"	2.7"	PCD-11820-166
.1915"	1.4"	2.7"	PCD-11820-192
.2210"	1.4"	2.7"	PCD-11820-221
.2510"	1.4"	2.7"	PCD-11820-251
.3125"	1.5"	2.7"	PCD-11820-313
.3765"	1.5"	2.7"	PCD-11820-377

PCD Elliptical PCD-Tipped Standard Length

Tool Diameter	Flute Length	Overall Length	Tool Number
.1655"	1.4"	2.7"	PCD-360-166
.1915"	1.4"	2.7"	PCD-360-192
.2210"	1.4"	2.7"	PCD-360-221
.2510"	1.4"	2.7"	PCD-360-251
.3125"	1.5"	2.7"	PCD-360-313
.3765"	1.5"	2.7"	PCD-360-377

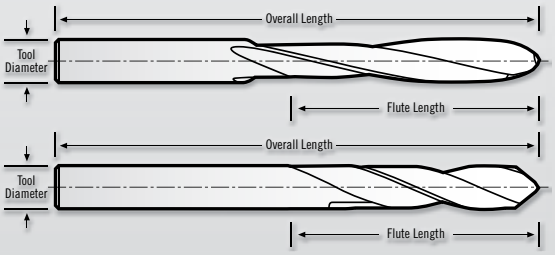
P810/F104 Diamond Coated Aircraft Drills

Characteristics 2 Flute · 118° Drill Tip · Elliptical Drill Tip

Applications Hole Drilling · Dry · Wet · Cold Air · Spray Mist

Materials Aluminum · Copper · Magnesium · Plastics · Composites · Brass

Coatings Diamond Coated (DCC)



P810/F104 Drills Tolerances

Drill Dia. = +0.0000/–0.0005"
+0.000mm/–0.0127mm
Shank Dia. = –0.0001/–0.0030"
+0.000mm/–0.076mm
Flute Length = +0.030"
+0.762mm
OAL = +/–0.060"
+/–1.5mm

10-20X *Tool Life Over Carbide!*

P810 118° Diamond Coated Standard Length Drills – 4 Facet

Tool Diameter	Flute Length	Overall Length	Tool Number Diamond Coated
0.0980"	1.4"	2.7"	P810-100345-1
0.1285"	1.4"	2.7"	P810-100344-1
0.1655"	1.4"	2.7"	P810-100335-1
0.1915"	1.4"	2.7"	P810-100336-1
0.2515"	1.4"	2.7"	P810-100337-1
0.2812"	1.4"	2.7"	P810-100410-1
0.3135"	1.5"	2.7"	P810-100338-1
0.3765"	1.5"	2.7"	P810-100341-1

F104 Elliptical Diamond Coated Standard Length Drills

Tool Diameter	Flute Length	Overall Length	Tool Number Diamond Coated
0.0980"	1.4"	2.7"	F104-100001-1
0.1285"	1.4"	2.7"	F104-100003-1
0.1655"	1.4"	2.7"	F104-100007-1
0.1915"	1.4"	2.7"	F104-100010-1
0.2515"	1.4"	2.7"	F104-100002-1
0.2812"	1.4"	2.7"	F104-100017-1
0.3135"	1.5"	2.7"	F104-100018-1
0.3765"	1.5"	2.7"	F104-100019-1

New Solid Tipped PCD!

Get the advantage of geometries that used to be only available in carbide. Get the wear resistance of Diamond and the ability to re-sharpen PCD drills.

See Page 68

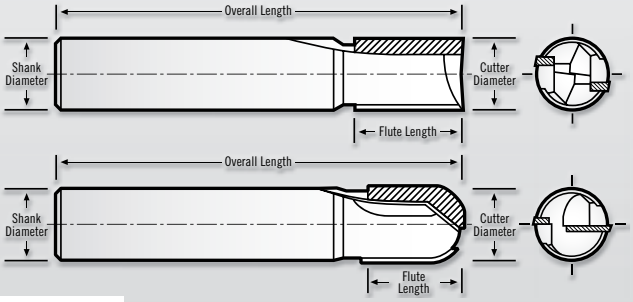
PCD-Tipped Router Bits CPCD/MCPCD

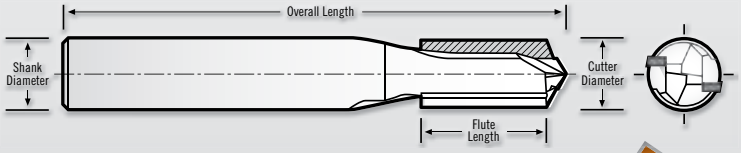
Characteristics Square End, Ball End, 118° Drill Tip, 2 Flute, PCD Diamond

Applications Slotting, Side Milling, Helical Interpolation, Ramping, Roughing, Semi-Finishing, Finishing, Dry, Wet, Cold Air, Spray Mist

Materials Aluminum, Copper, Magnesium, Plastics, Composites, Brass

10-20X Tool Life Over Carbide!





CPCD Tolerances
Cutting Dia. = ±.003"
Shank Dia. = –.0001/–.0002"
Flute Length = ±.030"
OAL = ±.060"

MCPCD Tolerances
Cutting Dia. = ±0,076mm
Shank Dia. = –0,003/–0,005mm
Flute Length = ±0,76mm
OAL = ±1,5mm

New PCD Grade & Geometries specifically designed for CFRP Materials

118° Drill Tip, PCD Diamond

CPCD-203 Drill Point Composite 2 Flute Standard Length

Cutting Diameter	Shank Diameter	Flute Length	Drill Point	Overall Length	Tool Number
1/8"	1/8"	5/16"	118°	1-1/2"	CPCD-203-04-118
3/16"	3/16"	7/16"	118°	2"	CPCD-203-06-118
1/4"	1/4"	9/16"	118°	2"	CPCD-203-08-118
3/8"	3/8"	5/8"	118°	2-1/2"	CPCD-203-12-118
1/2"	1/2"	7/8"	118°	3"	CPCD-203-16-118
5/8"	5/8"	7/8"	118°	3-1/2"	CPCD-203-20-118
3/4"	3/4"	7/8"	118°	4"	CPCD-203-24-118

Square End

PCD-203 Square End 2 Flute Standard Length

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number
1/8"	1/8"	3/8"	1-1/2"	PCD-203-04-**CF**
3/16"	3/16"	1/2"	2"	PCD-203-06-**CF**
1/4"	1/4"	5/8"	2"	PCD-203-08-**CF**
3/8"	3/8"	3/4"	2-1/2"	PCD-203-12-**CF**
1/2"	1/2"	1"	3"	PCD-203-16-**CF**
5/8"	5/8"	1"	3-1/2"	PCD-203-20-**CF**
3/4"	3/4"	1"	4"	PCD-203-24-**CF**

MCPCD-203 METRIC
Drill Point Composite 2 Flute Std. Lgth.

118° Drill Tip, PCD Diamond

Cutting Diameter	Shank Diameter	Flute Length	Drill Point	Overall Length	Tool Number
3mm	3mm	8mm	118°	38mm	MCPCD-203-03-118
6mm	6mm	14mm	118°	50mm	MCPCD-203-06-118
10mm	10mm	16mm	118°	63mm	MCPCD-203-10-118
12mm	12mm	22mm	118°	76mm	MCPCD-203-12-118

MPCD-203 METRIC
Square End Composite 2 Flute Std. Lgth.

Square End, PCD Diamond

Cutting Diameter	Shank Diameter	Number of Flutes	Flute Length	End Style	Overall Length	Tool Number
3mm	3mm	2	8mm	SE	38mm	MCPCD-203-03
6mm	6mm	2	14mm	SE	50mm	MCPCD-203-06
10mm	10mm	2	16mm	SE	63mm	MCPCD-203-10
12mm	12mm	2	22mm	SE	76mm	MCPCD-203-12

Ball End, PCD Diamond

PCD-201BN 2 Flute Ball End Stub Length

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number
1/8"	1/8"	1/4"	1-1/2"	PCD-201-04BN
3/16"	3/16"	5/16"	2"	PCD-201-06BN
1/4"	1/4"	3/8"	2"	PCD-201-08BN
3/8"	3/8"	1/2"	2-1/2"	PCD-201-12BN
1/2"	1/2"	5/8"	3"	PCD-201-16BN
5/8"	5/8"	7/8"	3-1/2"	PCD-201-20BN
3/4"	3/4"	1"	4"	PCD-201-24BN

Square End, PCD Diamond

PCD-203 Square End 2 Flute Standard Length

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number
1/8"	1/8"	3/8"	1-1/2"	PCD-203-04
3/16"	3/16"	1/2"	2"	PCD-203-06
1/4"	1/4"	5/8"	2"	PCD-203-08
3/8"	3/8"	3/4"	2-1/2"	PCD-203-12
1/2"	1/2"	1"	3"	PCD-203-16
5/8"	5/8"	1"	3-1/2"	PCD-203-20
3/4"	3/4"	1"	4"	PCD-203-24

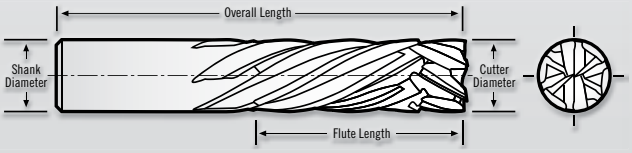
CR/MCR Compression Router

Characteristics Square End · 4 Flute · 6 Flute

Applications Slotting · Side Milling · Helical Interpolation · Ramping · Roughing · Semi-Finishing · Finishing · Dry · Wet · Cold Air · Spray Mist

Materials Composites

Coatings Diamond Coated (DCC) · Diamond-Like Carbon (DLC)



CR Tolerances
Cutting Dia. = –.001/–.003"
Shank Dia. = –.0001/–.0002"
Flute Length (<5/16") = +.020/+.030"
(>5/16") = +.030/+.060"
OAL = ±.060"

MCR Tolerances
Cutting Dia. = –0.025/–0.075mm
Shank Dia. = –0.002/–0.005mm
Flute Length = +0.500/+1.500mm
OAL = ±1.000mm

UNCOATED

CR Compression Router – 4/6 Flute Uncoated

Cutting Diameter	Shank Diameter	Number of Flutes	Upshear Length	Flute Length	Overall Length	Tool Number Uncoated
1/4"	1/4"	4	3/16"	3/4"	2-1/2"	CR-402-08
3/8"	3/8"	6	1/4"	1"	2-1/2"	CR-602-12
1/2"	1/2"	6	1/4"	1-1/8"	3"	CR-602-16

MCR Compression Router – 4/6 Flute Uncoated METRIC

Cutting Diameter	Shank Diameter	Number of Flutes	Upshear Length	Flute Length	Overall Length	Tool Number Uncoated
6mm	6mm	4	5mm	20mm	63mm	MCR-402-06
10mm	10mm	6	6mm	25mm	63mm	MCR-602-10
12mm	12mm	6	6mm	28mm	76mm	MCR-602-12

DLC COATED

Diamond-Like Carbon (DLC)

CR Compression Router – 4/6 Flute Black Widow DLC Coated

Cutting Diameter	Shank Diameter	Number of Flutes	Upshear Length	Flute Length	Overall Length	Tool Number DLC Coated
1/4"	1/4"	4	3/16"	3/4"	2-1/2"	CR-402-08-**DLC**
3/8"	3/8"	6	1/4"	1"	2-1/2"	CR-602-12-**DLC**
1/2"	1/2"	6	1/4"	1-1/8"	3"	CR-602-16-**DLC**

MCR Compression Router – 4/6 Flute Black Widow DLC Coated METRIC

Cutting Diameter	Shank Diameter	Number of Flutes	Upshear Length	Flute Length	Overall Length	Tool Number DLC Coated
6mm	6mm	4	5mm	20mm	63mm	MCR-402-06-**DLC**
10mm	10mm	6	6mm	25mm	63mm	MCR-602-10-**DLC**
12mm	12mm	6	6mm	28mm	76mm	MCR-602-12-**DLC**

DIAMOND COATED

Diamond Coated (DCC)

CR Compression Router – 4/6 Flute Diamond Coated

Cutting Diameter	Shank Diameter	Number of Flutes	Upshear Length	Flute Length	Overall Length	Tool Number Diamond Coated
1/4"	1/4"	4	3/16"	3/4"	2-1/2"	CR-402-08-**D**
3/8"	3/8"	6	1/4"	1"	2-1/2"	CR-602-12-**D**
1/2"	1/2"	6	1/4"	1-1/8"	3"	CR-602-16-**D**

MCR Compression Router – 4/6 Flute Diamond Coated METRIC

Cutting Diameter	Shank Diameter	Number of Flutes	Upshear Length	Flute Length	Overall Length	Tool Number Diamond Coated
6mm	6mm	4	5mm	20mm	63mm	MCR-402-06-**D**
10mm	10mm	6	6mm	25mm	63mm	MCR-602-10-**D**
12mm	12mm	6	6mm	28mm	76mm	MCR-602-12-**D**

Carbide Composite Router CE/MCE

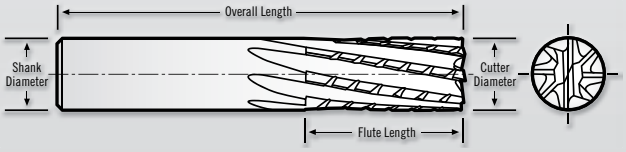
Characteristics Square End · 6 Flute · 8 Flute

Applications Slotting · Side Milling · Helical Interpolation · Ramping · Roughing · Semi-Finishing · Finishing · Dry · Wet · Cold Air · Spray Mist

Materials Composites

Coatings Diamond Coated (DCC) · Diamond-Like Carbon (DLC)

NEW!



CE Tolerances
Cutting Dia. = –.001/–.003"
Shank Dia. = –.0001/–.0002"
Flute Length (<5/16") = +.020/+.030"
(>5/16") = +.030/+.060"
OAL = ±.060"

MCE Tolerances
Cutting Dia. = –0.025/–0.075mm
Shank Dia. = –0.002/–0.005mm
Flute Length = +0.500/+1.500mm
OAL = ±1.000mm

UNCOATED

CE Carbide Composite Router – 6/8 Flute Uncoated

Cutting Diameter	Shank Diameter	Number of Flutes	Flute Length	Overall Length	Tool Number Uncoated
1/4"	1/4"	6	3/4"	2-1/2"	CE-602-08
3/8"	3/8"	8	1"	2-1/2"	CE-802-12
1/2"	1/2"	8	1-1/8"	3"	CE-802-16

MCE Carbide Composite Router – 6/8 Flute Uncoated METRIC

Cutting Diameter	Shank Diameter	Number of Flutes	Flute Length	Overall Length	Tool Number Uncoated
6mm	6mm	6	20mm	63mm	MCE-602-06
10mm	10mm	8	25mm	63mm	MCE-802-10
12mm	12mm	8	28mm	76mm	MCE-802-12

DLC COATED

Diamond-Like Carbon (DLC)

CE Carbide Composite Router – 6/8 Flute Black Widow DLC Coated

Cutting Diameter	Shank Diameter	Number of Flutes	Flute Length	Overall Length	Tool Number DLC Coated
1/4"	1/4"	6	3/4"	2-1/2"	CE-602-08-**DLC**
3/8"	3/8"	8	1"	2-1/2"	CE-802-12-**DLC**
1/2"	1/2"	8	1-1/8"	3"	CE-802-16-**DLC**

MCE Carbide Composite Router – 6/8 Flute Black Widow DLC Coated METRIC

Cutting Diameter	Shank Diameter	Number of Flutes	Flute Length	Overall Length	Tool Number DLC Coated
6mm	6mm	6	20mm	63mm	MCE-602-06-**DLC**
10mm	10mm	8	25mm	63mm	MCE-802-10-**DLC**
12mm	12mm	8	28mm	76mm	MCE-802-12-**DLC**

DIAMOND COATED

Diamond Coated (DCC)

CE Carbide Composite Router – 6/8 Flute Diamond Coated

Cutting Diameter	Shank Diameter	Number of Flutes	Flute Length	Overall Length	Tool Number Diamond Coated
1/4"	1/4"	6	3/4"	2-1/2"	CE-602-08-**D**
3/8"	3/8"	8	1"	2-1/2"	CE-802-12-**D**
1/2"	1/2"	8	1-1/8"	3"	CE-802-16-**D**

MCE Carbide Composite Router – 6/8 Flute Diamond Coated METRIC

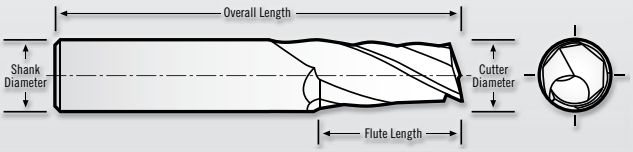
Cutting Diameter	Shank Diameter	Number of Flutes	Flute Length	Overall Length	Tool Number Diamond Coated
6mm	6mm	6	20mm	63mm	MCE-602-06-**D**
10mm	10mm	8	25mm	63mm	MCE-802-10-**D**
12mm	12mm	8	28mm	76mm	MCE-802-12-**D**

PM/MPM/MPD/GTS Tuffy Grade Carbide Router Bits

Characteristics Square End · 1 Flute · 2 Flute · Polished

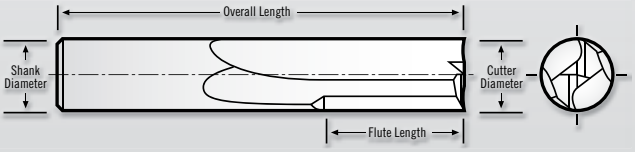
Applications Slotting · Side Milling · Helical Interpolation · Ramping · Roughing · Semi-Finishing · Finishing · Dry · Wet · Cold Air · Spray Mist

Materials Aluminum · Plastics · Wood



PM/PMD Series Tolerances
Cutting Dia. = +0.000/–0.002"
Shank Dia. = –0.0001/–0.0002"
Flute Length = +0.060/ –0.000"
OAL = ±0.060"

MPM Tolerances
Cutting Dia. = +.000/–.075mm
Shank Dia. = –.002/–.005mm
Flute Length = +0.500/+1.500mm
OAL = ±1.000mm



GTS Series Tolerances
Cutting Dia. = +.000/–.002"
Shank Dia. = –.0001/–.0002"
Flute Length = +.060/–.000"
OAL = ±.060"

Polished
Best Tool for Plastics
Eliminates Material Sticking to Tool and Melting in the Cut

1 Flute · Polished · UP Shear

PM Up Shear 1 Flute Tuffy Grade

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number
1/8"	1/8"	1/2"	2"	PM-104-04
1/8"	1/4"	1/2"	2"	PM-108-04
3/16"	3/16"	5/8"	2"	PM-106-06
3/16"	1/4"	5/8"	2"	PM-108-06
3/16"	1/4"	1-1/4"	3"	PM-108-06L
1/4"	1/4"	3/4"	2"	PM-108-08
1/4"	1/4"	1-1/2"	3"	PM-108-08L
3/8"	3/8"	1-1/4"	3"	PM-112-12
1/2"	1/2"	1-1/2"	4"	PM-116-16

1 Flute · Polished · UP Shear · NEW

MPM Up Shear 1 Flute Tuffy Grade METRIC

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number
4mm	3mm	12mm	50mm	MPM-104-04
6mm	4mm	12mm	50mm	MPM-106-04
6mm	6mm	14mm	50mm	MPM-106-05
6mm	6mm	14mm	57mm	MPM-106-06
8mm	8mm	22mm	63mm	MPM-108-08
10mm	10mm	25mm	72mm	MPM-110-10
12mm	12mm	25mm	83mm	MPM-112-12

1 Flute · Polished · Shear DN

PMD Down Shear 1 Flute Tuffy Grade

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number
1/8"	1/4"	1/2"	2"	PMD-108-04
3/16"	1/4"	5/8"	2"	PMD-108-06
1/4"	1/4"	3/4"	2"	PMD-108-08

2 Flute

GTS 2 Flute Tuffy Grade Straight Flute

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number
1/8"	1/4"	1/2"	2"	GTS-201-04
1/4"	1/4"	3/4"	2-1/2"	GTS-201-08
3/8"	3/8"	7/8"	2-1/2"	GTS-201-12
1/2"	1/2"	1"	3"	GTS-201-16

FROM ROBBJACK:

2 Great Problem Solving Tools
Made to Order

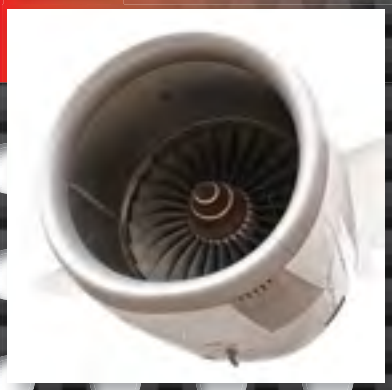
Sound Reduction Perforation Tools

Designed for Airplane Engine Nacelles

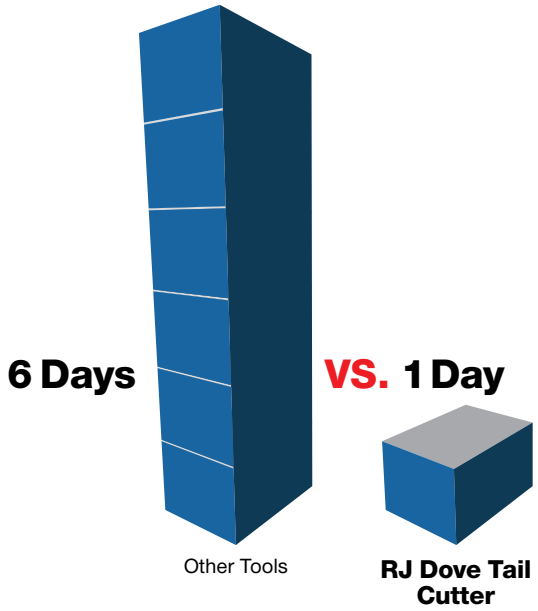
Up to 80,000 Holes in Fiberglass
Up to 40,000 Holes in Carbon Fiber

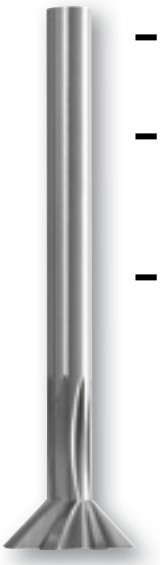
- No Uncut Fiber
- No Delamination
- No Fiber Pullout
- Best Finishes

Produces the Cleanest Holes



Dove Tail Cutters – Cut 40 Hours Off Operation!

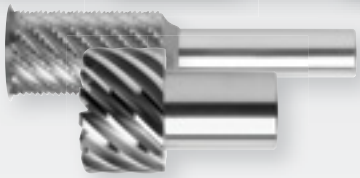




- Reduce Cycle Time by 1 Week
- Cut the Dove Tail and Trim the Part at the Same Time
- Available with Diamond Coating

Special dove tail cutters for carbon fiber that eliminate the operation of trimming the part to match the CAD file. Used in composite aircraft ribs and spars or where any dovetail cuts are needed.

Composites Tools in Other Sections

MINIATURES	(See Miniatures Applications)		**89**
A1 / MA1 201	(See Aluminum Applications)		**18**
SAWS	(See Saws Applications)		**121**
SPECIALS			

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Threaded Shank Tools *in a* **Solid Piece of Carbide** *by RobbJack*

Eliminate the problem of TIR and tool length associated with brazed threads. Can be diamond coated.

Nut Plate Drills
Made from a Solid Piece of Carbide

TOOLS FOR

Die/Mold & Hardened Materials

TOOLS FOR

Die/Mold & Hardened Materials

Die/Mold

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- Learn How to Choose the Right Tool
- And More...

Featured Tools:

TM/MTM Series – High Feed Mill

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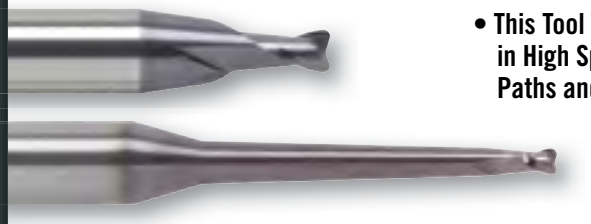
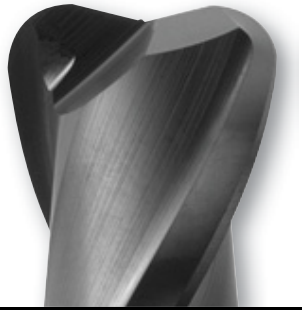


- High Speed Geometry
- This Tool Works Great in High Speed Tool Paths and in Tight Areas



DM/MDM Series – 3-D Cutting of Cavities & Cores

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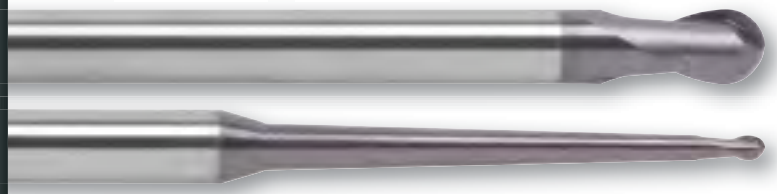

Best Tool for 3-D Cutting of Cavities & Cores

HM/MHM Series – Straight Walls, Flat Floors, Open Areas

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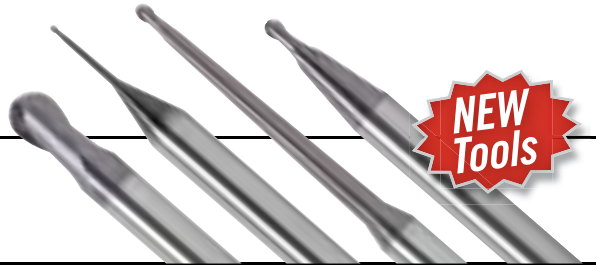
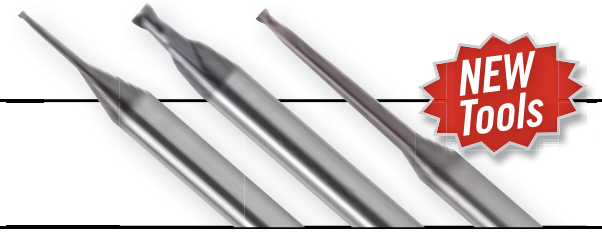
Best Tool for Straight Walls, Open Areas, & Flat Floors

Die/Mold & Hardened Materials Tools

DM	2 Flute Extended Length Ball Nose		**80**
MDM	2 Flute Extended Length Ball Nose		**81**
TM	2 Flute Extended Length Toroidal Corner Radius		**83**
MTM	2 Flute Extended Length Toroidal Corner Radius		**84**
HM	4, 6, 8 and 10 Flute Corner Radius		**85**
MHM	4, 6, 8 and 10 Flute Corner Radius		**85**
ET	NEW!	Engraving Tools (See Multiple Applications)	**118**





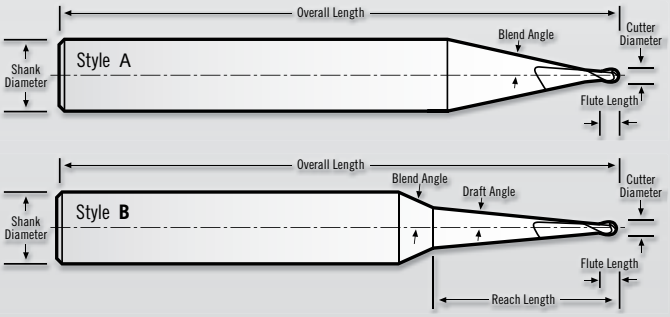
DM Die/Mold End Mills

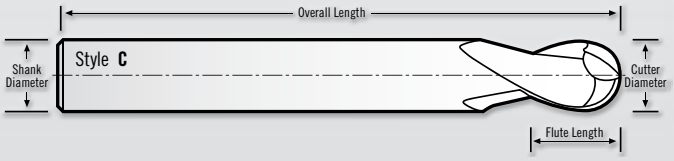
Characteristics Ball End · 2 Flute · 30° Helix

Applications Conventional · Ramping · High Performance · 3-D · Roughing · Semi-Finishing · Finishing · Dry · Cold Air · Spray Mist

Materials 40 HRc Hardness · 50 HRc Hardness · 64 HRc Hardness

Coatings Aluminum Titan. Nitride





DM Tolerances

Cutting Dia. (1/32"–3/16") = ±.0003"
(1/4"–1/2") = –.0007/–.0013"
Shank Dia. = –.0001/–.0002"
Flute Length (1/32"–1/2") = +.000/+.020"
OAL = ±.060"

MDM Tolerances

Cutting Dia. (0.5–5.0) = ±.008mm
(6.0–12.0) = –.018/ –.033mm
Shank Dia. = –.002/–.005mm
Flute Length (0.5–12.0) = +.000/+.500mm
OAL = ±1.000mm

NEW Sizes Now Available!

DM 2 Flute Grade Ball End Extended Length

Cutting Diameter	Shank Diameter	Flute Length	Reach Length	Draft Angle	Blend Angle	Tool Style	Overall Length	Tool Number AlTiN Coated
1/32"	1/4"	1/32"	–	–	8°	A	2-1/2"	DM-201-01
1/32"	1/4"	1/32"	1/8"	3°	18°	B	2-1/2"	DM-202-01
1/32"	1/4"	1/32"	3/16"	1.5°	16.5°	B	2-1/2"	DM-203-01
1/32"	1/4"	1/32"	3/8"	1.5°	16.5°	B	2-1/2"	DM-204-01
1/32"	1/4"	1/32"	9/16"	1.5°	16.5°	B	2-1/2"	DM-205-01
1/16"	1/4"	1/16"	–	–	8°	A	2-1/2"	DM-201-02
1/16"	1/4"	1/16"	3/16"	3°	18°	B	2-1/2"	DM-202-02
1/16"	1/4"	1/16"	3/8"	1.5°	16.5°	B	2-1/2"	DM-203-02
1/16"	1/4"	1/16"	3/4"	1.5°	16.5°	B	2-1/2"	DM-204-02
1/16"	1/4"	1/16"	1-1/8"	1.5°	16.5°	B	2-1/2"	DM-205-02
3/32"	1/4"	3/32"	–	–	8°	A	2-1/2"	DM-201-03
3/32"	1/4"	3/32"	1/4"	3°	18°	B	2-1/2"	DM-202-03
3/32"	1/4"	3/32"	1/2"	1.5°	16.5°	B	2-1/2"	DM-203-03
3/32"	1/4"	3/32"	15/16"	1.5°	16.5°	B	2-1/2"	DM-204-03
3/32"	1/4"	3/32"	1-5/16"	1.5°	16.5°	B	2-1/2"	DM-205-03
1/8"	1/4"	1/8"	–	–	8°	A	3"	DM-201-04
1/8"	1/4"	1/8"	5/16"	3°	18°	B	3"	DM-202-04
1/8"	1/4"	1/8"	5/8"	1.5°	16.5°	B	3"	DM-203-04
1/8"	1/4"	1/8"	1"	1°	16°	B	3"	DM-204-04
1/8"	1/4"	1/8"	1-1/2"	1°	16°	B	3"	DM-205-04

DM 2 Flute Grade Ball End Extended Length —CONTINUED FROM PREVIOUS

Cutting Diameter	Shank Diameter	Flute Length	Reach Length	Draft Angle	Blend Angle	Tool Style	Overall Length	Tool Number AlTiN Coated
3/16"	1/4"	3/16"	–	–	8°	A	3"	DM-201-06
3/16"	1/4"	3/16"	3/8"	2°	17°	B	3"	DM-202-06
3/16"	1/4"	3/16"	3/4"	1.5°	16.5°	B	3"	DM-203-06
3/16"	1/4"	3/16"	1-1/8"	1°	16°	B	3"	DM-204-06
3/16"	1/4"	3/16"	1-9/16"	1°	16°	B	3"	DM-205-06
1/4"	1/4"	1/4"	–	–	–	C	3"	DM-201-08
5/16"	5/16"	5/16"	–	–	–	C	3-1/8"	DM-201-10
3/8"	3/8"	3/8"	–	–	–	C	3-1/2"	DM-201-12
7/16"	7/16"	7/16"	–	–	–	C	3-3/4"	DM-201-14
1/2"	1/2"	1/2"	–	–	–	C	4"	DM-201-16

MDM 2 Flute Tuffy Ball End Extended Length METRIC

Cutting Diameter	Shank Diameter	Flute Length	Reach Length	Draft Angle	Blend Angle	Tool Style	Overall Length	Tool Number AlTiN Coated
0.5mm	6mm	0.5mm	–	–	8°	A	63mm	MDM-201-0.5
0.5mm	6mm	0.5mm	1mm	3°	18°	B	63mm	MDM-203-0.5
0.5mm	6mm	0.5mm	3mm	1.5°	16.5°	B	63mm	MDM-204-0.5
0.5mm	6mm	0.5mm	5mm	1.5°	16.5°	B	63mm	MDM-205-0.5
0.5mm	6mm	0.5mm	10mm	1.5°	16.5°	B	63mm	MDM-206-0.5
0.8mm	6mm	0.8mm	–	–	8°	A	63mm	MDM-201-0.8
0.8mm	6mm	0.8mm	3mm	3°	18°	B	63mm	MDM-203-0.8
0.8mm	6mm	0.8mm	5mm	1.5°	16.5°	B	63mm	MDM-204-0.8
0.8mm	6mm	0.8mm	10mm	1.5°	16.5°	B	63mm	MDM-205-0.8
0.8mm	6mm	0.8mm	15mm	1.5°	16.5°	B	63mm	MDM-206-0.8
1mm	6mm	1mm	–	–	8°	A	63mm	MDM-201-01
1mm	6mm	1mm	3mm	3°	18°	B	63mm	MDM-203-01
1mm	6mm	1mm	5mm	1.5°	16.5°	B	63mm	MDM-204-01
1mm	6mm	1mm	10mm	1.5°	16.5°	B	63mm	MDM-205-01
1mm	6mm	1mm	20mm	1.5°	16.5°	B	63mm	MDM-206-01
1.5mm	6mm	1.5mm	–	–	8°	A	63mm	MDM-201-01.5
1.5mm	6mm	1.5mm	5mm	3°	18°	B	63mm	MDM-203-01.5
1.5mm	6mm	1.5mm	10mm	1.5°	16.5°	B	63mm	MDM-204-01.5
1.5mm	6mm	1.5mm	20mm	1.5°	16.5°	B	63mm	MDM-205-01.5
1.5mm	6mm	1.5mm	30mm	1.5°	16.5°	B	63mm	MDM-206-01.5
2mm	6mm	2mm	–	–	8°	A	63mm	MDM-201-02
2mm	6mm	2mm	5mm	3°	18°	B	63mm	MDM-203-02
2mm	6mm	2mm	10mm	1.5°	16.5°	B	63mm	MDM-204-02
2mm	6mm	2mm	20mm	1.5°	16.5°	B	63mm	MDM-205-02
2mm	6mm	2mm	30mm	1.5°	16.5°	B	63mm	MDM-206-02
3mm	6mm	3mm	–	–	8°	A	75mm	MDM-201-03
3mm	6mm	3mm	5mm	3°	18°	B	75mm	MDM-203-03
3mm	6mm	3mm	15mm	1.5°	16.5°	B	75mm	MDM-204-03
3mm	6mm	3mm	30mm	1°	16°	B	75mm	MDM-205-03
3mm	6mm	3mm	45mm	1°	16°	B	75mm	MDM-206-03
4mm	6mm	4mm	–	–	8°	A	75mm	MDM-201-04
4mm	6mm	4mm	10mm	2°	17°	B	75mm	MDM-203-04
4mm	6mm	4mm	15mm	1.5°	16.5°	B	75mm	MDM-204-04
4mm	6mm	4mm	20mm	1°	16°	B	75mm	MDM-205-04
5mm	6mm	5mm	–	–	8°	B	75mm	MDM-201-05
5mm	6mm	5mm	10mm	2°	17°	B	75mm	MDM-203-05
5mm	6mm	5mm	25mm	1°	16°	B	75mm	MDM-204-05
6mm	6mm	6mm	–	–	–	C	75mm	MDM-201-06
8mm	8mm	8mm	–	–	–	C	80mm	MDM-201-08
10mm	10mm	10mm	–	–	–	C	82mm	MDM-201-10
12mm	12mm	12mm	–	–	–	C	100mm	MDM-201-12

DM Die/Mold End Mills

DM SERIES SPEEDS & FEEDS (Chipload per Tooth)

Tool Number	Cutter Diameter	Steels 30–40 HRc		Steels 40–50 HRc		Steels 50–60 HRc	
		ROUGHING	FINISHING	ROUGHING	FINISHING	ROUGHING	FINISHING
DM-201-01	1/32"	0.0006–0.0008	0.0005–0.0006	0.0005–0.0006	0.0004–0.0005	0.0004–0.0005	0.0003–0.0004
DM-201-02	1/16"	0.0013–0.0015	0.0010–0.0013	0.0010–0.0013	0.0008–0.0010	0.0008–0.0010	0.0005–0.0008
DM-201-03	3/32"	0.0019–0.0023	0.0015–0.0019	0.0015–0.0019	0.0011–0.0015	0.0011–0.0015	0.0008–0.0011
DM-201-04	1/8"	0.0025–0.0030	0.0020–0.0025	0.0020–0.0025	0.0015–0.0020	0.0015–0.0020	0.0010–0.0015
DM-201-06	3/16"	0.0038–0.0045	0.0030–0.0038	0.0030–0.0038	0.0023–0.0030	0.0023–0.0030	0.0015–0.0023
DM-201-08	1/4"	0.0050–0.0060	0.0040–0.0050	0.0040–0.0050	0.0030–0.0040	0.0030–0.0040	0.0020–0.0030
DM-201-10	5/16"	0.0063–0.0075	0.0050–0.0063	0.0050–0.0063	0.0038–0.0050	0.0038–0.0050	0.0025–0.0038
DM-201-12	3/8"	0.0075–0.0090	0.0060–0.0075	0.0060–0.0075	0.0045–0.0060	0.0045–0.0060	0.0030–0.0045
DM-201-14	7/16"	0.0088–0.0105	0.0070–0.0088	0.0070–0.0088	0.0053–0.0070	0.0053–0.0070	0.0035–0.0053
DM-201-16	1/2"	0.0100–0.0120	0.0080–0.0100	0.0080–0.0100	0.0060–0.0080	0.0060–0.0080	0.0040–0.0060

DM SERIES SPEEDS & FEEDS (Roughing & Semi-Finishing)

Tool Number	Cutter Diameter	Rotations Per Minute (RPM)		
		STEELS 30–40HRc	STEELS 40–50HRc	STEELS 50–60HRc
DM-201-01	1/32"	20,000–40,000	20,000–40,000	20,000–40,000
DM-201-02	1/16"	20,000–40,000	20,000–40,000	20,000–36,000
DM-201-03	3/32"	20,000–32,000	20,000–32,000	16,000–24,000
DM-201-04	1/8"	15,000–24,000	18,000–24,000	12,000–18,000
DM-201-06	3/16"	10,000–16,000	12,000–16,000	8,100–12,000
DM-201-08	1/4"	7,600–12,000	9,100–12,000	6,100–9,100
DM-201-10	5/16"	6,000–9,700	7,300–9,700	4,800–7,300
DM-201-12	3/8"	5,000–8,100	6,100–8,100	4,000–6,100
DM-201-14	7/16"	4,300–6,900	5,200–6,900	3,400–5,200
DM-201-16	1/2"	3,800–6,100	4,500–6,100	3,000–4,500

DM Series Guidelines

- Special diameters and lengths are available on a make-to-order basis.
- Air or mist coolant on materials greater than 40 HRc.

Radial Step Over

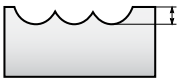
Roughing or Semi-Finishing 25%–40% of tool diameter

Radial Step Over for finishing depends on finish requirements.

DM SERIES SPEEDS & FEEDS (Finishing)

Tool Number	Cutter Diameter	Rotations Per Minute (RPM)		
		STEELS 30–40HRc	STEELS 40–50HRc	STEELS 50–60HRc
DM-201-01	1/32"	20,000–40,000	20,000–40,000	20,000–40,000
DM-201-02	1/16"	20,000–40,000	20,000–40,000	20,000–36,000
DM-201-03	3/32"	20,000–32,000	20,000–32,000	16,000–24,000
DM-201-04	1/8"	15,000–24,000	18,000–24,000	12,000–18,000
DM-201-06	3/16"	10,000–16,000	12,000–16,000	8,100–12,000
DM-201-08	1/4"	7,600–12,000	9,100–12,000	6,100–9,100
DM-201-10	5/16"	6,000–9,700	7,300–9,700	4,800–7,300
DM-201-12	3/8"	5,000–8,100	6,100–8,100	4,000–6,100
DM-201-14	7/16"	4,300–6,900	5,200–6,900	3,400–5,200
DM-201-16	1/2"	3,800–6,100	4,500–6,100	3,000–4,500

Axial Depth



30–40 HRc Axial depth = 10% of tool diameter
40–50 HRc Axial depth = 5% of tool diameter
50–60 HRc Axial depth = 4% of tool diameter

Solid Carbide Toroid Style End Mills TM/MTM

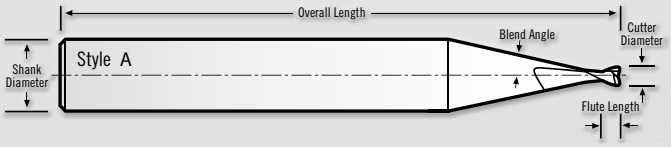
Characteristics Corner Radius · 2 Flute · 30° Helix

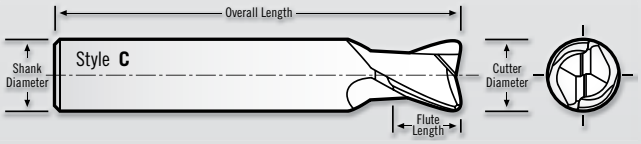
Applications Side Milling · Helical Interpolation · Conventional · Ramping · High Performance · Roughing · Semi-Finishing · Finishing · Dry · Cold Air · Spray Mist

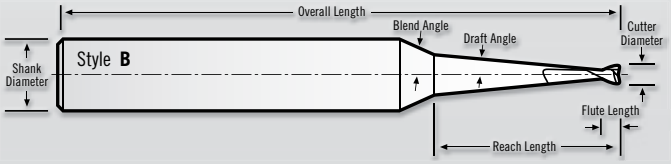
Materials ≤40 HRC 40 HRc Hardness · ≤50 HRC 50 HRc Hardness · ≤64 HRC 64 HRc Hardness

Coatings AlTiN Aluminum Titan. Nitride

Best Tool for Helical Bores or Tight Corners







TM Tolerances:
Cutting Dia. = –.001/–.002"
Shank Dia. = –.0001/–.0002"
Flute Length (1/32" to 1/2") = +.000/+.020"
OAL = ±.060"

MTM Tolerances
Cutting Dia. = –.025/–.050mm
Shank Dia. = –.002/–.005mm
Flute Length = +0.50/+1.50mm
OAL = ±1.000mm

NEW Sizes Now Available!

TM 2 Flute Tuffy Grade Toroid End Mill

Cutting Diameter	Shank Diameter	Flute Length	Reach Length	Draft Angle	Blend Angle	Corner Radius	Tool Style	Overall Length	Tool Number AlTiN Coated
1/32"	1/4"	1/32"	–	–	8°	.008"	A	2-1/2"	TM-201-01
1/32"	1/4"	1/32"	1/8"	3°	18°	.008"	B	2-1/2"	TM-202-01
1/32"	1/4"	1/32"	3/16"	1.5°	16.5°	.008"	B	2-1/2"	TM-203-01
1/32"	1/4"	1/32"	3/8"	1.5°	16.5°	.008"	B	2-1/2"	TM-204-01
1/32"	1/4"	1/32"	9/16"	1.5°	16.5°	.008"	B	2-1/2"	TM-205-01
1/16"	1/4"	1/16"	–	–	8°	.012"	A	2-1/2"	TM-201-02
1/16"	1/4"	1/16"	3/16"	3°	18°	.012"	B	2-1/2"	TM-202-02
1/16"	1/4"	1/16"	3/8"	1.5°	16.5°	.012"	B	2-1/2"	TM-203-02
1/16"	1/4"	1/16"	3/4"	1.5°	16.5°	.012"	B	2-1/2"	TM-204-02
1/16"	1/4"	1/16"	1-1/8"	1.5°	16.5°	.012"	B	2-1/2"	TM-205-02
3/32"	1/4"	3/32"	–	–	8°	.020"	A	2-1/2"	TM-201-03
3/32"	1/4"	3/32"	1/4"	3°	18°	.020"	B	2-1/2"	TM-202-03
3/32"	1/4"	3/32"	1/2"	1.5°	16.5°	.020"	B	2-1/2"	TM-203-03
3/32"	1/4"	3/32"	15/16"	1.5°	16.5°	.020"	B	2-1/2"	TM-204-03
3/32"	1/4"	3/32"	1-5/16"	1.5°	16.5°	.020"	B	2-1/2"	TM-205-03
1/8"	1/4"	1/8"	–	–	8°	.020"	A	3"	TM-201-04
1/8"	1/4"	1/8"	5/16"	3°	18°	.020"	B	3"	TM-202-04
1/8"	1/4"	1/8"	5/8"	1.5°	16.5°	.020"	B	3"	TM-203-04
1/8"	1/4"	1/8"	1"	1°	16°	.020"	B	3"	TM-204-04
1/8"	1/4"	1/8"	1-1/2"	1°	16°	.020"	B	3"	TM-205-04
3/16"	1/4"	3/16"	–	–	8°	.040"	A	3"	TM-201-06
3/16"	1/4"	3/16"	3/8"	2°	17°	.040"	B	3"	TM-202-06
3/16"	1/4"	3/16"	3/4"	1.5°	16.5°	.040"	B	3"	TM-203-06
3/16"	1/4"	3/16"	1-1/8"	1°	16°	.040"	B	3"	TM-204-06
3/16"	1/4"	3/16"	1-9/16"	1°	16°	.040"	B	3"	TM-205-06
1/4"	1/4"	1/4"	–	–	–	.040"	C	3"	TM-201-08
5/16"	5/16"	5/16"	–	–	–	.040"	C	3-1/8"	TM-201-10
3/8"	3/8"	3/8"	–	–	–	.080"	C	3-1/5"	TM-201-12
7/16"	7/16"	7/16"	–	–	–	.080"	C	3-3/4"	TM-201-14
1/2"	1/2"	1/2"	–	–	–	.120"	C	4"	TM-201-16

TM/MTM Solid Carbide Toroid Style End Mills

NEW Sizes Now Available!

MTM Metrics 2 Flute Tuffy Grade Toroid End Mill METRIC

AlTiN

Cutting Diameter	Shank Diameter	Flute Length	Reach Length	Draft Angle	Blend Angle	Corner Radius	Tool Style	Overall Length	Tool Number AlTiN Coated
0.8mm	6mm	0.8mm	–	–	8°	0.2mm	A	63mm	MTM-201-0.8
0.8mm	6mm	0.8mm	3mm	3°	18°	0.2mm	B	63mm	MTM-202-0.8
0.8mm	6mm	0.8mm	5mm	1.5°	16.5°	0.2mm	B	63mm	MTM-203-0.8
0.8mm	6mm	0.8mm	10mm	1.5°	16.5°	0.2mm	B	63mm	MTM-204-0.8
0.8mm	6mm	0.8mm	15mm	1.5°	16.5°	0.2mm	B	63mm	MTM-205-0.8
1mm	6mm	1mm	–	–	8°	0.3mm	A	63mm	MTM-201-01
1mm	6mm	1mm	3mm	3°	18°	0.3mm	B	63mm	MTM-202-01
1mm	6mm	1mm	5mm	1.5°	16.5°	0.3mm	B	63mm	MTM-203-01
1mm	6mm	1mm	10mm	1.5°	16.5°	0.3mm	B	63mm	MTM-204-01
1mm	6mm	1mm	20mm	1.5°	16.5°	0.3mm	B	63mm	MTM-205-01
1.5mm	6mm	1.5mm	–	–	8°	0.5mm	A	63mm	MTM-201-01.5
1.5mm	6mm	1.5mm	5mm	3°	18°	0.5mm	B	63mm	MTM-202-01.5
1.5mm	6mm	1.5mm	10mm	1.5°	16.5°	0.5mm	B	63mm	MTM-203-01.5
1.5mm	6mm	1.5mm	20mm	1.5°	16.5°	0.5mm	B	63mm	MTM-204-01.5
1.5mm	6mm	1.5mm	30mm	1.5°	16.5°	0.5mm	B	63mm	MTM-205-01.5
2mm	6mm	2mm	–	–	8°	0.5mm	A	63mm	MTM-201-02
2mm	6mm	2mm	5mm	3°	18°	0.5mm	B	63mm	MTM-202-02
2mm	6mm	2mm	10mm	1.5°	16.5°	0.5mm	B	63mm	MTM-203-02
2mm	6mm	2mm	20mm	1.5°	16.5°	0.5mm	B	63mm	MTM-204-02
2mm	6mm	2mm	30mm	1.5°	16.5°	0.5mm	B	63mm	MTM-205-02
3mm	6mm	3mm	–	–	8°	0.5mm	A	75mm	MTM-201-03
3mm	6mm	3mm	5mm	3°	18°	0.5mm	B	75mm	MTM-202-03
3mm	6mm	3mm	15mm	1.5°	16.5°	0.5mm	B	75mm	MTM-203-03
3mm	6mm	3mm	30mm	1°	16°	0.5mm	B	75mm	MTM-204-03
3mm	6mm	3mm	45mm	1°	16°	0.5mm	B	75mm	MTM-205-03
4mm	6mm	4mm	–	–	8°	0.5mm	A	75mm	MTM-201-04
4mm	6mm	4mm	10mm	2°	17°	0.5mm	B	75mm	MTM-202-04
4mm	6mm	4mm	15mm	1.5°	16.5°	0.5mm	B	75mm	MTM-203-04
4mm	6mm	4mm	20mm	1°	16°	0.5mm	B	75mm	MTM-204-04
5mm	6mm	5mm	–	–	8°	1mm	A	75mm	MTM-201-05
5mm	6mm	5mm	10mm	3°	18°	1mm	B	75mm	MTM-202-05
5mm	6mm	5mm	25mm	1°	16°	1mm	B	75mm	MTM-203-05
6mm	6mm	6mm	–	–	–	1mm	C	75mm	MTM-201-06
8mm	8mm	8mm	–	–	–	1mm	C	80mm	MTM-201-08
10mm	10mm	10mm	–	–	–	2mm	C	82mm	MTM-201-10
12mm	12mm	12mm	–	–	–	3mm	C	100mm	MTM-201-12

TM SERIES SPEEDS & FEEDS (Semi-Finishing & Finishing)

Tool Number	Cutter Diameter	Steels 30–40 HRc		Steels 40–50 HRc		Steels 50–60 HRc	
		ROUGHING	FINISHING	ROUGHING	FINISHING	ROUGHING	FINISHING
TM-201-01	1/32"	34,000–40,000	0.0001–0.00025	26,000–30,000	0.0001–0.0002	16,000–18,000	0.0001–0.0002
TM-201-02	1/16"	34,000–40,000	0.0003–0.0005	25000–30,000	0.0003–0.0005	16,000–18,000	0.0002–0.0004
TM-201-03	3/32"	22,000–26,000	0.0006–0.00075	16,000–19,000	0.0005–0.0007	10,000–12,000	0.0005–0.0006
TM-201-04	1/8"	17,000–20,000	0.0008–0.001	13,000–17,000	0.0007–0.0009	8,000–13,000	0.0006–0.0008
TM-201-06	3/16"	12,000–14,000	0.0011–0.0015	9,000–12,000	0.0001–0.0014	5,300–9,000	0.0009–0.0012
TM-201-08	1/4"	9,000–10400	0.0015–0.002	7,000–9,000	0.0014–0.0018	4,000–6,600	0.0012–0.0016
TM-201-10	5/16"	7,200–8,300	0.0019–0.0025	5,500–7,200	0.0017–0.0023	3,200–5,400	0.0015–0.0020
TM-201-12	3/8"	6,000–6,900	0.0020–0.003	4,600–6,000	0.0018–0.0027	2,700–4,500	0.0016–0.0024
TM-201-14	7/16"	5,200–6,000	0.0023–0.0035	4,000–5,200	0.0021–0.0032	2,300–3,900	0.0019–0.0028
TM-201-16	1/2"	4,500–5,200	0.0025–0.004	3,500–4,500	0.0023–0.0036	2,100–3,500	0.0020–0.0032

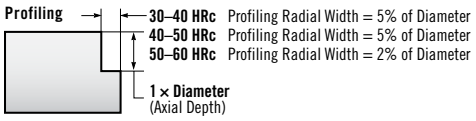
(Use maximum RPM if suggested RPM is higher than the machine's capabilities)

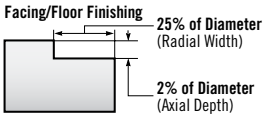
Additional Notes

- Special diameters, lengths, and corner radii are available on a make-to-order basis.
- Special draft angles (blend angle) or necked shanks for part clearance are available upon request and usually ship within the next business day.

TM Series Guidelines

- Speeds and feeds are only general starting points and may vary depending on specific applications.
- Use Climb Milling for better finish and longer tool life.
- Air or mist coolant on materials greater than 40 HRc.
- Good machines, tool holders, and programming methods all help in extending tool life.
- The best way to engage into the material is by helical interpolation or entering from off the part.
- Use for tight areas like helical bores or tight corners. For large open areas use HM/MHM Series.





Die/Mold End Mills HM/MHM

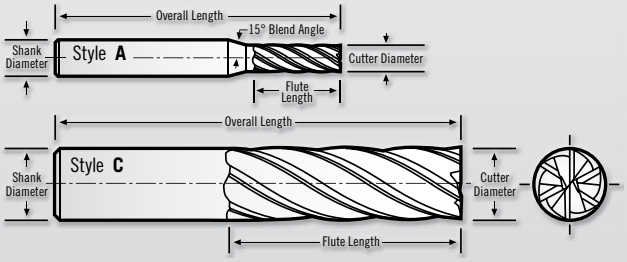
Characteristics: 4 Flute, 6 Flute, 8 Flute, 10 Flute, 45° Helix

Applications: Side Milling, High Performance, Roughing, Semi-Finishing, Finishing, Dry, Cold Air, Spray Mist

Materials: ≤40 HRC Hardness, ≤50 HRC Hardness, ≤64 HRC Hardness

Coatings: AlTiN Aluminum Titan. Nitride

Best Tool for Open Areas of Floors & Walls



HM Tolerances
Cutting Dia. = –.001/–.002"
Shank Dia. = –.0001/–.0002"
Flute Length = +.060/–.000"
OAL = ±.060"

MHM Tolerances
Cutting Dia. = –.025/–.050mm
Shank Dia. = –.002/–.005mm
Flute Length = +0.50/+1.50mm
OAL = ±1.000mm

HM Multi-Flute Tuffy Grade

AlTiN

Cutting Diameter	Shank Diameter	Number of Flutes	Flute Length	Corner Radius	Tool Style	Overall Length	Tool Number AlTiN Coated
1/8"	1/4"	4	3/8"	0.015"	A	3"	HM-402-04
3/16"	1/4"	4	9/16"	0.02"	A	3"	HM-402-06
1/4"	1/4"	6	5/8"	0.02"	C	3-1/2"	HM-602-08
5/16"	5/16"	6	3/4"	0.03"	C	4"	HM-602-10
3/8"	3/8"	6	1"	0.03"	C	4"	HM-602-12
7/16"	7/16"	6	1-1/8"	0.04"	C	4"	HM-602-14
1/2"	1/2"	6	1-1/4"	0.04"	C	4"	HM-602-16
5/8"	5/8"	6	1-5/8"	0.04"	C	6"	HM-602-20
3/4"	3/4"	8	1-3/4"	0.06"	C	6"	HM-802-24
1"	1"	10	2"	0.06"	C	6"	HM-102-32

MHM Metric Multi-Flute Tuffy Grade METRIC

AlTiN

Cutting Diameter	Shank Diameter	Number of Flutes	Flute Length	Corner Radius	Tool Style	Overall Length	Tool Number AlTiN Coated
3mm	6mm	4	9mm	0.4mm	A	76mm	MHM-402-03
4mm	6mm	4	12mm	0.5mm	A	76mm	MHM-402-04
5mm	6mm	4	15mm	0.5mm	C	90mm	MHM-402-05
6mm	6mm	6	15mm	0.5mm	C	90mm	MHM-602-06
8mm	8mm	6	20mm	0.75mm	C	100mm	MHM-602-08
10mm	10mm	6	25mm	0.75mm	C	100mm	MHM-602-10
12mm	12mm	6	30mm	1mm	C	100mm	MHM-602-12
16mm	16mm	6	40mm	1mm	C	150mm	MHM-602-16
20mm	20mm	8	45mm	1.5mm	C	150mm	MHM-802-20
25mm	25mm	10	50mm	1.5mm	C	150mm	MHM-102-25

HM Die/Mold End Mills

HM SERIES SPEEDS & FEEDS (Semi-Finishing & Finishing)

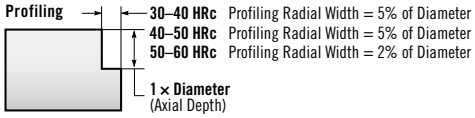
Tool Number	Cutter Diameter	Steels 30–40 HRc		Steels 40–50 HRc		Steels 50–60 HRc	
		RPM	CLPT	RPM	CLPT	RPM	CLPT
HM-402-04	1/8"	17,000–20,000	0.0008–0.001	13,000–17,000	0.0007–0.0009	8,000–13,000	0.0006–0.0008
HM-402-06	3/16"	12,000–14,000	0.0011–0.0015	9,000–12,000	0.0010–0.0014	5,300–9,000	0.0009–0.0012
HM-602-08	1/4"	9,000–10,400	0.0015–0.002	7,000–9,000	0.0014–0.0018	4,000–6,600	0.0012–0.0016
HM-602-10	5/16"	7,200–8,300	0.0019–0.0025	5,500–7,200	0.0017–0.0023	3,200–5,400	0.0015–0.0020
HM-602-12	3/8"	6,000–6,900	0.0020–0.003	4,600–6,000	0.0018–0.0027	2,700–4,500	0.0016–0.0024
HM-602-14	7/16"	5,200–6,000	0.0023–0.0035	4,000–5,200	0.0021–0.0032	2,300–3,900	0.0019–0.0028
HM-602-16	1/2"	4,500–5,200	0.0025–0.004	3,500–4,500	0.0023–0.0036	2,100–3,500	0.0020–0.0032
HM-602-20	5/8"	3,600–4,150	0.0026–0.0042	2,800–3,600	0.0023–0.0038	1,600–2,750	0.0021–0.0034
HM-802-24	3/4"	3,000–3,500	0.0028–0.005	2,300–3,000	0.0025–0.0045	1,350–2,250	0.0023–0.0041
HM-102-32	1"	2,200–2,600	0.0030–0.006	1,700–2,200	0.0027–0.0054	1,000–1,700	0.0024–0.0049

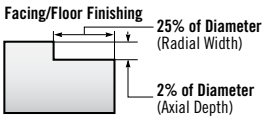
HM Series Guidelines

- Speeds and feeds are only general starting points and may vary depending on specific applications.
- Use Climb Milling for better finish and longer tool life.
- Air or mist coolant on materials greater than 40 HRc.
- Good machines, tool holders, and programming methods all help in extending tool life.
- The best way to engage into the material is by helical interpolation or entering from off the part.
- Use for open areas of floors or walls. For tight areas like helical bores or tight corners use TM/MTM Series.

Additional Notes

- Special draft angles (blend angle) or necked shanks for part clearance are available upon request.
- Special diameters, lengths, and corner radii are available on a make-to-order basis.





Die/Mold Tools in Other Sections

ET Engraving Tools (See Multiple Applications) 118

TOOLS FOR Miniature Applications

TOOLS FOR

Miniature Applications

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The BEST Miniature Tools
in Any Size as Standard

- **.005"–.062" in every .001" increment as standard. All shipped from stock.**
- **You can get any size in between to .0002" tolerance.**

"We only use RobbJack's SS and SR tools on our machines. When you need a tool to work, the first time, every time, we can count on RobbJack."

"…these tools are amazing! They run faster and longer than any other tool we have ever tried."

Miniature Applications Tools

SS-2 / MSS-2	2 Flute Stub Length		**90**
SR-2 / MSR-2	2 Flute Standard Length		**92**
SS-2BN / MSS-2BN	2 Flute Stub Length Ball Nose		**94**
SR-2BN / MSR-2BN	2 Flute Standard Length Ball Nose		**95**
SS-4 / MSS-4	4 Flute Stub Length		**96**
SR-4 / MSR-4	4 Flute Standard Length		**97**
ACH / MAH **Accuhold**	Extension Holder (Also in Multiple Apps)		**97**

SS-2 2 Flute Miniature End Mills

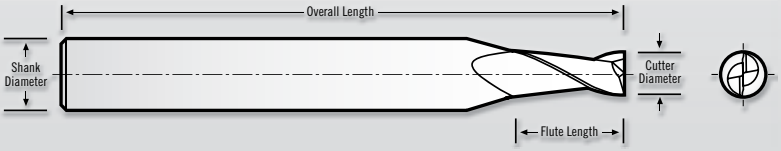
Characteristics: Square End, 2 Flute, 30° Helix

Applications: Slotting, Side Milling, Helical Interpolation, Ramping, High Performance, Roughing, Semi-Finishing, Finishing, Dry, Wet

Materials: Aluminum, Copper, Titanium, Magnesium, Cast Iron, Steel, Stainless Steel, Super Alloys, Plastics, Composites, Brass

Coatings: Titanium Nitride, Titanium Carbo-Nitride, Aluminum Titan. Nitride, Diamond-Like Carbon (DLC)

Hand-Select +/-.0002" Available



SS/SR Tolerances
Cutting Dia. = ±.0005"
Shank Dia. = –.0001/–.0002"
Flute Length = +.003/–.000"
OAL = ±.040"/–.000"

MSS/MSR Tolerances
Cutting Dia. = ±.010mm
Shank Dia. = –.002/–.005mm
Flute Length = +0.10/–0.00mm
OAL = +1.00/–0.00mm

SS-2 2 Flute Tuffy Grade Stub Length

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool NumberCoated	Tool Number DLC Coated
.005"	1/8"	.0100"	1-1/2"	SS-2-005	SS-2-005-**T**	SS-2-005-**C**	SS-2-005-**A**	SS-2-005-**DLC**
.006"	1/8"	.0120"	1-1/2"	SS-2-006	SS-2-006-**T**	SS-2-006-**C**	SS-2-006-**A**	SS-2-006-**DLC**
.007"	1/8"	.0140"	1-1/2"	SS-2-007	SS-2-007-**T**	SS-2-007-**C**	SS-2-007-**A**	SS-2-007-**DLC**
.008"	1/8"	.0160"	1-1/2"	SS-2-008	SS-2-008-**T**	SS-2-008-**C**	SS-2-008-**A**	SS-2-008-**DLC**
.009"	1/8"	.0180"	1-1/2"	SS-2-009	SS-2-009-**T**	SS-2-009-**C**	SS-2-009-**A**	SS-2-009-**DLC**
.010"	1/8"	.0150"	1-1/2"	SS-2-010	SS-2-010-**T**	SS-2-010-**C**	SS-2-010-**A**	SS-2-010-**DLC**
.011"	1/8"	.0165"	1-1/2"	SS-2-011	SS-2-011-**T**	SS-2-011-**C**	SS-2-011-**A**	SS-2-011-**DLC**
.012"	1/8"	.0180"	1-1/2"	SS-2-012	SS-2-012-**T**	SS-2-012-**C**	SS-2-012-**A**	SS-2-012-**DLC**
.013"	1/8"	.0195"	1-1/2"	SS-2-013	SS-2-013-**T**	SS-2-013-**C**	SS-2-013-**A**	SS-2-013-**DLC**
.014"	1/8"	.0210"	1-1/2"	SS-2-014	SS-2-014-**T**	SS-2-014-**C**	SS-2-014-**A**	SS-2-014-**DLC**
.015"	1/8"	.0225"	1-1/2"	SS-2-015	SS-2-015-**T**	SS-2-015-**C**	SS-2-015-**A**	SS-2-015-**DLC**
.016"	1/8"	.0240"	1-1/2"	SS-2-016	SS-2-016-**T**	SS-2-016-**C**	SS-2-016-**A**	SS-2-016-**DLC**
.017"	1/8"	.0255"	1-1/2"	SS-2-017	SS-2-017-**T**	SS-2-017-**C**	SS-2-017-**A**	SS-2-017-**DLC**
.018"	1/8"	.0270"	1-1/2"	SS-2-018	SS-2-018-**T**	SS-2-018-**C**	SS-2-018-**A**	SS-2-018-**DLC**
.019"	1/8"	.0285"	1-1/2"	SS-2-019	SS-2-019-**T**	SS-2-019-**C**	SS-2-019-**A**	SS-2-019-**DLC**
.020"	1/8"	.0300"	1-1/2"	SS-2-020	SS-2-020-**T**	SS-2-020-**C**	SS-2-020-**A**	SS-2-020-**DLC**
.021"	1/8"	.0315"	1-1/2"	SS-2-021	SS-2-021-**T**	SS-2-021-**C**	SS-2-021-**A**	SS-2-021-**DLC**
.022"	1/8"	.0330"	1-1/2"	SS-2-022	SS-2-022-**T**	SS-2-022-**C**	SS-2-022-**A**	SS-2-022-**DLC**
.023"	1/8"	.0345"	1-1/2"	SS-2-023	SS-2-023-**T**	SS-2-023-**C**	SS-2-023-**A**	SS-2-023-**DLC**
.024"	1/8"	.0360"	1-1/2"	SS-2-024	SS-2-024-**T**	SS-2-024-**C**	SS-2-024-**A**	SS-2-024-**DLC**
.025"	1/8"	.0375"	1-1/2"	SS-2-025	SS-2-025-**T**	SS-2-025-**C**	SS-2-025-**A**	SS-2-025-**DLC**
.026"	1/8"	.0390"	1-1/2"	SS-2-026	SS-2-026-**T**	SS-2-026-**C**	SS-2-026-**A**	SS-2-026-**DLC**
.027"	1/8"	.0405"	1-1/2"	SS-2-027	SS-2-027-**T**	SS-2-027-**C**	SS-2-027-**A**	SS-2-027-**DLC**
.028"	1/8"	.0420"	1-1/2"	SS-2-028	SS-2-028-**T**	SS-2-028-**C**	SS-2-028-**A**	SS-2-028-**DLC**
.029"	1/8"	.0435"	1-1/2"	SS-2-029	SS-2-029-**T**	SS-2-029-**C**	SS-2-029-**A**	SS-2-029-**DLC**
.030"	1/8"	.0450"	1-1/2"	SS-2-030	SS-2-030-**T**	SS-2-030-**C**	SS-2-030-**A**	SS-2-030-**DLC**
.031"	1/8"	.0465"	1-1/2"	SS-2-031	SS-2-031-**T**	SS-2-031-**C**	SS-2-031-**A**	SS-2-031-**DLC**
.032"	1/8"	.0480"	1-1/2"	SS-2-032	SS-2-032-**T**	SS-2-032-**C**	SS-2-032-**A**	SS-2-032-**DLC**
.033"	1/8"	.0495"	1-1/2"	SS-2-033	SS-2-033-**T**	SS-2-033-**C**	SS-2-033-**A**	SS-2-033-**DLC**
.034"	1/8"	.0510"	1-1/2"	SS-2-034	SS-2-034-**T**	SS-2-034-**C**	SS-2-034-**A**	SS-2-034-**DLC**

2 Flute Miniature End Mills SS-2/MSS-2

SS-2 2 Flute Tuffy Grade Stub Length —CONTINUED FROM PREVIOUS

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated	Tool Number DLC Coated
.035"	1/8"	.0525"	1-1/2"	SS-2-035	SS-2-035-**T**	SS-2-035-**C**	SS-2-035-**A**	SS-2-035-**DLC**
.036"	1/8"	.0540"	1-1/2"	SS-2-036	SS-2-036-**T**	SS-2-036-**C**	SS-2-036-**A**	SS-2-036-**DLC**
.037"	1/8"	.0555"	1-1/2"	SS-2-037	SS-2-037-**T**	SS-2-037-**C**	SS-2-037-**A**	SS-2-037-**DLC**
.038"	1/8"	.0570"	1-1/2"	SS-2-038	SS-2-038-**T**	SS-2-038-**C**	SS-2-038-**A**	SS-2-038-**DLC**
.039"	1/8"	.0585"	1-1/2"	SS-2-039	SS-2-039-**T**	SS-2-039-**C**	SS-2-039-**A**	SS-2-039-**DLC**
.040"	1/8"	.0600"	1-1/2"	SS-2-040	SS-2-040-**T**	SS-2-040-**C**	SS-2-040-**A**	SS-2-040-**DLC**
.041"	1/8"	.0615"	1-1/2"	SS-2-041	SS-2-041-**T**	SS-2-041-**C**	SS-2-041-**A**	SS-2-041-**DLC**
.042"	1/8"	.0630"	1-1/2"	SS-2-042	SS-2-042-**T**	SS-2-042-**C**	SS-2-042-**A**	SS-2-042-**DLC**
.043"	1/8"	.0645"	1-1/2"	SS-2-043	SS-2-043-**T**	SS-2-043-**C**	SS-2-043-**A**	SS-2-043-**DLC**
.044"	1/8"	.0660"	1-1/2"	SS-2-044	SS-2-044-**T**	SS-2-044-**C**	SS-2-044-**A**	SS-2-044-**DLC**
.045"	1/8"	.0675"	1-1/2"	SS-2-045	SS-2-045-**T**	SS-2-045-**C**	SS-2-045-**A**	SS-2-045-**DLC**
.046"	1/8"	.0690"	1-1/2"	SS-2-046	SS-2-046-**T**	SS-2-046-**C**	SS-2-046-**A**	SS-2-046-**DLC**
.047"	1/8"	.0705"	1-1/2"	SS-2-047	SS-2-047-**T**	SS-2-047-**C**	SS-2-047-**A**	SS-2-047-**DLC**
.048"	1/8"	.0720"	1-1/2"	SS-2-048	SS-2-048-**T**	SS-2-048-**C**	SS-2-048-**A**	SS-2-048-**DLC**
.049"	1/8"	.0735"	1-1/2"	SS-2-049	SS-2-049-**T**	SS-2-049-**C**	SS-2-049-**A**	SS-2-049-**DLC**
.050"	1/8"	.0750"	1-1/2"	SS-2-050	SS-2-050-**T**	SS-2-050-**C**	SS-2-050-**A**	SS-2-050-**DLC**
.051"	1/8"	.0765"	1-1/2"	SS-2-051	SS-2-051-**T**	SS-2-051-**C**	SS-2-051-**A**	SS-2-051-**DLC**
.052"	1/8"	.0780"	1-1/2"	SS-2-052	SS-2-052-**T**	SS-2-052-**C**	SS-2-052-**A**	SS-2-052-**DLC**
.053"	1/8"	.0795"	1-1/2"	SS-2-053	SS-2-053-**T**	SS-2-053-**C**	SS-2-053-**A**	SS-2-053-**DLC**
.054"	1/8"	.0810"	1-1/2"	SS-2-054	SS-2-054-**T**	SS-2-054-**C**	SS-2-054-**A**	SS-2-054-**DLC**
.055"	1/8"	.0825"	1-1/2"	SS-2-055	SS-2-055-**T**	SS-2-055-**C**	SS-2-055-**A**	SS-2-055-**DLC**
.056"	1/8"	.0840"	1-1/2"	SS-2-056	SS-2-056-**T**	SS-2-056-**C**	SS-2-056-**A**	SS-2-056-**DLC**
.057"	1/8"	.0855"	1-1/2"	SS-2-057	SS-2-057-**T**	SS-2-057-**C**	SS-2-057-**A**	SS-2-057-**DLC**
.058"	1/8"	.0870"	1-1/2"	SS-2-058	SS-2-058-**T**	SS-2-058-**C**	SS-2-058-**A**	SS-2-058-**DLC**
.059"	1/8"	.0885"	1-1/2"	SS-2-059	SS-2-059-**T**	SS-2-059-**C**	SS-2-059-**A**	SS-2-059-**DLC**
.060"	1/8"	.0900"	1-1/2"	SS-2-060	SS-2-060-**T**	SS-2-060-**C**	SS-2-060-**A**	SS-2-060-**DLC**
.061"	1/8"	.0915"	1-1/2"	SS-2-061	SS-2-061-**T**	SS-2-061-**C**	SS-2-061-**A**	SS-2-061-**DLC**
.062"	1/8"	.0930"	1-1/2"	SS-2-062	SS-2-062-**T**	SS-2-062-**C**	SS-2-062-**A**	SS-2-062-**DLC**

MSS-2 Metric 2 Flute Miniature Stub Length METRIC

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated	Tool Number DLC Coated
.15mm	3mm	.225mm	38mm	MSS-2-015	MSS-2-015-**T**	MSS-2-015-**C**	MSS-2-015-**A**	MSS-2-015-**DLC**
.20mm	3mm	.300mm	38mm	MSS-2-020	MSS-2-020-**T**	MSS-2-020-**C**	MSS-2-020-**A**	MSS-2-020-**DLC**
.25mm	3mm	.375mm	38mm	MSS-2-025	MSS-2-025-**T**	MSS-2-025-**C**	MSS-2-025-**A**	MSS-2-025-**DLC**
.30mm	3mm	.450mm	38mm	MSS-2-030	MSS-2-030-**T**	MSS-2-030-**C**	MSS-2-030-**A**	MSS-2-030-**DLC**
.35mm	3mm	.525mm	38mm	MSS-2-035	MSS-2-035-**T**	MSS-2-035-**C**	MSS-2-035-**A**	MSS-2-035-**DLC**
.40mm	3mm	.600mm	38mm	MSS-2-040	MSS-2-040-**T**	MSS-2-040-**C**	MSS-2-040-**A**	MSS-2-040-**DLC**
.45mm	3mm	.675mm	38mm	MSS-2-045	MSS-2-045-**T**	MSS-2-045-**C**	MSS-2-045-**A**	MSS-2-045-**DLC**
.50mm	3mm	.750mm	38mm	MSS-2-050	MSS-2-050-**T**	MSS-2-050-**C**	MSS-2-050-**A**	MSS-2-050-**DLC**
.55mm	3mm	.825mm	38mm	MSS-2-055	MSS-2-055-**T**	MSS-2-055-**C**	MSS-2-055-**A**	MSS-2-055-**DLC**
.60mm	3mm	.900mm	38mm	MSS-2-060	MSS-2-060-**T**	MSS-2-060-**C**	MSS-2-060-**A**	MSS-2-060-**DLC**
.65mm	3mm	.975mm	38mm	MSS-2-065	MSS-2-065-**T**	MSS-2-065-**C**	MSS-2-065-**A**	MSS-2-065-**DLC**
.70mm	3mm	1.05mm	38mm	MSS-2-070	MSS-2-070-**T**	MSS-2-070-**C**	MSS-2-070-**A**	MSS-2-070-**DLC**
.80mm	3mm	1.20mm	38mm	MSS-2-080	MSS-2-080-**T**	MSS-2-080-**C**	MSS-2-080-**A**	MSS-2-080-**DLC**
1.00mm	3mm	1.50mm	38mm	MSS-2-100	MSS-2-100-**T**	MSS-2-100-**C**	MSS-2-100-**A**	MSS-2-100-**DLC**
1.50mm	3mm	2.25mm	38mm	MSS-2-150	MSS-2-150-**T**	MSS-2-150-**C**	MSS-2-150-**A**	MSS-2-150-**DLC**

SR-2 2 Flute Miniature End Mills

SR-2 2 Flute Tuffy Grade Standard Length

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated	Tool Number DLC Coated
.010"	1/8"	.0300"	1-1/2"	SR-2-010	SR-2-010-**T**	SR-2-010-**C**	SR-2-010-**A**	SR-2-010-**DLC**
.011"	1/8"	.0330"	1-1/2"	SR-2-011	SR-2-011-**T**	SR-2-011-**C**	SR-2-011-**A**	SR-2-011-**DLC**
.012"	1/8"	.0360"	1-1/2"	SR-2-012	SR-2-012-**T**	SR-2-012-**C**	SR-2-012-**A**	SR-2-012-**DLC**
.013"	1/8"	.0390"	1-1/2"	SR-2-013	SR-2-013-**T**	SR-2-013-**C**	SR-2-013-**A**	SR-2-013-**DLC**
.014"	1/8"	.0420"	1-1/2"	SR-2-014	SR-2-014-**T**	SR-2-014-**C**	SR-2-014-**A**	SR-2-014-**DLC**
.015"	1/8"	.0450"	1-1/2"	SR-2-015	SR-2-015-**T**	SR-2-015-**C**	SR-2-015-**A**	SR-2-015-**DLC**
.016"	1/8"	.0480"	1-1/2"	SR-2-016	SR-2-016-**T**	SR-2-016-**C**	SR-2-016-**A**	SR-2-016-**DLC**
.017"	1/8"	.0510"	1-1/2"	SR-2-017	SR-2-017-**T**	SR-2-017-**C**	SR-2-017-**A**	SR-2-017-**DLC**
.018"	1/8"	.0540"	1-1/2"	SR-2-018	SR-2-018-**T**	SR-2-018-**C**	SR-2-018-**A**	SR-2-018-**DLC**
.019"	1/8"	.0570"	1-1/2"	SR-2-019	SR-2-019-**T**	SR-2-019-**C**	SR-2-019-**A**	SR-2-019-**DLC**
.020"	1/8"	.0600"	1-1/2"	SR-2-020	SR-2-020-**T**	SR-2-020-**C**	SR-2-020-**A**	SR-2-020-**DLC**
.021"	1/8"	.0630"	1-1/2"	SR-2-021	SR-2-021-**T**	SR-2-021-**C**	SR-2-021-**A**	SR-2-021-**DLC**
.022"	1/8"	.0660"	1-1/2"	SR-2-022	SR-2-022-**T**	SR-2-022-**C**	SR-2-022-**A**	SR-2-022-**DLC**
.023"	1/8"	.0690"	1-1/2"	SR-2-023	SR-2-023-**T**	SR-2-023-**C**	SR-2-023-**A**	SR-2-023-**DLC**
.024"	1/8"	.0720"	1-1/2"	SR-2-024	SR-2-024-**T**	SR-2-024-**C**	SR-2-024-**A**	SR-2-024-**DLC**
.025"	1/8"	.0750"	1-1/2"	SR-2-025	SR-2-025-**T**	SR-2-025-**C**	SR-2-025-**A**	SR-2-025-**DLC**
.026"	1/8"	.0780"	1-1/2"	SR-2-026	SR-2-026-**T**	SR-2-026-**C**	SR-2-026-**A**	SR-2-026-**DLC**
.027"	1/8"	.0810"	1-1/2"	SR-2-027	SR-2-027-**T**	SR-2-027-**C**	SR-2-027-**A**	SR-2-027-**DLC**
.028"	1/8"	.0840"	1-1/2"	SR-2-028	SR-2-028-**T**	SR-2-028-**C**	SR-2-028-**A**	SR-2-028-**DLC**
.029"	1/8"	.0870"	1-1/2"	SR-2-029	SR-2-029-**T**	SR-2-029-**C**	SR-2-029-**A**	SR-2-029-**DLC**
.030"	1/8"	.0900"	1-1/2"	SR-2-030	SR-2-030-**T**	SR-2-030-**C**	SR-2-030-**A**	SR-2-030-**DLC**
.031"	1/8"	.0930"	1-1/2"	SR-2-031	SR-2-031-**T**	SR-2-031-**C**	SR-2-031-**A**	SR-2-031-**DLC**
.032"	1/8"	.0960	1-1/2"	SR-2-032	SR-2-032-**T**	SR-2-032-**C**	SR-2-032-**A**	SR-2-032-**DLC**
.033"	1/8"	.0990"	1-1/2"	SR-2-033	SR-2-033-**T**	SR-2-033-**C**	SR-2-033-**A**	SR-2-033-**DLC**
.034"	1/8"	.1020"	1-1/2"	SR-2-034	SR-2-034-**T**	SR-2-034-**C**	SR-2-034-**A**	SR-2-034-**DLC**
.035"	1/8"	.1050"	1-1/2"	SR-2-035	SR-2-035-**T**	SR-2-035-**C**	SR-2-035-**A**	SR-2-035-**DLC**
.036"	1/8"	.1080"	1-1/2"	SR-2-036	SR-2-036-**T**	SR-2-036-**C**	SR-2-036-**A**	SR-2-036-**DLC**
.037"	1/8"	.1110"	1-1/2"	SR-2-037	SR-2-037-**T**	SR-2-037-**C**	SR-2-037-**A**	SR-2-037-**DLC**
.038"	1/8"	.1140"	1-1/2"	SR-2-038	SR-2-038-**T**	SR-2-038-**C**	SR-2-038-**A**	SR-2-038-**DLC**
.039"	1/8"	.1170"	1-1/2"	SR-2-039	SR-2-039-**T**	SR-2-039-**C**	SR-2-039-**A**	SR-2-039-**DLC**
.040"	1/8"	.1200"	1-1/2"	SR-2-040	SR-2-040-**T**	SR-2-040-**C**	SR-2-040-**A**	SR-2-040-**DLC**
.041"	1/8"	.1230"	1-1/2"	SR-2-041	SR-2-041-**T**	SR-2-041-**C**	SR-2-041-**A**	SR-2-041-**DLC**
.042"	1/8"	.1260"	1-1/2"	SR-2-042	SR-2-042-**T**	SR-2-042-**C**	SR-2-042-**A**	SR-2-042-**DLC**
.043"	1/8"	.1290"	1-1/2"	SR-2-043	SR-2-043-**T**	SR-2-043-**C**	SR-2-043-**A**	SR-2-043-**DLC**
.044"	1/8"	.1320"	1-1/2"	SR-2-044	SR-2-044-**T**	SR-2-044-**C**	SR-2-044-**A**	SR-2-044-**DLC**
.045"	1/8"	.1350"	1-1/2"	SR-2-045	SR-2-045-**T**	SR-2-045-**C**	SR-2-045-**A**	SR-2-045-**DLC**
.046"	1/8"	.1380"	1-1/2"	SR-2-046	SR-2-046-**T**	SR-2-046-**C**	SR-2-046-**A**	SR-2-046-**DLC**
.047"	1/8"	.1410"	1-1/2"	SR-2-047	SR-2-047-**T**	SR-2-047-**C**	SR-2-047-**A**	SR-2-047-**DLC**
.048"	1/8"	.1440"	1-1/2"	SR-2-048	SR-2-048-**T**	SR-2-048-**C**	SR-2-048-**A**	SR-2-048-**DLC**
.049"	1/8"	.1470"	1-1/2"	SR-2-049	SR-2-049-**T**	SR-2-049-**C**	SR-2-049-**A**	SR-2-049-**DLC**
.050"	1/8"	.1500"	1-1/2"	SR-2-050	SR-2-050-**T**	SR-2-050-**C**	SR-2-050-**A**	SR-2-050-**DLC**
.051"	1/8"	.1530"	1-1/2"	SR-2-051	SR-2-051-**T**	SR-2-051-**C**	SR-2-051-**A**	SR-2-051-**DLC**
.052"	1/8"	.1560"	1-1/2"	SR-2-052	SR-2-052-**T**	SR-2-052-**C**	SR-2-052-**A**	SR-2-052-**DLC**
.053"	1/8"	.1590"	1-1/2"	SR-2-053	SR-2-053-**T**	SR-2-053-**C**	SR-2-053-**A**	SR-2-053-**DLC**
.054"	1/8"	.1620"	1-1/2"	SR-2-054	SR-2-054-**T**	SR-2-054-**C**	SR-2-054-**A**	SR-2-054-**DLC**
.055"	1/8"	.1650"	1-1/2"	SR-2-055	SR-2-055-**T**	SR-2-055-**C**	SR-2-055-**A**	SR-2-055-**DLC**
.056"	1/8"	.1680"	1-1/2"	SR-2-056	SR-2-056-**T**	SR-2-056-**C**	SR-2-056-**A**	SR-2-056-**DLC**
.057"	1/8"	.1710"	1-1/2"	SR-2-057	SR-2-057-**T**	SR-2-057-**C**	SR-2-057-**A**	SR-2-057-**DLC**
.058"	1/8"	.1740"	1-1/2"	SR-2-058	SR-2-058-**T**	SR-2-058-**C**	SR-2-058-**A**	SR-2-058-**DLC**
.059"	1/8"	.1770"	1-1/2"	SR-2-059	SR-2-059-**T**	SR-2-059-**C**	SR-2-059-**A**	SR-2-059-**DLC**
.060"	1/8"	.1800"	1-1/2"	SR-2-060	SR-2-060-**T**	SR-2-060-**C**	SR-2-060-**A**	SR-2-060-**DLC**
.061"	1/8"	.1830"	1-1/2"	SR-2-061	SR-2-061-**T**	SR-2-061-**C**	SR-2-061-**A**	SR-2-061-**DLC**
.062"	1/8"	.1860"	1-1/2"	SR-2-062	SR-2-062-**T**	SR-2-062-**C**	SR-2-062-**A**	SR-2-062-**DLC**

2 Flute Miniature End Mills MSR-2

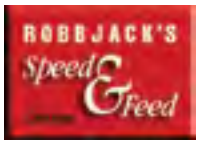
MSR-2 2 Flute Standard Length METRIC

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated	Tool NumberCoated
.25mm	3mm	.75mm	38mm	MSR-2-025	MSR-2-025-**T**	MSR-2-025-**C**	MSR-2-025-**A**	MSR-2-025-**DLC**
.30mm	3mm	.90mm	38mm	MSR-2-030	MSR-2-030-**T**	MSR-2-030-**C**	MSR-2-030-**A**	MSR-2-030-**DLC**
.35mm	3mm	1.05mm	38mm	MSR-2-035	MSR-2-035-**T**	MSR-2-035-**C**	MSR-2-035-**A**	MSR-2-035-**DLC**
.40mm	3mm	1.20mm	38mm	MSR-2-040	MSR-2-040-**T**	MSR-2-040-**C**	MSR-2-040-**A**	MSR-2-040-**DLC**
.45mm	3mm	1.35mm	38mm	MSR-2-045	MSR-2-045-**T**	MSR-2-045-**C**	MSR-2-045-**A**	MSR-2-045-**DLC**
.50mm	3mm	1.50mm	38mm	MSR-2-050	MSR-2-050-**T**	MSR-2-050-**C**	MSR-2-050-**A**	MSR-2-050-**DLC**
.55mm	3mm	1.65mm	38mm	MSR-2-055	MSR-2-055-**T**	MSR-2-055-**C**	MSR-2-055-**A**	MSR-2-055-**DLC**
.60mm	3mm	1.80mm	38mm	MSR-2-060	MSR-2-060-**T**	MSR-2-060-**C**	MSR-2-060-**A**	MSR-2-060-**DLC**
.65mm	3mm	1.95mm	38mm	MSR-2-065	MSR-2-065-**T**	MSR-2-065-**C**	MSR-2-065-**A**	MSR-2-065-**DLC**
.70mm	3mm	2.10mm	38mm	MSR-2-070	MSR-2-070-**T**	MSR-2-070-**C**	MSR-2-070-**A**	MSR-2-070-**DLC**
.80mm	3mm	2.40mm	38mm	MSR-2-080	MSR-2-080-**T**	MSR-2-080-**C**	MSR-2-080-**A**	MSR-2-080-**DLC**
1.00mm	3mm	3.00mm	38mm	MSR-2-100	MSR-2-100-**T**	MSR-2-100-**C**	MSR-2-100-**A**	MSR-2-100-**DLC**
1.50mm	3mm	4.50mm	38mm	MSR-2-150	MSR-2-150-**T**	MSR-2-150-**C**	MSR-2-150-**A**	MSR-2-150-**DLC**

Videos Online

See RobbJack's miniatures in action online:
www.youtube.com/RobbJackCorp
or
www.robbjack.com/videos

Hand-Select +/-.0002" Available



Speed & Feed

Speed & Feed Calculations
now online at:
www.robbjack.com/technical/speed-and-feed

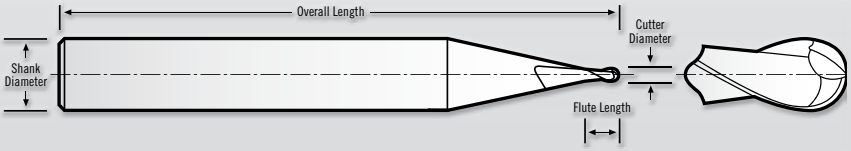
SS/SR-2BN 2 Flute Miniature Ball End Mills

Characteristics: Ball End, 2 Flute, 30° Helix

Applications: Slotting, Side Milling, Helical Interpolation, Conventional, Ramping, 3-D, High Performance, Roughing, Semi-Finishing, Finishing, Dry, Wet, Cold Air, Spray Mist

Materials: Aluminum, Copper, Titanium, Magnesium, Cast Iron, Steel, Stainless Steel, Super Alloys, Plastics, Composites, 40 HRc Hardness, Brass

Coatings: Titanium Nitride, Titanium Carbo-Nitride, Aluminum Titan. Nitride, Diamond-Like Carbon (DLC)



SS/SR Tolerances
Cutting Dia. = ±.0005"
Shank Dia. = – .0001/–.0002"
Flute Length = +.003/–.000"
OAL = ±.060"

MSS/MSR Tolerances
Cutting Dia. = ±.010 mm
Shank Dia. = –.002/–.005 mm
Flute Length = +0.10/–0.00 mm
OAL = +1.00/–0.00 mm

SS-2BN 2 Flute Ball End Stub Length

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated	Tool Number DLC Coated
.010"	1/8"	.0150"	1-1/2"	SS-2-010-**BN**	SS-2-010-**BN-T**	SS-2-010-**BN-C**	SS-2-010-**BN-A**	SS-2-010-**BN-DLC**
.015"	1/8"	.0230"	1-1/2"	SS-2-015-**BN**	SS-2-015-**BN-T**	SS-2-015-**BN-C**	SS-2-015-**BN-A**	SS-2-015-**BN-DLC**
.016"	1/8"	.0240"	1-1/2"	SS-2-016-**BN**	SS-2-016-**BN-T**	SS-2-016-**BN-C**	SS-2-016-**BN-A**	SS-2-016-**BN-DLC**
.020"	1/8"	.0300"	1-1/2"	SS-2-020-**BN**	SS-2-020-**BN-T**	SS-2-020-**BN-C**	SS-2-020-**BN-A**	SS-2-020-**BN-DLC**
.025"	1/8"	.0375"	1-1/2"	SS-2-025-**BN**	SS-2-025-**BN-T**	SS-2-025-**BN-C**	SS-2-025-**BN-A**	SS-2-025-**BN-DLC**
.030"	1/8"	.0450"	1-1/2"	SS-2-030-**BN**	SS-2-030-**BN-T**	SS-2-030-**BN-C**	SS-2-030-**BN-A**	SS-2-030-**BN-DLC**
.031"	1/8"	.0465"	1-1/2"	SS-2-031-**BN**	SS-2-031-**BN-T**	SS-2-031-**BN-C**	SS-2-031-**BN-A**	SS-2-031-**BN-DLC**
.040"	1/8"	.0600"	1-1/2"	SS-2-040-**BN**	SS-2-040-**BN-T**	SS-2-040-**BN-C**	SS-2-040-**BN-A**	SS-2-040-**BN-DLC**
.047"	1/8"	.0750"	1-1/2"	SS-2-047-**BN**	SS-2-047-**BN-T**	SS-2-047-**BN-C**	SS-2-047-**BN-A**	SS-2-047-**BN-DLC**
.055"	1/8"	.0825"	1-1/2"	SS-2-055-**BN**	SS-2-055-**BN-T**	SS-2-055-**BN-C**	SS-2-055-**BN-A**	SS-2-055-**BN-DLC**
.060"	1/8"	.0900"	1-1/2"	SS-2-060-**BN**	SS-2-060-**BN-T**	SS-2-060-**BN C**	SS-2-060-**BN A**	SS-2-060-**BN DLC**

MSS-2BN Metric 2 Flute Ball End Stub Length METRIC

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated	Tool Number DLC Coated
.50mm	3mm	.750mm	38mm	MSS-2-050-**BN**	MSS-2-050-**BN-T**	MSS-2-050BN-**C**	MSS-2-050BN-**A**	MSS-2-050BN-**DLC**
.60mm	3mm	.900mm	38mm	MSS-2-060-**BN**	MSS-2-060-**BN-T**	MSS-2-060BN-**C**	MSS-2-060BN-**A**	MSS-2-060BN-**DLC**
.70mm	3mm	1.05mm	38mm	MSS-2-070-**BN**	MSS-2-070-**BN-T**	MSS-2-070BN-**C**	MSS-2-070BN-**A**	MSS-2-070BN-**DLC**
.80mm	3mm	1.20mm	38mm	MSS-2-080-**BN**	MSS-2-080-**BN-T**	MSS-2-080BN-**C**	MSS-2-080BN-**A**	MSS-2-080BN-**DLC**
1.00mm	3mm	1.50mm	38mm	MSS-2-100-**BN**	MSS-2-100-**BN-T**	MSS-2-100BN-**C**	MSS-2-100BN-**A**	MSS-2-100BN-**DLC**
1.50mm	3mm	2.25mm	38mm	MSS-2-150-**BN**	MSS-2-150-**BN-T**	MSS-2-150BN-**C**	MSS-2-150BN-**A**	MSS-2-150BN-**DLC**

2 Flute Miniature Ball End Mills MSS/MSR-2BN

SR-2BN 2 Flute Ball End Tuffy Grade Standard Length

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated	Tool Number DLC Coated
.010"	1/8"	.0300"	1-1/2"	SR-2-010-**BN**	SR-2-010-**BN-T**	SR-2-010-**BN-C**	SR-2-010-**BN-A**	SR-2-010-**BN-DLC**
.015"	1/8"	.0450"	1-1/2"	SR-2-015-**BN**	SR-2-015-**BN-T**	SR-2-015-**BN-C**	SR-2-015-**BN-A**	SR-2-015-**BN-DLC**
.016"	1/8"	.0480"	1-1/2"	SR-2-016-**BN**	SR-2-016-**BN-T**	SR-2-016-**BN-C**	SR-2-016-**BN-A**	SR-2-016-**BN-DLC**
.020"	1/8"	.0600"	1-1/2"	SR-2-020-**BN**	SR-2-020-**BN-T**	SR-2-020-**BN-C**	SR-2-020-**BN-A**	SR-2-020-**BN-DLC**
.025"	1/8"	.0750"	1-1/2"	SR-2-025-**BN**	SR-2-025-**BN-T**	SR-2-025-**BN-C**	SR-2-025-**BN-A**	SR-2-025-**BN-DLC**
.030"	1/8"	.0900"	1-1/2"	SR-2-030-**BN**	SR-2-030-**BN-T**	SR-2-030-**BN-C**	SR-2-030-**BN-A**	SR-2-030-**BN-DLC**
.031"	1/8"	.0930"	1-1/2"	SR-2-031-**BN**	SR-2-031-**BN-T**	SR-2-031-**BN-C**	SR-2-031-**BN-A**	SR-2-031-**BN-DLC**
.040"	1/8"	.1200"	1-1/2"	SR-2-040-**BN**	SR-2-040-**BN-T**	SR-2-040-**BN-C**	SR-2-040-**BN-A**	SR-2-040-**BN-DLC**
.047"	1/8"	.1410"	1-1/2"	SR-2-047-**BN**	SR-2-047-**BN-T**	SR-2-047-**BN-C**	SR-2-047-**BN-A**	SR-2-047-**BN-DLC**
.050"	1/8"	.1500"	1-1/2"	SR-2-050-**BN**	SR-2-050-**BN-T**	SR-2-050-**BN-C**	SR-2-050-**BN-A**	SR-2-050-**BN-DLC**
.055"	1/8"	.1650"	1-1/2"	SR-2-055-**BN**	SR-2-055-**BN-T**	SR-2-055-**BN-C**	SR-2-055-**BN-A**	SR-2-055-**BN-DLC**
.060"	1/8"	.1800"	1-1/2"	SR-2-060-**BN**	SR-2-060-**BN-T**	SR-2-060-**BN-C**	SR-2-060-**BN-A**	SR-2-060-**BN-DLC**

MSR-2BN Metric 2 Flute Ball End Tuffy Grade Standard Length METRIC

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN-Coated	Tool Number AlTiN Coated	Tool Number DLC Coated
.50mm	3mm	1.50mm	38mm	MSR-2-050-**BN**	MSR-2-050-**BN-T**	MSR-2-050-**BN-C**	MSR-2-050-**BN-A**	MSR-2-050-**BN-DLC**
.60mm	3mm	1.80mm	38mm	MSR-2-060-**BN**	MSR-2-060-**BN-T**	MSR-2-060-**BN-C**	MSR-2-060-**BN-A**	MSR-2-060-**BN-DLC**
.70mm	3mm	2.10mm	38mm	MSR-2-070-**BN**	MSR-2-070-**BN-T**	MSR-2-070-**BN-C**	MSR-2-070-**BN-A**	MSR-2-070-**BN-DLC**
.80mm	3mm	2.40mm	38mm	MSR-2-080-**BN**	MSR-2-080-**BN-T**	MSR-2-080-**BN-C**	MSR-2-080-**BN-A**	MSR-2-080-**BN-DLC**
1.00mm	3mm	3.00mm	38mm	MSR-2-100-**BN**	MSR-2-100-**BN-T**	MSR-2-100-**BN-C**	MSR-2-100-**BN-A**	MSR-2-100-**BN-DLC**
1.50mm	3mm	4.50mm	38mm	MSR-2-150-**BN**	MSR-2-150-**BN-T**	MSR-2-150-**BN-C**	MSR-2-150-**BN-A**	MSR-2-150-**BN-DLC**

Videos Online

See RobbJack's miniatures in action online:
www.youtube.com/RobbJackCorp
or
www.robbjack.com/videos

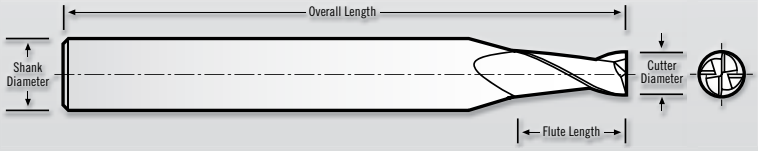
SS/MSS-4 4 Flute Miniature End Mills

Characteristics: Square End, 4 Flute, 30° Helix

Applications: Slotting, Side Milling, Helical Interpolation, Ramping, High Performance, Roughing, Semi-Finishing, Finishing, Dry, Wet, Cold Air, Spray Mist

Materials: Aluminum, Copper, Titanium, Magnesium, Cast Iron, Steel, Stainless Steel, Super Alloys, Plastics, Composites, 40 HRc Hardness, Brass

Coatings: Titanium Nitride, Titanium Carbo-Nitride, Aluminum Titan. Nitride, Diamond-Like Carbon (DLC)



SS/SR Tolerances
Cutting Dia. = ±.0005"
Shank Dia. = – .0001/–.0002"
Flute Length = +.003/–.000"
OAL = ±.060"

MSS/MSR Tolerances
Cutting Dia. = ±.010mm
Shank Dia. = –.002/–.005mm
Flute Length = +0.10/–0.00mm
OAL = +1.00/–0.00mm

SS-4 4 Flute Tuffy Grade Stub Length

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated	Tool Number DLC Coated
.031"	1/8"	.0465"	1-1/2"	SS-4-031	SS-4-031-**T**	SS-4-031-**C**	SS-4-031-**A**	SS-4-031-**DLC**
.040"	1/8"	.0600"	1-1/2"	SS-4-040	SS-4-040-**T**	SS-4-040-**C**	SS-4-040-**A**	SS-4-040-**DLC**
.047"	1/8"	.0705"	1-1/2"	SS-4-047	SS-4-047-**T**	SS-4-047-**C**	SS-4-047-**A**	SS-4-047-**DLC**
.050"	1/8"	.0750"	1-1/2"	SS-4-050	SS-4-050-**T**	SS-4-050-**C**	SS-4-050-**A**	SS-4-050-**DLC**
.055"	1/8"	.0825"	1-1/2"	SS-4-055	SS-4-055-**T**	SS-4-055-**C**	SS-4-055-**A**	SS-4-055-**DLC**
.060"	1/8"	.0900"	1-1/2"	SS-4-060	SS-4-060-**T**	SS-4-060-**C**	SS-4-060-**A**	SS-4-060-**DLC**

MSS-4 Metric 4 Flute Tuffy Grade Stub Length METRIC

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated	Tool Number DLC Coated
.80mm	3mm	1.20mm	38mm	MSS-4-080	MSS-4-080-**T**	MSS-4-080-**C**	MSS-4-080-**A**	MSS-4-080-**DLC**
1.00mm	3mm	1.50mm	38mm	MSS-4-100	MSS-4-100-**T**	MSS-4-100-**C**	MSS-4-100-**A**	MSS-4-100-**DLC**
1.50mm	3mm	2.25mm	38mm	MSS-4-150	MSS-4-150-**T**	MSS-4-150-**C**	MSS-4-150-**A**	MSS-4-150-**DLC**

4 Flute Miniature End Mills SR/MSR-4

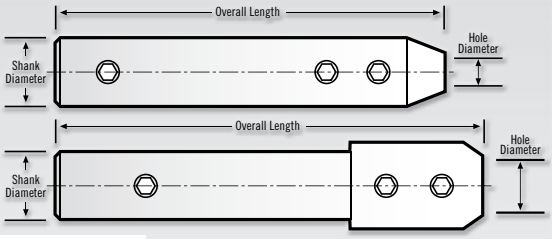
SR-4 4 Flute Tuffy Grade Standard Length

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated	Tool Number DLC Coated
.031"	1/8"	.0930"	1-1/2"	SR-4-031	SR-4-031-**T**	SR-4-031-**C**	SR-4-031-**A**	SR-4-031-**DLC**
.040"	1/8"	.1200"	1-1/2"	SR-4-040	SR-4-040-**T**	SR-4-040-**C**	SR-4-040-**A**	SR-4-040-**DLC**
.047"	1/8"	.1410"	1-1/2"	SR-4-047	SR-4-047-**T**	SR-4-047-**C**	SR-4-047-**A**	SR-4-047-**DLC**
.050"	1/8"	.1500"	1-1/2"	SR-4-050	SR-4-050-**T**	SR-4-050-**C**	SR-4-050-**A**	SR-4-050-**DLC**
.055"	1/8"	.1650"	1-1/2"	SR-4-055	SR-4-055-**T**	SR-4-055-**C**	SR-4-055-**A**	SR-4-055-**DLC**
.060"	1/8"	.1800"	1-1/2"	SR-4-060	SR-4-060-**T**	SR-4-060-**C**	SR-4-060-**A**	SR-4-060-**DLC**

MSR-4 Metric 4 Flute Standard Length METRIC

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated	Tool Number DLC Coated
.80mm	3mm	2.40mm	38mm	MSR-4-080	MSR-4-080-**T**	MSR-4-080-**C**	MSR-4-080-**A**	MSR-4-080-**DLC**
1.00mm	3mm	3.00mm	38mm	MSR-4-100	MSR-4-100-**T**	MSR-4-100-**C**	MSR-4-100-**A**	MSR-4-100-**DLC**
1.50mm	3mm	4.50mm	38mm	MSR-4-150	MSR-4-150-**T**	MSR-4-150-**C**	MSR-4-150-**A**	MSR-4-150-**DLC**

Accuhold End Mill Extension Holder ACH/MAH



ACH Tolerances
Hole Dia. = +.00015/–.00000"
Shank Dia. = –.0001/–.0003"
OAL = ±.060"

MAH Tolerances
Hole Dia. = +.004/–.000 mm
Shank Dia. = +.000/–.007 mm
OAL = ±1.5 mm

ACH Accuhold – End Mill Extension Holder

Hole Diameter	Shank Diameter	Overall Length	Tool Number
1/8"	3/8"	3-1/4"	ACH-04
3/16"	1/2"	3-1/2"	ACH-06
1/4"	5/8"	4-1/4"	ACH-08
3/8"	3/4"	4-1/2"	ACH-12
* 1/2"	3/4"	4-3/4"	ACH-16
* 1/2"	1"	4-3/4"	ACH-16L

** 1" Diameter x 1.5" Long Head*

MAH Accuhold – Metric End Mill Extension Holder METRIC

Hole Diameter	Shank Diameter	Overall Length	Tool Number
3mm	10mm	82.5mm	MAH-03
4mm	12mm	110mm	MAH-04
5mm	12mm	110mm	MAH-05
6mm	16mm	125mm	MAH-06
8mm	20mm	135mm	MAH-08
10mm	20mm	135mm	MAH-10
* 12mm	25mm	150mm	MAH-12

TOOLS FOR Multiple Applications

Multiple Application Tools

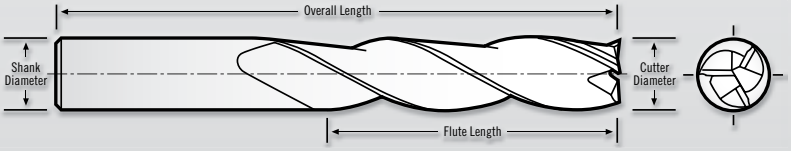
NR / MNR 204/303/404	2, 3 and 4 Flute Nominal Plus Diameter Tolerance		114
TS / MTS 201/301/401	2, 3 and 4 Flute		106
TR 303/404/606	3, 4 and 6 Flute		108
T6 200/202/400/402	2 and 4 Flute Double End		101
C8 201/203	2 Flute		105
C8 301/303	3 Flute		105
T12 201/203	2 Flute		103
T12 403/405	2 and 4 Flute		104
SB / MSB 201 **B / MB** 203	2 Flute Ball End		110
SB / MSB 301 **B / MB** 333	3 Flute Ball End		112
EX 204/206	2 Flute Extended Reach		117
TL / MTL 303	3 Flute Extra Long Cutting Length		100
ET	Engraving Tools		118
ACH / MAH Accuhold	Extension Holder		119

TL/MTL Tuffy Grade Carbide End Mills

Characteristics Square End · 3 Flute · 30° Helix · Flats

Applications Side Milling · Semi-Finishing · Finishing · Wet · Cold Air · Spray Mist

Materials Aluminum · Copper · Magnesium · Cast Iron · Steel · Stainless Steel · Plastics · Brass



TL Series Tolerances
Cutting Dia. = +.001/–.000"
Shank Dia. = –.0001/–.0002"
Flute Length = +.060/–.000"
OAL = ±.060"

MTL Tolerances
Cutting Dia. = +.025/–.000mm
Shank Dia. = –.002/–.005mm
Flute Length = +0.500/+1.500mm
OAL = ±1.000mm

TL-303 3 Flute Tuffy Grade Extra Length

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number
1/8"	1/8"	1"	3"	TL-303-04*
3/16"	3/16"	1-1/8"	3"	TL-303-06*
1/4"	1/4"	1-1/4"	3"	TL-303-08*
5/16"	5/16"	1-3/8"	3-1/8"	TL-303-10*
3/8"	3/8"	1-1/2"	3-1/4"	TL-303-12
7/16"	7/16"	1-3/4"	3-3/4"	TL-303-14*
1/2"	1/2"	2"	4"	TL-303-16
5/8"	5/8"	2-1/2"	4-5/8"	TL-303-20
3/4"	3/4"	3"	5"	TL-303-24

**Does not come with flats.*

MTL-303 Metric 3 Flute Tuffy Grade Extra Length METRIC

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number
3mm	3mm	25mm	75mm	MTL-303-03
4mm	4mm	26mm	75mm	MTL-303-04
5mm	5mm	28mm	75mm	MTL-303-05
6mm	6mm	32mm	75mm	MTL-303-06
8mm	8mm	35mm	80mm	MTL-303-08
10mm	10mm	38mm	82mm	MTL-303-10
12mm	12mm	50mm	100mm	MTL-303-12
16mm	16mm	63mm	110mm	MTL-303-16
20mm	20mm	75mm	130mm	MTL-303-20

NOTE: Metric tools do not have flats.

2 Flute Tuffy Grade Carbide End Mills T6

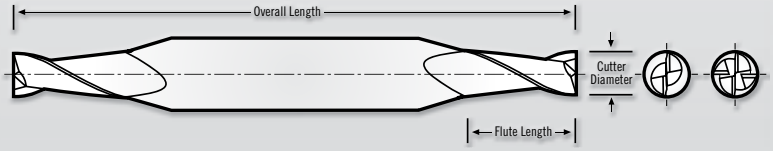
Characteristics: Square End, 2 Flute, 30° Helix

Applications: Slotting, Side Milling, Helical Interpolation, Ramping, Roughing, Semi-Finishing, Finishing, Dry, Wet, Cold Air, Spray Mist

Materials: Aluminum, Copper, Titanium, Magnesium, Cast Iron, Steel, Stainless Steel, Brass, Wood

Coatings: Titanium Nitride, Titanium Carbo-Nitride, Aluminum Titan. Nitride, Diamond-Like Carbon (DLC)

+/- TIGHT Tolerances



T6 Series Tolerances

Cutting Dia. = ±.0005"
Shank Dia. = –.0001/–.0002"
Flute Length = +.030/–.000"
OAL = ±.060"

All Sizes on 3/16" Shanks for Strength

NEW Coatings Available!

T6-200 2 Flute Tuffy Grade Stub Length

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated	Tool Number DLC Coated
1/16"	3/16"	1/8"	2-1/2"	T6-200-02	T6-200-02-**T**	T6-200-02-**C**	T6-200-02-**A**	T6-200-02-**DLC**
5/64"	3/16"	5/32"	2-1/2"	T6-200-02.5	T6-200-02.5-**T**	T6-200-02.5-**C**	T6-200-02.5-**A**	T6-200-02.5-**DLC**
3/32"	3/16"	5/32"	2-1/2"	T6-200-03	T6-200-03-**T**	T6-200-03-**C**	T6-200-03-**A**	T6-200-03-**DLC**
7/64"	3/16"	3/16"	2-1/2"	T6-200-03.5	T6-200-03.5-**T**	T6-200-03.5-**C**	T6-200-03.5-**A**	T6-200-03.5-**DLC**
1/8"	3/16"	3/16"	2-1/2"	T6-200-04	T6-200-04-**T**	T6-200-04-**C**	T6-200-04-**A**	T6-200-04-**DLC**
9/64"	3/16"	7/32"	2-1/2"	T6-200-04.5	T6-200-04.5-**T**	T6-200-04.5-**C**	T6-200-04.5-**A**	T6-200-04.5-**DLC**
5/32"	3/16"	9/32"	2-1/2"	T6-200-05	T6-200-05-**T**	T6-200-05-**C**	T6-200-05-**A**	T6-200-05-**DLC**
11/64"	3/16"	9/32"	2-1/2"	T6-200-05.5	T6-200-05.5-**T**	T6-200-05.5-**C**	T6-200-05.5-**A**	T6-200-05.5-**DLC**
3/16"	3/16"	3/8"	2"	T6-200-06*	T6-200-06-**T***	T6-200-06-**C***	T6-200-06-**A***	T6-200-06-**DLC***

**Single End only to allow plus/minus tolerance*

NEW Coatings Available!

T6-202 2 Flute Tuffy Grade Standard Length

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated	Tool Number DLC Coated
1/16"	3/16"	3/16"	2-1/2"	T6-202-02	T6-202-02-**T**	T6-202-02-**C**	T6-202-02-**A**	T6-202-02-**DLC**
5/64"	3/16"	5/16"	2-1/2"	T6-202-02.5	T6-202-02.5-**T**	T6-202-02.5-**C**	T6-202-02.5-**A**	T6-202-02.5-**DLC**
3/32"	3/16"	3/8"	2-1/2"	T6-202-03	T6-202-03-**T**	T6-202-03-**C**	T6-202-03-**A**	T6-202-03-**DLC**
7/64"	3/16"	3/8"	2-1/2"	T6-202-03.5	T6-202-03.5-**T**	T6-202-03.5-**C**	T6-202-03.5-**A**	T6-202-03.5-**DLC**
1/8"	3/16"	3/8"	2-1/2"	T6-202-04	T6-202-04-**T**	T6-202-04-**C**	T6-202-04-**A**	T6-202-04-**DLC**
9/64"	3/16"	7/16"	2-1/2"	T6-202-04.5	T6-202-04.5-**T**	T6-202-04.5-**C**	T6-202-04.5-**A**	T6-202-04.5-**DLC**
5/32"	3/16"	7/16"	2-1/2"	T6-202-05	T6-202-05-**T**	T6-202-05-**C**	T6-202-05-**A**	T6-202-05-**DLC**
11/64"	3/16"	7/16"	2-1/2"	T6-202-05.5	T6-202-05.5-**T**	T6-202-05.5-**C**	T6-202-05.5-**A**	T6-202-05.5-**DLC**
3/16"	3/16"	1/2"	2"	T6-202-06*	T6-202-06-**T***	T6-202-06-**C***	T6-202-06-**A***	T6-202-06-**DLC***

**Single End only to allow plus/minus tolerance*

T6 4 Flute Tuffy Grade Carbide End Mills

Characteristics: Square End, 4 Flute, 30° Helix

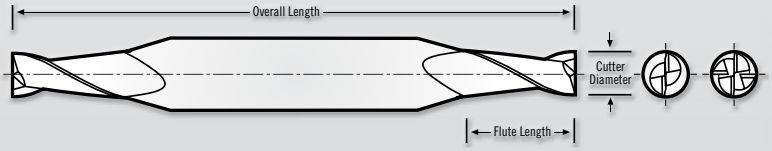
Applications: Side Milling, Semi-Finishing, Finishing, Dry, Wet, Cold Air, Spray Mist

Materials: Aluminum, Copper, Titanium, Magnesium, Cast Iron, Steel, Stainless Steel, Brass

Coatings: Titanium Nitride, Titanium Carbo-Nitride, Aluminum Titan. Nitride, Diamond-Like Carbon (DLC)

NEW Coatings Available!

TiN TiCN AlTiN



T6 Series Tolerances

Cutting Dia. = ±.0005"
Shank Dia. = –.0001/–.0002"
Flute Length = +.030/–.000"
OAL = ±.060"

All Sizes on 3/16" Shanks for Strength

T6-400 4 Flute Tuffy Grade Stub Length

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated	Tool Number DLC Coated
1/16"	3/16"	1/8"	2-1/2"	T6-400-02	T6-400-02-**T**	T6-400-02-**C**	T6-400-02-**A**	T6-400-02-**DLC**
5/64"	3/16"	5/32"	2-1/2"	T6-400-02.5	T6-400-02.5-**T**	T6-400-02.5-**C**	T6-400-02.5-**A**	T6-400-02.5-**DLC**
3/32"	3/16"	5/32"	2-1/2"	T6-400-03	T6-400-03-**T**	T6-400-03-**C**	T6-400-03-**A**	T6-400-03-**DLC**
7/64"	3/16"	3/16"	2-1/2"	T6-400-03.5	T6-400-03.5-**T**	T6-400-03.5-**C**	T6-400-03.5-**A**	T6-400-03.5-**DLC**
1/8"	3/16"	3/16"	2-1/2"	T6-400-04	T6-400-04-**T**	T6-400-04-**C**	T6-400-04-**A**	T6-400-04-**DLC**
9/64"	3/16"	7/32"	2-1/2"	T6-400-04.5	T6-400-04.5-**T**	T6-400-04.5-**C**	T6-400-04.5-**A**	T6-400-04.5-**DLC**
5/32"	3/16"	9/32"	2-1/2"	T6-400-05	T6-400-05-**T**	T6-400-05-**C**	T6-400-05-**A**	T6-400-05-**DLC**
11/64"	3/16"	9/32"	2-1/2"	T6-400-05.5	T6-400-05.5-**T**	T6-400-05.5-**C**	T6-400-05.5-**A**	T6-400-05.5-**DLC**
3/16"	3/16"	3/8"	2"	T6-400-06*	T6-400-06-**T***	T6-400-06-**C***	T6-400-06-**A***	T6-400-06-**DLC***

**Single End only to allow plus/minus tolerance*

T6-402 4 Flute Tuffy Grade Standard Length

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated	Tool Number DLC Coated
1/16"	3/16"	3/16"	2-1/2"	T6-402-02	T6-402-02-**T**	T6-402-02-**C**	T6-402-02-**A**	T6-402-02-**DLC**
5/64"	3/16"	5/16"	2-1/2"	T6-402-02.5	T6-402-02.5-**T**	T6-402-02.5-**C**	T6-402-02.5-**A**	T6-402-02.5-**DLC**
3/32"	3/16"	3/8"	2-1/2"	T6-402-03	T6-402-03-**T**	T6-402-03-**C**	T6-402-03-**A**	T6-402-03-**DLC**
7/64"	3/16"	3/8"	2-1/2"	T6-402-03.5	T6-402-03.5-**T**	T6-402-03.5-**C**	T6-402-03.5-**A**	T6-402-03.5-**DLC**
1/8"	3/16"	3/8"	2-1/2"	T6-402-04	T6-402-04-**T**	T6-402-04-**C**	T6-402-04-**A**	T6-402-04-**DLC**
9/64"	3/16"	7/16"	2-1/2"	T6-402-04.5	T6-402-04.5-**T**	T6-402-04.5-**C**	T6-402-04.5-**A**	T6-402-04.5-**DLC**
5/32"	3/16"	7/16"	2-1/2"	T6-402-05	T6-402-05-**T**	T6-402-05-**C**	T6-402-05-**A**	T6-402-05-**DLC**
11/64"	3/16"	7/16"	2-1/2"	T6-402-05.5	T6-402-05.5-**T**	T6-402-05.5-**C**	T6-402-05.5-**A**	T6-402-05.5-**DLC**
3/16"	3/16"	1/2"	2"	T6-402-06*	T6-402-06-**T***	T6-402-06-**C***	T6-402-06-**A***	T6-402-06-**DLC***

**Single End only to allow plus/minus tolerance*

2 Flute Tuffy Grade Carbide End Mills T12

Characteristics: Square End, 2 Flute, 30° Helix, Flats

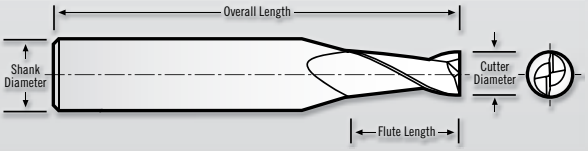
Applications: Slotting, Side Milling, Helical Interpolation, Ramping, Roughing, Semi-Finishing, Finishing, Dry, Wet, Cold Air, Spray Mist

Materials: Aluminum, Copper, Titanium, Magnesium, Cast Iron, Steel, Stainless Steel, Brass, Wood

Coatings: Titanium Nitride, Titanium Carbo-Nitride, Aluminum Titan. Nitride, Diamond-Like Carbon (DLC)

T12 Series Comes in 64th Sizes

All Sizes Smaller than 3/8" on 3/8" Shanks for Strength



T12 Series Tolerances

Cutting Dia. = +.001/–.000"
Shank Dia. = –.0001/–.0002"
Flute Length (1/8" to 5/16") = +.030/–.000"
(21/64" to 3/4") = +.060/–.000"
OAL = ±.060"

T12-201 2 Flute Tuffy Grade Stub Length

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated	Tool Number DLC Coated
1/8"	3/8"	1/4"	2-1/2"	T12-201-04	T12-201-04-**T**	T12-201-04-**C**	T12-201-04-**A**	T12-201-04-**DLC**
5/32"	3/8"	1/4"	2-1/2"	T12-201-05	T12-201-05-**T**	T12-201-05-**C**	T12-201-05-**A**	T12-201-05-**DLC**
3/16"	3/8"	5/16"	2-1/2"	T12-201-06	T12-201-06-**T**	T12-201-06-**C**	T12-201-06-**A**	T12-201-06-**DLC**
7/32"	3/8"	5/16"	2-1/2"	T12-201-07	T12-201-07-**T**	T12-201-07-**C**	T12-201-07-**A**	T12-201-07-**DLC**
1/4"	3/8"	5/16"	2-1/2"	T12-201-08	T12-201-08-**T**	T12-201-08-**C**	T12-201-08-**A**	T12-201-08-**DLC**
9/32"	3/8"	7/16"	2-1/2"	T12-201-09	T12-201-09-**T**	T12-201-09-**C**	T12-201-09-**A**	T12-201-09-**DLC**
5/16"	3/8"	7/16"	2-1/2"	T12-201-10	T12-201-10-**T**	T12-201-10-**C**	T12-201-10-**A**	T12-201-10-**DLC**
3/8"	3/8"	1/2"	2-1/2"	T12-201-12	T12-201-12-**T**	T12-201-12-**C**	T12-201-12-**A**	T12-201-12-**DLC**
7/16"	1/2"	5/8"	3"	T12-201-14	T12-201-14-**T**	T12-201-14-**C**	T12-201-14-**A**	T12-201-14-**DLC**
1/2"	1/2"	5/8"	3"	T12-201-16	T12-201-16-**T**	T12-201-16-**C**	T12-201-16-**A**	T12-201-16-**DLC**
5/8"	5/8"	7/8"	3-1/4"	T12-201-20	T12-201-20-**T**	T12-201-20-**C**	T12-201-20-**A**	T12-201-20-**DLC**
3/4"	3/4"	1"	3-1/2"	T12-201-24	T12-201-24-**T**	T12-201-24-**C**	T12-201-24-**A**	T12-201-24-**DLC**

T12-203 2 Flute Tuffy Grade Standard Length

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated	Tool Number DLC Coated
1/8"	3/8"	1/2"	2-1/2"	T12-203-04	T12-203-04-**T**	T12-203-04-**C**	T12-203-04-**A**	T12-203-04-**DLC**
9/64"	3/8"	1/2"	2-1/2"	T12-203-04.5	T12-203-04.5-**T**	T12-203-04.5-**C**	T12-203-04.5-**A**	T12-203-04.5-**DLC**
5/32"	3/8"	9/16"	2-1/2"	T12-203-05	T12-203-05-**T**	T12-203-05-**C**	T12-203-05-**A**	T12-203-05-**DLC**
11/64"	3/8"	9/16"	2-1/2"	T12-203-05.5	T12-203-05.5-**T**	T12-203-05.5-**C**	T12-203-05.5-**A**	T12-203-05.5-**DLC**
3/16"	3/8"	5/8"	2-1/2"	T12-203-06	T12-203-06-**T**	T12-203-06-**C**	T12-203-06-**A**	T12-203-06-**DLC**
13/64"	3/8"	5/8"	2-1/2"	T12-203-06.5	T12-203-06.5-**T**	T12-203-06.5-**C**	T12-203-06.5-**A**	T12-203-06.5-**DLC**
7/32"	3/8"	5/8"	2-1/2"	T12-203-07	T12-203-07-**T**	T12-203-07-**C**	T12-203-07-**A**	T12-203-07-**DLC**
15/64"	3/8"	5/8"	2-1/2"	T12-203-07.5	T12-203-07.5-**T**	T12-203-07.5-**C**	T12-203-07.5-**A**	T12-203-07.5-**DLC**
1/4"	3/8"	3/4"	2-1/2"	T12-203-08	T12-203-08-**T**	T12-203-08-**C**	T12-203-08-**A**	T12-203-08-**DLC**
17/64"	3/8"	3/4"	2-1/2"	T12-203-08.5	T12-203-08.5-**T**	T12-203-08.5-**C**	T12-203-08.5-**A**	T12-203-08.5-**DLC**
9/32"	3/8"	3/4"	2-1/2"	T12-203-09	T12-203-09-**T**	T12-203-09-**C**	T12-203-09-**A**	T12-203-09-**DLC**
19/64"	3/8"	3/4"	2-1/2"	T12-203-09.5	T12-203-09.5-**T**	T12-203-09.5-**C**	T12-203-09.5-**A**	T12-203-09.5-**DLC**
5/16"	3/8"	13/16"	2-1/2"	T12-203-10	T12-203-10-**T**	T12-203-10-**C**	T12-203-10-**A**	T12-203-10-**DLC**
21/64"	3/8"	13/16"	2-1/2"	T12-203-10.5	T12-203-10.5-**T**	T12-203-10.5-**C**	T12-203-10.5-**A**	T12-203-10.5-**DLC**
11/32"	3/8"	13/16"	2-1/2"	T12-203-11	T12-203-11-**T**	T12-203-11-**C**	T12-203-11-**A**	T12-203-11-**DLC**
23/64"	3/8"	13/16"	2-1/2"	T12-203-11.5	T12-203-11.5-**T**	T12-203-11.5-**C**	T12-203-11.5-**A**	T12-203-11.5-**DLC**
3/8"	3/8"	7/8"	2-1/2"	T12-203-12	T12-203-12-**T**	T12-203-12-**C**	T12-203-12-**A**	T12-203-12-**DLC**
13/32"	1/2"	1"	3"	T12-203-13	T12-203-13-**T**	T12-203-13-**C**	T12-203-13-**A**	T12-203-13-**DLC**
7/16"	1/2"	1"	3"	T12-203-14	T12-203-14-**T**	T12-203-14-**C**	T12-203-14-**A**	T12-203-14-**DLC**
15/32"	1/2"	1"	3"	T12-203-15	T12-203-15-**T**	T12-203-15-**C**	T12-203-15-**A**	T12-203-15-**DLC**
1/2"	1/2"	1"	3"	T12-203-16	T12-203-16-**T**	T12-203-16-**C**	T12-203-16-**A**	T12-203-16-**DLC**

T12 4 Flute Tuffy Grade Carbide End Mills

Characteristics: Square End, 4 Flute, 30° Helix, Flats

Applications: Side Milling, Semi-Finishing, Finishing, Dry, Wet, Cold Air

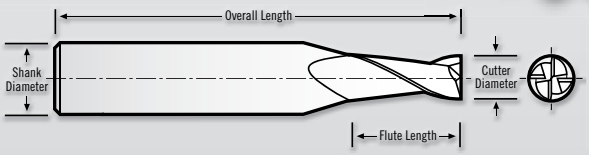
Materials: Aluminum, Copper, Titanium, Magnesium, Cast Iron, Steel, Brass

Coatings: Titanium Nitride, Titanium Carbo-Nitride, Aluminum Titan. Nitride, Diamond-Like Carbon (DLC)

T12 Series Comes in 64th Sizes

All Sizes Smaller than 3/8" on 3/8" Shanks for Strength

Need WITHOUT Flats? Order any tool without flats by adding "NF" to the end of the tool number.



T12 Series Tolerances

Cutting Dia. = +.001/–.000"
Shank Dia. = –.0001/–.0002"
Flute Length (1/8" to 5/16") = +.030/–.000"
(21/64" to 3/4") = +.060/–.000"
OAL = ±.060"

T12-403 4 Flute Tuffy Grade Stub Length

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated	Tool Number DLC Coated
1/8"	3/8"	1/4"	2-1/2"	T12-403-04	T12-403-04-**T**	T12-403-04-**C**	T12-403-04-**A**	T12-403-04-**DLC**
5/32"	3/8"	1/4"	2-1/2"	T12-403-05	T12-403-05-**T**	T12-403-05-**C**	T12-403-05-**A**	T12-403-05-**DLC**
3/16"	3/8"	5/16"	2-1/2"	T12-403-06	T12-403-06-**T**	T12-403-06-**C**	T12-403-06-**A**	T12-403-06-**DLC**
7/32"	3/8"	5/16"	2-1/2"	T12-403-07	T12-403-07-**T**	T12-403-07-**C**	T12-403-07-**A**	T12-403-07-**DLC**
1/4"	3/8"	5/16"	2-1/2"	T12-403-08	T12-403-08-**T**	T12-403-08-**C**	T12-403-08-**A**	T12-403-08-**DLC**
9/32"	3/8"	7/16"	2-1/2"	T12-403-09	T12-403-09-**T**	T12-403-09-**C**	T12-403-09-**A**	T12-403-09-**DLC**
5/16"	3/8"	7/16"	2-1/2"	T12-403-10	T12-403-10-**T**	T12-403-10-**C**	T12-403-10-**A**	T12-403-10-**DLC**
3/8"	3/8"	1/2"	2-1/2"	T12-403-12	T12-403-12-**T**	T12-403-12-**C**	T12-403-12-**A**	T12-403-12-**DLC**
7/16"	1/2"	5/8"	3"	T12-403-14	T12-403-14-**T**	T12-403-14-**C**	T12-403-14-**A**	T12-403-14-**DLC**
1/2"	1/2"	5/8"	3"	T12-403-16	T12-403-16-**T**	T12-403-16-**C**	T12-403-16-**A**	T12-403-16-**DLC**
5/8"	5/8"	7/8"	3-1/2"	T12-403-20	T12-403-20-**T**	T12-403-20-**C**	T12-403-20-**A**	T12-403-20-**DLC**
3/4"	3/4"	1"	3-1/2"	T12-403-24	T12-403-24-**T**	T12-403-24-**C**	T12-403-24-**A**	T12-403-24-**DLC**

T12-405 4 Flute Tuffy Grade Standard Length

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated	Tool Number DLC Coated
1/8"	3/8"	1/2"	2-1/2"	T12-405-04	T12-405-04-**T**	T12-405-04-**C**	T12-405-04-**A**	T12-405-04-**DLC**
9/64"	3/8"	1/2"	2-1/2"	T12-405-04.5	T12-405-04.5-**T**	T12-405-04.5-**C**	T12-405-04.5-**A**	T12-405-04.5-**DLC**
5/32"	3/8"	9/16"	2-1/2"	T12-405-05	T12-405-05-**T**	T12-405-05-**C**	T12-405-05-**A**	T12-405-05-**DLC**
11/64"	3/8"	9/16"	2-1/2"	T12-405-05.5	T12-405-05.5-**T**	T12-405-05.5-**C**	T12-405-05.5-**A**	T12-405-05.5-**DLC**
3/16"	3/8"	5/8"	2-1/2"	T12-405-06	T12-405-06-**T**	T12-405-06-**C**	T12-405-06-**A**	T12-405-06-**DLC**
13/64"	3/8"	5/8"	2-1/2"	T12-405-06.5	T12-405-06.5-**T**	T12-405-06.5-**C**	T12-405-06.5-**A**	T12-405-06.5-**DLC**
7/32"	3/8"	5/8"	2-1/2"	T12-405-07	T12-405-07-**T**	T12-405-07-**C**	T12-405-07-**A**	T12-405-07-**DLC**
15/64"	3/8"	5/8"	2-1/2"	T12-405-07.5	T12-405-07.5-**T**	T12-405-07.5-**C**	T12-405-07.5-**A**	T12-405-07.5-**DLC**
1/4"	3/8"	3/4"	2-1/2"	T12-405-08	T12-405-08-**T**	T12-405-08-**C**	T12-405-08-**A**	T12-405-08-**DLC**
17/64"	3/8"	3/4"	2-1/2"	T12-405-08.5	T12-405-08.5-**T**	T12-405-08.5-**C**	T12-405-08.5-**A**	T12-405-08.5-**DLC**
9/32"	3/8"	3/4"	2-1/2"	T12-405-09	T12-405-09-**T**	T12-405-09-**C**	T12-405-09-**A**	T12-405-09-**DLC**
19/64"	3/8"	3/4"	2-1/2"	T12-405-09.5	T12-405-09.5-**T**	T12-405-09.5-**C**	T12-405-09.5-**A**	T12-405-09.5-**DLC**
5/16"	3/8"	13/16"	2-1/2"	T12-405-10	T12-405-10-**T**	T12-405-10-**C**	T12-405-10-**A**	T12-405-10-**DLC**
21/64"	3/8"	13/16"	2-1/2"	T12-405-10.5	T12-405-10.5-**T**	T12-405-10.5-**C**	T12-405-10.5-**A**	T12-405-10.5-**DLC**
11/32"	3/8"	13/16"	2-1/2"	T12-405-11	T12-405-11-**T**	T12-405-11-**C**	T12-405-11-**A**	T12-405-11-**DLC**
23/64"	3/8"	13/16"	2-1/2"	T12-405-11.5	T12-405-11.5-**T**	T12-405-11.5-**C**	T12-405-11.5-**A**	T12-405-11.5-**DLC**
3/8"	3/8"	7/8"	2-1/2"	T12-405-12	T12-405-12-**T**	T12-405-12-**C**	T12-405-12-**A**	T12-405-12-**DLC**
13/32"	1/2"	1"	3"	T12-405-13	T12-405-13-**T**	T12-405-13-**C**	T12-405-13-**A**	T12-405-13-**DLC**
7/16"	1/2"	1"	3"	T12-405-14	T12-405-14-**T**	T12-405-14-**C**	T12-405-14-**A**	T12-405-14-**DLC**
15/32"	1/2"	1"	3"	T12-405-15	T12-405-15-**T**	T12-405-15-**C**	T12-405-15-**A**	T12-405-15-**DLC**
1/2"	1/2"	1"	3"	T12-405-16	T12-405-16-**T**	T12-405-16-**C**	T12-405-16-**A**	T12-405-16-**DLC**

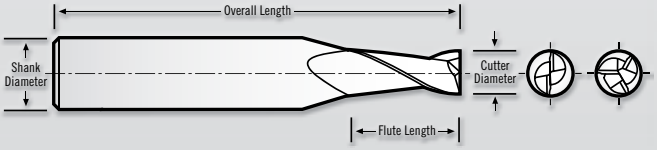
C-2 Grade Carbide End Mills C8

Characteristics Square End, 2 Flute, 3 Flute, 30° Helix

Applications Side Milling, Helical Interpolation, High Performance, Roughing, Semi-Finishing, Finishing, Dry, Wet, Cold Air, Spray Mist

Materials Aluminum, Copper, Magnesium, Plastics, Composites, Brass, Wood

Coatings Diamond-Like Carbon (DLC)



C8 Series Tolerances
Cutting Dia. = +.000/–.002"
Shank Dia. = –.0001/–.0002"
Flute Length = +.030/–.000"
OAL = ±.060"

All Sizes on 1/4" Shanks for Strength

Slotting, Side Milling, Helical Interpolation

C8-201 2 Flute C-2 Grade Stub Length

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number DLC Coated
1/16"	1/4"	1/8"	2"	C8-201-02	C8-201-02-**DLC**
1/8"	1/4"	1/4"	2"	C8-201-04	C8-201-04-**DLC**
3/16"	1/4"	3/8"	2"	C8-201-06	C8-201-06-**DLC**
1/4"	1/4"	1/2"	2"	C8-201-08	C8-201-08-**DLC**

Slotting, Side Milling, Helical Interpolation

C8-203 2 Flute C-2 Grade Standard Length

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number DLC Coated
1/16"	1/4"	1/4"	2-1/2"	C8-203-02	C8-203-02-**DLC**
1/8"	1/4"	1/2"	2-1/2"	C8-203-04	C8-203-04-**DLC**
3/16"	1/4"	5/8"	2-1/2"	C8-203-06	C8-203-06-**DLC**
1/4"	1/4"	3/4"	2-1/2"	C8-203-08	C8-203-08-**DLC**

Side Milling

C8-301 3 Flute C-2 Grade Stub Length

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number DLC Coated
1/8"	1/4"	1/4"	2"	C8-301-04	C8-301-04-**DLC**
3/16"	1/4"	3/8"	2"	C8-301-06	C8-301-06-**DLC**
1/4"	1/4"	1/2"	2"	C8-301-08	C8-301-08-**DLC**

Side Milling

C8-303 3 Flute C-2 Grade Standard Length

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number DLC Coated
1/8"	1/4"	1/2"	2-1/2"	C8-303-04	C8-303-04-**DLC**
3/16"	1/4"	5/8"	2-1/2"	C8-303-06	C8-303-06-**DLC**
1/4"	1/4"	3/4"	2-1/2"	C8-303-08	C8-303-08-**DLC**

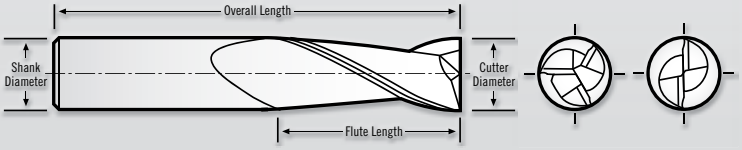
TS 2 & 3 Flute Tuffy Grade Carbide End Mills

Characteristics: Square End, 2 Flute, 3 Flute, 30° Helix

Applications: Slotting, Side Milling, Helical Interpolation, High Performance, Roughing, Semi-Finishing, Finishing, Dry, Wet, Cold Air, Spray Mist

Materials: Aluminum, Copper, Titanium, Magnesium, Cast Iron, Steel, Brass, Wood

Coatings: Titanium Nitride, Titanium Carbo-Nitride, Aluminum Titan. Nitride, Diamond-Like Carbon (DLC)

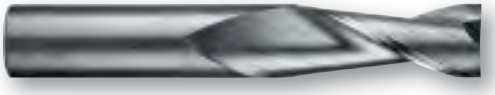


TS Tolerances

Cutting Dia. (1/16" to 1/4") = +.000/–.002"
(5/16" to 3/4") = +.000/–.003"
Shank Dia. = –.0001/–.0002"
Flute Length (1/16" to 5/16") = +.030/–.000"
(3/8" to 3/4") = +.060/–.000"
OAL = ±.060"

MTS Tolerances

Cutting Dia. = +.000/–.075mm
Shank Dia. = –.002/–.005mm
Flute Length = +0.500/+1.500mm
OAL = ±1.000mm



Slotting, Side Milling, Helical Interpolation

TS-201 2 Flute Tuffy Grade Stub Length

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated	Tool NumberCoated
1/16"	1/8"	1/8"	1-1/2"	TS-201-02	TS-201-02-**T**	TS-201-02-**C**	TS-201-02-**A**	TS-201-02-**DLC**
3/32"	1/8"	3/16"	1-1/2"	TS-201-03	TS-201-03-**T**	TS-201-03-**C**	TS-201-03-**A**	TS-201-03-**DLC**
1/8"	1/8"	1/4"	1-1/2"	TS-201-04	TS-201-04-**T**	TS-201-04-**C**	TS-201-04-**A**	TS-201-04-**DLC**
3/16"	3/16"	3/8"	2"	TS-201-06	TS-201-06-**T**	TS-201-06-**C**	TS-201-06-**A**	TS-201-06-**DLC**
1/4"	1/4"	1/2"	2"	TS-201-08	TS-201-08-**T**	TS-201-08-**C**	TS-201-08-**A**	TS-201-08-**DLC**
5/16"	5/16"	1/2"	2-1/2"	TS-201-10	TS-201-10-**T**	TS-201-10-**C**	TS-201-10-**A**	TS-201-10-**DLC**
3/8"	3/8"	5/8"	2-1/2"	TS-201-12	TS-201-12-**T**	TS-201-12-**C**	TS-201-12-**A**	TS-201-12-**DLC**
7/16"	7/16"	5/8"	2-3/4"	TS-201-14	TS-201-14-**T**	TS-201-14-**C**	TS-201-14-**A**	TS-201-14-**DLC**
1/2"	1/2"	5/8"	3"	TS-201-16	TS-201-16-**T**	TS-201-16-**C**	TS-201-16-**A**	TS-201-16-**DLC**
5/8"	5/8"	7/8"	3-1/2"	TS-201-20	TS-201-20-**T**	TS-201-20-**C**	TS-201-20-**A**	TS-201-20-**DLC**
3/4"	3/4"	1"	3-1/2"	TS-201-24	TS-201-24-**T**	TS-201-24-**C**	TS-201-24-**A**	TS-201-24-**DLC**

Slotting, Side Milling, Helical Interpolation

TS-301 3 Flute Tuffy Grade Stub Length

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated	Tool Number DLC Coated
1/16"	1/8"	1/8"	1-1/2"	TS-301-02	TS-301-02-**T**	TS-301-02-**C**	TS-301-02-**A**	TS-301-02-**DLC**
3/32"	1/8"	3/16"	1-1/2"	TS-301-03	TS-301-03-**T**	TS-301-03-**C**	TS-301-03-**A**	TS-301-03-**DLC**
1/8"	1/8"	1/4"	1-1/2"	TS-301-04	TS-301-04-**T**	TS-301-04-**C**	TS-301-04-**A**	TS-301-04-**DLC**
3/16"	3/16"	3/8"	2"	TS-301-06	TS-301-06-**T**	TS-301-06-**C**	TS-301-06-**A**	TS-301-06-**DLC**
1/4"	1/4"	1/2"	2"	TS-301-08	TS-301-08-**T**	TS-301-08-**C**	TS-301-08-**A**	TS-301-08-**DLC**
5/16"	5/16"	1/2"	2-1/2"	TS-301-10	TS-301-10-**T**	TS-301-10-**C**	TS-301-10-**A**	TS-301-10-**DLC**
3/8"	3/8"	5/8"	2-1/2"	TS-301-12	TS-301-12-**T**	TS-301-12-**C**	TS-301-12-**A**	TS-301-12-**DLC**
7/16"	7/16"	5/8"	2-3/4"	TS-301-14	TS-301-14-**T**	TS-301-14-**C**	TS-301-14-**A**	TS-301-14-**DLC**
1/2"	1/2"	5/8"	3"	TS-301-16	TS-301-16-**T**	TS-301-16-**C**	TS-301-16-**A**	TS-301-16-**DLC**

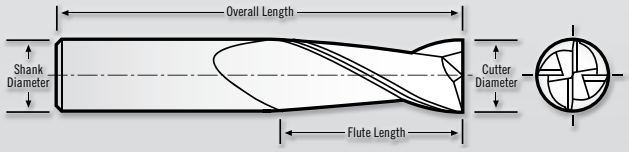
4 Flute Tuffy Grade Carbide End Mills TS/MTS

Characteristics Square End · 4 Flute · 30° Helix

Applications Side Milling · High Performance · Roughing · Semi-Finishing · Finishing · Dry · Wet · Cold Air · Spray Mist

Materials Aluminum · Copper · Titanium · Magnesium · Cast Iron · Steel · Brass

Coatings Titanium Nitride · Titanium Carbo-Nitride · Aluminum Titan. Nitride · Diamond-Like Carbon (DLC)



TS Tolerances
Cutting Dia. (1/16" to 1/4") = +.000/–.002"
(5/16" to 3/4") = +.000/–.003"
Shank Dia. = –.0001/–.0002"
Flute Length (1/16" to 5/16") = +.030/–.000"
(3/8" to 3/4") = +.060/–.000"
OAL = ±.060"

MTS Tolerances
Cutting Dia. = +.000/–.075mm
Shank Dia. = –.002/–.005mm
Flute Length = +0.500/+1.500mm
OAL = ±1.000mm

Side Milling

TS-401 4 Flute Tuffy Grade Stub Length

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated	Tool Number DLC Coated
1/16"	1/8"	1/8"	1-1/2"	TS-401-02	TS-401-02-**T**	TS-401-02-**C**	TS-401-02-**A**	TS-401-02-**DLC**
3/32"	1/8"	3/16"	1-1/2"	TS-401-03	TS-401-03-**T**	TS-401-03-**C**	TS-401-03-**A**	TS-401-03-**DLC**
1/8"	1/8"	1/4"	1-1/2"	TS-401-04	TS-401-04-**T**	TS-401-04-**C**	TS-401-04-**A**	TS-401-04-**DLC**
3/16"	3/16"	3/8"	2"	TS-401-06	TS-401-06-**T**	TS-401-06-**C**	TS-401-06-**A**	TS-401-06-**DLC**
1/4"	1/4"	1/2"	2"	TS-401-08	TS-401-08-**T**	TS-401-08-**C**	TS-401-08-**A**	TS-401-08-**DLC**
5/16"	5/16"	1/2"	2-1/2"	TS-401-10	TS-401-10-**T**	TS-401-10-**C**	TS-401-10-**A**	TS-401-10-**DLC**
3/8"	3/8"	5/8"	2-1/2"	TS-401-12	TS-401-12-**T**	TS-401-12-**C**	TS-401-12-**A**	TS-401-12-**DLC**
7/16"	7/16"	5/8"	2-3/4"	TS-401-14	TS-401-14-**T**	TS-401-14-**C**	TS-401-14-**A**	TS-401-14-**DLC**
1/2"	1/2"	5/8"	3"	TS-401-16	TS-401-16-**T**	TS-401-16-**C**	TS-401-16-**A**	TS-401-16-**DLC**
5/8"	5/8"	7/8"	3-1/2"	TS-401-20	TS-401-20-**T**	TS-401-20-**C**	TS-401-20-**A**	TS-401-20-**DLC**
3/4"	3/4"	1"	3-1/2"	TS-401-24	TS-401-24-**T**	TS-401-24-**C**	TS-401-24-**A**	TS-401-24-**DLC**

MTS-401 Metric 4 Flute Tuffy Grade Stub Length METRIC

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated	Tool Number DLC Coated
2mm	3mm	5mm	38mm	MTS-401-02	MTS-401-02-**T**	MTS-401-02-**C**	MTS-401-02-**A**	MTS-401-02-**DLC**
3mm	3mm	6mm	38mm	MTS-401-03	MTS-401-03-**T**	MTS-401-03-**C**	MTS-401-03-**A**	MTS-401-03-**DLC**
4mm	4mm	8mm	50mm	MTS-401-04	MTS-401-04-**T**	MTS-401-04-**C**	MTS-401-04-**A**	MTS-401-04-**DLC**
5mm	5mm	8mm	50mm	MTS-401-05	MTS-401-05-**T**	MTS-401-05-**C**	MTS-401-05-**A**	MTS-401-05-**DLC**
6mm	6mm	8mm	50mm	MTS-401-06	MTS-401-06-**T**	MTS-401-06-**C**	MTS-401-06-**A**	MTS-401-06-**DLC**
8mm	8mm	12mm	58mm	MTS-401-08	MTS-401-08-**T**	MTS-401-08-**C**	MTS-401-08-**A**	MTS-401-08-**DLC**
10mm	10mm	14mm	66mm	MTS-401-10	MTS-401-10-**T**	MTS-401-10-**C**	MTS-401-10-**A**	MTS-401-10-**DLC**
12mm	12mm	16mm	73mm	MTS-401-12	MTS-401-12-**T**	MTS-401-12-**C**	MTS-401-12-**A**	MTS-401-12-**DLC**
16mm	16mm	20mm	82mm	MTS-401-16	MTS-401-16-**T**	MTS-401-16-**C**	MTS-401-16-**A**	MTS-401-16-**DLC**
20mm	20mm	25mm	92mm	MTS-401-20	MTS-401-20-**T**	MTS-401-20-**C**	MTS-401-20-**A**	MTS-401-20-**DLC**

TR 3 Flute Tuffy Grade Carbide End Mills

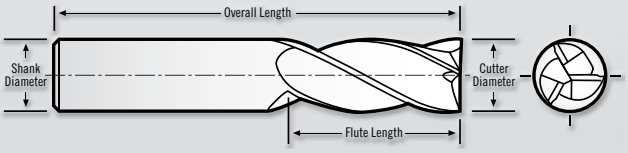
Characteristics: Square End, 3 Flute, 30° Helix, Flats

Applications: Slotting, Side Milling, High Performance, Roughing, Semi-Finishing, Finishing, Dry, Wet, Cold Air, Spray Mist

Materials: Aluminum, Copper, Titanium, Magnesium, Cast Iron, Steel, Brass, Wood

Coatings: Titanium Nitride, Titanium Carbo-Nitride, Aluminum Titan. Nitride, Diamond-Like Carbon (DLC)

TR Series Comes in + Tolerances



TR-303 Tolerances

Cutting Dia. = +.001/–.000"
Shank Dia. = –.0001/–.0002"
Flute Length (1/8" to 5/16") = +.030/–.000"
(3/8" to 3/4") = +.060/–.000"
OAL = ±.060"

NEW 3 Flute

TR-303 3 Flute Tuffy Grade Standard Length

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated	Tool Number DLC Coated
1/8"	1/8"	1/2"	1-1/2"	TR-303-04*	TR-303-04-**T***	TR-303-04-**C***	TR-303-04-**A***	TR-303-04-**DLC***
5/32"	3/16"	9/16"	2"	TR-303-05*	TR-303-05-**T***	TR-303-05-**C***	TR-303-05-**A***	TR-303-05-**DLC***
3/16"	3/16"	5/8"	2"	TR-303-06*	TR-303-06-**T***	TR-303-06-**C***	TR-303-06-**A***	TR-303-06-**DLC***
7/32"	1/4"	5/8"	2-1/2"	TR-303-07*	TR-303-07-**T***	TR-303-07-**C***	TR-303-07-**A***	TR-303-07-**DLC***
1/4"	1/4"	3/4"	2-1/2"	TR-303-08*	TR-303-08-**T***	TR-303-08-**C***	TR-303-08-**A***	TR-303-08-**DLC***
9/32"	5/16"	3/4"	2-1/2"	TR-303-09*	TR-303-09-**T***	TR-303-09-**C***	TR-303-09-**A***	TR-303-09-**DLC***
5/16"	5/16"	13/16"	2-1/2"	TR-303-10*	TR-303-10-**T***	TR-303-10-**C***	TR-303-10-**A***	TR-303-10-**DLC***
3/8"	3/8"	7/8"	2-1/2"	TR-303-12	TR-303-12-**T**	TR-303-12-**C**	TR-303-12-**A**	TR-303-12-**DLC**
7/16"	7/16"	1"	2-3/4"	TR-303-14*	TR-303-14-**T***	TR-303-14-**C***	TR-303-14-**A***	TR-303-14-**DLC***
1/2"	1/2"	1"	3"	TR-303-16	TR-303-16-**T**	TR-303-16-**C**	TR-303-16-**A**	TR-303-16-**DLC**
9/16"	9/16"	1-1/4"	3-1/2"	TR-303-18*	TR-303-18-**T***	TR-303-18-**C***	TR-303-18-**A***	TR-303-18-**DLC***
5/8"	5/8"	1-1/4"	3-1/2"	TR-303-20	TR-303-20-**T**	TR-303-20-**C**	TR-303-20-**A**	TR-303-20-**DLC**
3/4"	3/4"	1-1/2"	4"	TR-303-24	TR-303-24-**T**	TR-303-24-**C**	TR-303-24-**A**	TR-303-24-**DLC**

**Does not come with flats.*

Need WITHOUT Flats?

Order any tool without flats by adding "NF" to the end of the tool number.

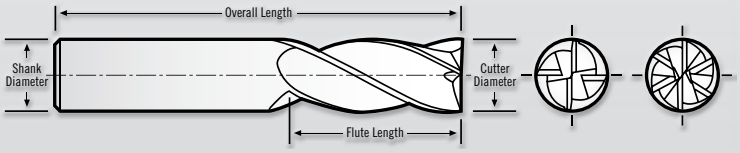
4/6 Flute Tuffy Grade Carbide End Mills TR

Characteristics: Square End, 4 Flute, 6 Flute, 30° Helix, Flats

Applications: Side Milling, High Performance, Semi-Finishing, Finishing, Dry, Wet, Cold Air, Spray Mist

Materials: Aluminum, Copper, Titanium, Magnesium, Cast Iron, Steel, Brass

Coatings: Titanium Nitride, Titanium Carbo-Nitride, Aluminum Titan. Nitride, Diamond-Like Carbon (DLC)



TR-404 Tolerances

Cutting Dia. = +.001/–.000"
Shank Dia. = –.0001/–.0002"
Flute Length (1/8" to 5/16") = +.030/–.000"
(3/8" to 3/4") = +.060/–.000"
OAL = ±.060"

TR-606 Tolerances

Cutting Dia. = +.001/–.000"
Shank Dia. = –.0001/–.0002"
Flute Length = +.060/–.000"
OAL = ±.060"

Side Milling

TR-404 4 Flute Tuffy Grade Standard Length

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated	Tool Number DLC Coated
1/8"	1/8"	1/2"	1-1/2"	TR-404-04*	TR-404-04-**T***	TR-404-04-**C***	TR-404-04-**A***	TR-404-04-**DLC***
5/32"	3/16"	9/16"	2"	TR-404-05*	TR-404-05-**T***	TR-404-05-**C***	TR-404-05-**A***	TR-404-05-**DLC***
3/16"	3/16"	5/8"	2"	TR-404-06*	TR-404-06-**T***	TR-404-06-**C***	TR-404-06-**A***	TR-404-06-**DLC***
7/32"	1/4"	5/8"	2-1/2"	TR-404-07*	TR-404-07-**T***	TR-404-07-**C***	TR-404-07-**A***	TR-404-07-**DLC***
1/4"	1/4"	3/4"	2-1/2"	TR-404-08*	TR-404-08-**T***	TR-404-08-**C***	TR-404-08-**A***	TR-404-08-**DLC***
9/32"	5/16"	3/4"	2-1/2"	TR-404-09*	TR-404-09-**T***	TR-404-09-**C***	TR-404-09-**A***	TR-404-09-**DLC***
5/16"	5/16"	13/16"	2-1/2"	TR-404-10*	TR-404-10-**T***	TR-404-10-**C***	TR-404-10-**A***	TR-404-10-**DLC***
3/8"	3/8"	7/8"	2-1/2"	TR-404-12	TR-404-12-**T**	TR-404-12-**C**	TR-404-12-**A**	TR-404-12-**DLC**
7/16"	7/16"	1"	2-3/4"	TR-404-14*	TR-404-14-**T***	TR-404-14-**C***	TR-404-14-**A***	TR-404-14-**DLC***
1/2"	1/2"	1"	3"	TR-404-16	TR-404-16-**T**	TR-404-16-**C**	TR-404-16-**A**	TR-404-16-**DLC**
9/16"	9/16"	1-1/4"	3-1/2"	TR-404-18*	TR-404-18-**T***	TR-404-18-**C***	TR-404-18-**A***	TR-404-18-**DLC***
5/8"	5/8"	1-1/4"	3-1/2"	TR-404-20	TR-404-20-**T**	TR-404-20-**C**	TR-404-20-**A**	TR-404-20-**DLC**
3/4"	3/4"	1-1/2"	4"	TR-404-24	TR-404-24-**T**	TR-404-24-**C**	TR-404-24-**A**	TR-404-24-**DLC**

**Does not come with flats.*

Side Milling

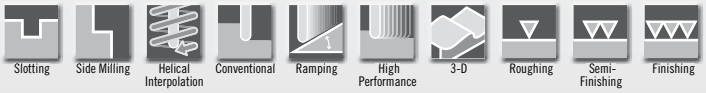
TR-606 6 Flute Tuffy Grade Standard Length

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated	Tool Number DLC Coated
1"	1"	2-1/2"	5"	TR-606-32	TR-606-32-**T**	TR-606-32-**C**	TR-606-32-**A**	TR-606-32-**DLC**

SB/MSB 2 Flute Tuffy Grade Carbide Ball End Mills

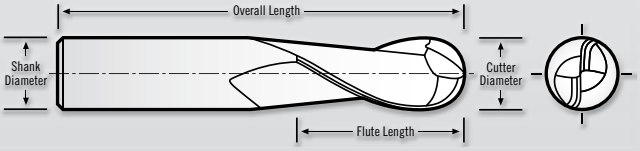
Characteristics

Applications



Materials

Coatings



SB Series Tolerances

Cutting Dia. (1/16" to 1/4") = +.000/–.002"
(9/32" to 3/4") = +.000/–.003"
Shank Dia. = –.0001/–.0002"
Flute Length (1/16" to 5/16") = +.030/–.000"
(3/8" to 3/4") = +.060/–.000"
OAL = ±.060"

MSB Tolerances

Cutting Dia. = +.000/–.075mm
Shank Dia. = –.002/–.005mm
Flute Length = +0.500/+1.500mm
OAL = ±1.000mm

NEW Coatings Available!

SB-201 2 Flute Tuffy Ball End Stub Length

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated	Tool Number DLC Coated
1/16"	1/8"	1/8"	1-1/2"	SB-201-02	SB-201-02-**T**	SB-201-02-**C**	SB-201-02-**A**	SB-201-02-**DLC**
3/32"	1/8"	3/16"	1-1/2"	SB-201-03	SB-201-03-**T**	SB-201-03-**C**	SB-201-03-**A**	SB-201-03-**DLC**
1/8"	1/8"	1/4"	1-1/2"	SB-201-04	SB-201-04-**T**	SB-201-04-**C**	SB-201-04-**A**	SB-201-04-**DLC**
5/32"	3/16"	1/4"	2"	SB-201-05	SB-201-05-**T**	SB-201-05-**C**	SB-201-05-**A**	SB-201-05-**DLC**
3/16"	3/16"	5/16"	2"	SB-201-06	SB-201-06-**T**	SB-201-06-**C**	SB-201-06-**A**	SB-201-06-**DLC**
7/32"	1/4"	5/16"	2-1/2"	SB-201-07	SB-201-07-**T**	SB-201-07-**C**	SB-201-07-**A**	SB-201-07-**DLC**
1/4"	1/4"	5/16"	2-1/2"	SB-201-08	SB-201-08-**T**	SB-201-08-**C**	SB-201-08-**A**	SB-201-08-**DLC**
9/32"	5/16"	7/16"	2-1/2"	SB-201-09	SB-201-09-**T**	SB-201-09-**C**	SB-201-09-**A**	SB-201-09-**DLC**
5/16"	5/16"	7/16"	2 -1/2"	SB-201-10	SB-201-10-**T**	SB-201-10-**C**	SB-201-10-**A**	SB-201-10-**DLC**
3/8"	3/8"	1/2"	2-1/2"	SB-201-12	SB-201-12-**T**	SB-201-12-**C**	SB-201-12-**A**	SB-201-12-**DLC**
7/16"	7/16"	5/8"	2-3/4"	SB-201-14	SB-201-14-**T**	SB-201-14-**C**	SB-201-14-**A**	SB-201-14-**DLC**
1/2"	1/2"	5/8"	3"	SB-201-16	SB-201-16-**T**	SB-201-16-**C**	SB-201-16-**A**	SB-201-16-**DLC**
5/8"	5/8"	7/8"	3-1/2"	SB-201-20	SB-201-20-**T**	SB-201-20-**C**	SB-201-20-**A**	SB-201-20-**DLC**
3/4"	3/4"	1"	4"	SB-201-24	SB-201-24-**T**	SB-201-24-**C**	SB-201-24-**A**	SB-201-24-**DLC**

MSB-201 Metric 2 Flute Tuffy Ball End Mill Stub METRIC

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated	Tool Number DLC Coated
2mm	3mm	5mm	38mm	MSB-201-02	MSB-201-02-**T**	MSB-201-02-**C**	MSB-201-02-**A**	MSB-201-02-**DLC**
3mm	3mm	6mm	38mm	MSB-201-03	MSB-201-03-**T**	MSB-201-03-**C**	MSB-201-03-**A**	MSB-201-03-**DLC**
4mm	4mm	8mm	50mm	MSB-201-04	MSB-201-04-**T**	MSB-201-04-**C**	MSB-201-04-**A**	MSB-201-04-**DLC**
5mm	5mm	8mm	50mm	MSB-201-05	MSB-201-05-**T**	MSB-201-05-**C**	MSB-201-05-**A**	MSB-201-05-**DLC**
6mm	6mm	8mm	50mm	MSB-201-06	MSB-201-06-**T**	MSB-201-06-**C**	MSB-201-06-**A**	MSB-201-06-**DLC**
8mm	8mm	12mm	58mm	MSB-201-08	MSB-201-08-**T**	MSB-201-08-**C**	MSB-201-08-**A**	MSB-201-08-**DLC**
10mm	10mm	14mm	66mm	MSB-201-10	MSB-201-10-**T**	MSB-201-10-**C**	MSB-201-10-**A**	MSB-201-10-**DLC**
12mm	12mm	16mm	73mm	MSB-201-12	MSB-201-12-**T**	MSB-201-12-**C**	MSB-201-12-**A**	MSB-201-12-**DLC**
16mm	16mm	20mm	82mm	MSB-201-16	MSB-201-16-**T**	MSB-201-16-**C**	MSB-201-16-**A**	MSB-201-16-**DLC**
20mm	20mm	25mm	92mm	MSB-201-20	MSB-201-20-**T**	MSB-201-20-**C**	MSB-201-20-**A**	MSB-201-20-**DLC**

2 Flute Tuffy Grade Carbide Ball End Mills B/MB

B-203 2 Flute Tuffy Ball End Standard Length

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated	Tool Number DLC Coated
1/16"	1/8"	3/16"	1-1/2"	B-203-02	B-203-02-**T**	B-203-02-**C**	B-203-02-**A**	B-203-02-**DLC**
3/32"	1/8"	3/8"	1-1/2"	B-203-03	B-203-03-**T**	B-203-03-**C**	B-203-03-**A**	B-203-03-**DLC**
1/8"	1/8"	1/2"	1-1/2"	B-203-04	B-203-04-**T**	B-203-04-**C**	B-203-04-**A**	B-203-04-**DLC**
5/32"	3/16"	9/16"	2"	B-203-05	B-203-05-**T**	B-203-05-**C**	B-203-05-**A**	B-203-05-**DLC**
3/16"	3/16"	5/8"	2"	B-203-06	B-203-06-**T**	B-203-06-**C**	B-203-06-**A**	B-203-06-**DLC**
7/32"	1/4"	5/8"	2-1/2"	B-203-07	B-203-07-**T**	B-203-07-**C**	B-203-07-**A**	B-203-07-**DLC**
1/4"	1/4"	3/4"	2-1/2"	B-203-08	B-203-08-**T**	B-203-08-**C**	B-203-08-**A**	B-203-08-**DLC**
9/32"	5/16"	3/4"	2-1/2"	B-203-09	B-203-09-**T**	B-203-09-**C**	B-203-09-**A**	B-203-09-**DLC**
5/16"	5/16"	13/16"	2-1/2"	B-203-10	B-203-10-**T**	B-203-10-**C**	B-203-10-**A**	B-203-10-**DLC**
3/8"	3/8"	7/8"	2-1/2"	B-203-12	B-203-12-**T**	B-203-12-**C**	B-203-12-**A**	B-203-12-**DLC**
7/16"	7/16"	1"	2-3/4"	B-203-14	B-203-14-**T**	B-203-14-**C**	B-203-14-**A**	B-203-14-**DLC**
1/2"	1/2"	1"	3"	B-203-16	B-203-16-**T**	B-203-16-**C**	B-203-16-**A**	B-203-16-**DLC**
5/8"	5/8"	1-1/4"	3-1/2"	B-203-20	B-203-20-**T**	B-203-20-**C**	B-203-20-**A**	B-203-20-**DLC**
3/4"	3/4"	1-1/2"	4"	B-203-24	B-203-24-**T**	B-203-24-**C**	B-203-24-**A**	B-203-24-**DLC**

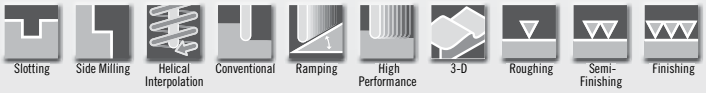
MB-203 Metric 2 Flute Tuffy Ball End Standard Length METRIC

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated	Tool Number DLC Coated
2mm	3mm	8mm	38mm	MB-203-02	MB-203-02-**T**	MB-203-02-**C**	MB-203-02-**A**	MB-203-02-**DLC**
3mm	3mm	12mm	38mm	MB-203-03	MB-203-03-**T**	MB-203-03-**C**	MB-203-03-**A**	MB-203-03-**DLC**
4mm	4mm	12mm	50mm	MB-203-04	MB-203-04-**T**	MB-203-04-**C**	MB-203-04-**A**	MB-203-04-**DLC**
5mm	5mm	14mm	50mm	MB-203-05	MB-203-05-**T**	MB-203-05-**C**	MB-203-05-**A**	MB-203-05-**DLC**
6mm	6mm	14mm	57mm	MB-203-06	MB-203-06-**T**	MB-203-06-**C**	MB-203-06-**A**	MB-203-06-**DLC**
8mm	8mm	16mm	63mm	MB-203-08	MB-203-08-**T**	MB-203-08-**C**	MB-203-08-**A**	MB-203-08-**DLC**
10mm	10mm	20mm	72mm	MB-203-10	MB-203-10-**T**	MB-203-10-**C**	MB-203-10-**A**	MB-203-10-**DLC**
12mm	12mm	25mm	83mm	MB-203-12	MB-203-12-**T**	MB-203-12-**C**	MB-203-12-**A**	MB-203-12-**DLC**
16mm	16mm	32mm	92mm	MB-203-16	MB-203-16-**T**	MB-203-16-**C**	MB-203-16-**A**	MB-203-16-**DLC**
20mm	20mm	38mm	104mm	MB-203-20	MB-203-20-**T**	MB-203-20-**C**	MB-203-20-**A**	MB-203-20-**DLC**

SB/MSB 3 Flute Tuffy Grade Carbide Ball End Mills

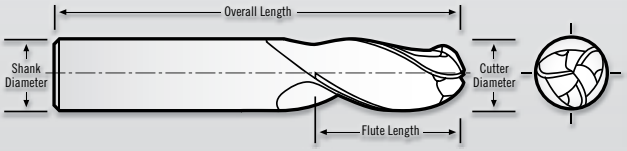
Characteristics

Applications



Materials

Coatings



SB/B Series Tolerances

Cutting Dia. (1/16" to 1/4") = +.000/–.002"
(9/32" to 3/4") = +.000/–.003"
Shank Dia. = –.0001/–.0002"
Flute Length (1/16" to 5/16") = +.030/–.000"
(3/8" to1") = +.060/–.000"
OAL = ±.060"

MB Tolerances

Cutting Dia. = +.000/–.075mm
Shank Dia. = –.002/–.005mm
Flute Length = +0.500/+1.500mm
OAL = ±1.000mm

SB-301 3 Flute Tuffy Ball End Stub Length

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated	Tool Number DLC Coated
1/16"	1/8"	1/8"	1-1/2"	SB-301-02	SB-301-02-**T**	SB-301-02-**C**	SB-301-02-**A**	SB-301-02-**DLC**
3/32"	1/8"	3/16"	1-1/2"	SB-301-03	SB-301-03-**T**	SB-301-03-**C**	SB-301-03-**A**	SB-301-03-**DLC**
1/8"	1/8"	1/4"	1-1/2"	SB-301-04	SB-301-04-**T**	SB-301-04-**C**	SB-301-04-**A**	SB-301-04-**DLC**
5/32"	3/16"	1/4"	2"	SB-301-05	SB-301-05-**T**	SB-301-05-**C**	SB-301-05-**A**	SB-301-05-**DLC**
3/16"	3/16"	5/16"	2"	SB-301-06	SB-301-06-**T**	SB-301-06-**C**	SB-301-06-**A**	SB-301-06-**DLC**
7/32"	1/4"	5/16"	2-1/2"	SB-301-07	SB-301-07-**T**	SB-301-07-**C**	SB-301-07-**A**	SB-301-07-**DLC**
1/4"	1/4"	5/16"	2-1/2"	SB-301-08	SB-301-08-**T**	SB-301-08-**C**	SB-301-08-**A**	SB-301-08-**DLC**
9/32"	5/16"	7/16"	2-1/2"	SB-301-09	SB-301-09-**T**	SB-301-09-**C**	SB-301-09-**A**	SB-301-09-**DLC**
5/16"	5/16"	7/16"	2-1/2"	SB-301-10	SB-301-10-**T**	SB-301-10-**C**	SB-301-10-**A**	SB-301-10-**DLC**
3/8"	3/8"	1/2"	2-1/2"	SB-301-12	SB-301-12-**T**	SB-301-12-**C**	SB-301-12-**A**	SB-301-12-**DLC**
7/16"	7/16"	5/8"	2-3/4"	SB-301-14	SB-301-14-**T**	SB-301-14-**C**	SB-301-14-**A**	SB-301-14-**DLC**
1/2"	1/2"	5/8"	3"	SB-301-16	SB-301-16-**T**	SB-301-16-**C**	SB-301-16-**A**	SB-301-16-**DLC**
5/8"	5/8"	7/8"	3-1/2"	SB-301-20	SB-301-20-**T**	SB-301-20-**C**	SB-301-20-**A**	SB-301-20-**DLC**
3/4"	3/4"	1"	4"	SB-301-24	SB-301-24-**T**	SB-301-24-**C**	SB-301-24-**A**	SB-301-24-**DLC**

MSB-301 Metric 3 Flute Tuffy Ball End Stub Length METRIC

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated	Tool Number DLC Coated
1.5mm	3mm	3mm	38mm	MSB-301-1.5	MSB-301-1.5-**T**	MSB-301-1.5-**C**	MSB-301-1.5-**A**	MSB-301-1.5-**DLC**
2mm	3mm	5mm	38mm	MSB-301-02	MSB-301-02-**T**	MSB-301-02-**C**	MSB-301-02-**A**	MSB-301-02-**DLC**
3mm	3mm	6mm	38mm	MSB-301-03	MSB-301-03-**T**	MSB-301-03-**C**	MSB-301-03-**A**	MSB-301-03-**DLC**
4mm	4mm	8mm	50mm	MSB-301-04	MSB-301-04-**T**	MSB-301-04-**C**	MSB-301-04-**A**	MSB-301-04-**DLC**
5mm	5mm	8mm	50mm	MSB-301-05	MSB-301-05-**T**	MSB-301-05-**C**	MSB-301-05-**A**	MSB-301-05-**DLC**
6mm	6mm	8mm	50mm	MSB-301-06	MSB-301-06-**T**	MSB-301-06-**C**	MSB-301-06-**A**	MSB-301-06-**DLC**
8mm	8mm	12mm	58mm	MSB-301-08	MSB-301-08-**T**	MSB-301-08-**C**	MSB-301-08-**A**	MSB-301-08-**DLC**
10mm	10mm	14mm	66mm	MSB-301-10	MSB-301-10-**T**	MSB-301-10-**C**	MSB-301-10-**A**	MSB-301-10-**DLC**
12mm	12mm	16mm	73mm	MSB-301-12	MSB-301-12-**T**	MSB-301-12-**C**	MSB-301-12-**A**	MSB-301-12-**DLC**
16mm	16mm	20mm	82mm	MSB-301-16	MSB-301-16-**T**	MSB-301-16-**C**	MSB-301-16-**A**	MSB-301-16-**DLC**
20mm	20mm	25mm	92mm	MSB-301-20	MSB-301-20-**T**	MSB-301-20-**C**	MSB-301-20-**A**	MSB-301-20-**DLC**

3 Flute Tuffy Grade Carbide Ball End Mills B/MB

B-333 3 Flute Tuffy Ball End Standard Length

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated	Tool Number DLC Coated
1/16"	1/8"	3/16"	1-1/2"	B-333-02	B-333-02-**T**	B-333-02-**C**	B-333-02-**A**	B-333-02-**DLC**
3/32"	1/8"	3/8"	1-1/2"	B-333-03	B-333-03-**T**	B-333-03-**C**	B-333-03-**A**	B-333-03-**DLC**
1/8"	1/8"	1/2"	1-1/2"	B-333-04	B-333-04-**T**	B-333-04-**C**	B-333-04-**A**	B-333-04-**DLC**
5/32"	3/16"	9/16"	2"	B-333-05	B-333-05-**T**	B-333-05-**C**	B-333-05-**A**	B-333-05-**DLC**
3/16"	3/16"	5/8"	2"	B-333-06	B-333-06-**T**	B-333-06-**C**	B-333-06-**A**	B-333-06-**DLC**
7/32"	1/4"	5/8"	2-1/2"	B-333-07	B-333-07-**T**	B-333-07-**C**	B-333-07-**A**	B-333-07-**DLC**
1/4"	1/4"	3/4"	2-1/2"	B-333-08	B-333-08-**T**	B-333-08-**C**	B-333-08-**A**	B-333-08-**DLC**
9/32"	5/16"	3/4"	2-1/2"	B-333-09	B-333-09-**T**	B-333-09-**C**	B-333-09-**A**	B-333-09-**DLC**
5/16"	5/16"	13/16"	2-1/2"	B-333-10	B-333-10-**T**	B-333-10-**C**	B-333-10-**A**	B-333-10-**DLC**
3/8"	3/8"	7/8"	2-1/2"	B-333-12	B-333-12-**T**	B-333-12-**C**	B-333-12-**A**	B-333-12-**DLC**
7/16"	7/16"	1"	2-3/4"	B-333-14	B-333-14-**T**	B-333-14-**C**	B-333-14-**A**	B-333-14-**DLC**
1/2"	1/2"	1"	3"	B-333-16	B-333-16-**T**	B-333-16-**C**	B-333-16-**A**	B-333-16-**DLC**
5/8"	5/8"	1-1/4"	3-1/2"	B-333-20	B-333-20-**T**	B-333-20-**C**	B-333-20-**A**	B-333-20-**DLC**
3/4"	3/4"	1-1/2"	4"	B-333-24	B-333-24-**T**	B-333-24-**C**	B-333-24-**A**	B-333-24-**DLC**
1"	1"	2"	5"	B-333-32	B-333-32-**T**	B-333-32-**C**	B-333-32-**A**	B-333-32-**DLC**
1"	1"	2-1/2"	5"	BL-333-32	BL-333-32-**T**	BL-333-32-**C**	BL-333-32-**A**	BL-333-32-**DLC**
1"	1"	4"	6-1/2"	BX-333-32	BX-333-32-**T**	BX-333-32-**C**	BX-333-32-**A**	BX-333-32-**DLC**

MB-333 Metric 3 Flute Tuffy Ball End Standard Length METRIC

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated	Tool Number DLC Coated
1.5mm	3mm	6mm	38mm	MB-333-1.5	MB-333-1.5-**T**	MB-333-1.5-**C**	MB-333-1.5-**A**	MB-333-1.5-**DLC**
2mm	3mm	8mm	38mm	MB-333-02	MB-333-02-**T**	MB-333-02-**C**	MB-333-02-**A**	MB-333-02-**DLC**
3mm	3mm	12mm	38mm	MB-333-03	MB-333-03-**T**	MB-333-03-**C**	MB-333-03-**A**	MB-333-03-**DLC**
4mm	4mm	12mm	50mm	MB-333-04	MB-333-04-**T**	MB-333-04-**C**	MB-333-04-**A**	MB-333-04-**DLC**
5mm	5mm	14mm	50mm	MB-333-05	MB-333-05-**T**	MB-333-05-**C**	MB-333-05-**A**	MB-333-05-**DLC**
6mm	6mm	14mm	57mm	MB-333-06	MB-333-06-**T**	MB-333-06-**C**	MB-333-06-**A**	MB-333-06-**DLC**
8mm	8mm	16mm	63mm	MB-333-08	MB-333-08-**T**	MB-333-08-**C**	MB-333-08-**A**	MB-333-08-**DLC**
10mm	10mm	20mm	72mm	MB-333-10	MB-333-10-**T**	MB-333-10-**C**	MB-333-10-**A**	MB-333-10-**DLC**
12mm	12mm	25mm	83mm	MB-333-12	MB-333-12-**T**	MB-333-12-**C**	MB-333-12-**A**	MB-333-12-**DLC**
16mm	16mm	32mm	92mm	MB-333-16	MB-333-16-**T**	MB-333-16-**C**	MB-333-16-**A**	MB-333-16-**DLC**
20mm	20mm	38mm	104mm	MB-333-20	MB-333-20-**T**	MB-333-20-**C**	MB-333-20-**A**	MB-333-20-**DLC**

NR C-2 Grade Carbide End Mills

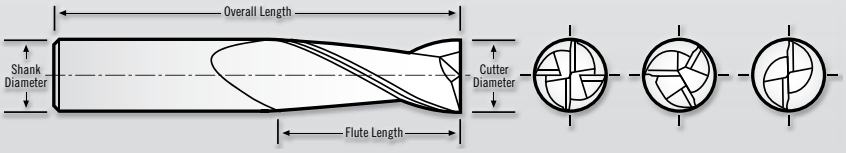
Characteristics Square End, 2 Flute, 3 Flute, 4 Flute, 30° Helix, Flats

Applications Side Milling, High Performance, Roughing, Semi-Finishing, Finishing, Dry, Wet, Cold Air, Spray Mist

Materials Aluminum, Copper, Magnesium, Plastics, Composites, Brass, Wood

Coatings Diamond-Like Carbon (DLC)

+ Tolerances 64th Sizes



NR Series Tolerances
Cutting Dia. = +.001/–.000"
Shank Dia. = –.0001/–.0002"
Flute Length (1/16" to 5/16") = +.030/–.000"
(21/64" to1") = +.060/–.000"
OAL = ±.060"

MNR Tolerances
Cutting Dia. = +.025/–.000mm
Shank Dia. = –.002/–.005mm
Flute Length = +0.500/+1.500mm
OAL = ±1.000mm

Slotting, Side Milling, Helical Interpolation

Flats!

+ Tolerances

NR-204 2 Flute C-2 Grade Standard Length

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Flats, Uncoated	Tool Number No Flats, Uncoated	Tool Number Flats, DLC Coated	Tool Number No Flats, DLC Coated
1/16"	1/8"	3/16"	1-1/2"	–	NR-204-02	–	NR-204-02-**DLC**
5/64"	1/8"	1/4"	1-1/2"	–	NR-204-02.5	–	NR-204-02.5-**DLC**
3/32"	1/8"	3/8"	1-1/2"	–	NR-204-03	–	NR-204-03-**DLC**
7/64"	1/8"	7/16"	1-1/2"	Flats!	NR-204-03.5	–	NR-204-03.5-**DLC**
1/8"	1/8"	1/2"	1-1/2"		NR-204-04	–	NR-204-04-**DLC**
9/64"	3/16"	1/2"	2"		NR-204-04.5	–	NR-204-04.5-**DLC**
5/32"	3/16"	9/16"	2"	–	NR-204-05	–	NR-204-05-**DLC**
11/64"	3/16"	5/8"	2"	–	NR-204-05.5	–	NR-204-05.5-**DLC**
3/16"	3/16"	5/8"	2"	–	NR-204-06	–	NR-204-06-**DLC**
13/64"	1/4"	5/8"	2-1/2"	–	NR-204-06.5	–	NR-204-06.5-**DLC**
7/32"	1/4"	5/8"	2-1/2"	–	NR-204-07	–	NR-204-07-**DLC**
15/64"	1/4"	5/8"	2-1/2"	–	NR-204-07.5	–	NR-204-07.5-**DLC**
1/4"	1/4"	3/4"	2-1/2"	–	NR-204-08	–	NR-204-08-**DLC**
17/64"	5/16"	3/4"	2-1/2"	–	NR-204-08.5	–	NR-204-08.5-**DLC**
9/32"	5/16"	3/4"	2-1/2"	–	NR-204-09	–	NR-204-09-**DLC**
19/64"	5/16"	3/4"	2-1/2"	–	NR-204-09.5	–	NR-204-09.5-**DLC**
5/16"	5/16"	13/16"	2-1/2"	–	NR-204-10	–	NR-204-10-**DLC**
21/64"	3/8"	13/16"	2-1/2"	NR-204-10.5	NR-204-10.5-**NF**	NR-204-10.5-**DLC**	NR-204-10.5-**NF-DLC**
11/32"	3/8"	13/16"	2-1/2"	NR-204-11	NR-204-11-**NF**	NR-204-11-**DLC**	NR-204-11-**NF-DLC**
23/64"	3/8"	7/8"	2-1/2"	NR-204-11.5	NR-204-11.5-**NF**	NR-204-11.5-**DLC**	NR-204-11.5-**NF-DLC**
3/8"	3/8"	7/8"	2-1/2"	NR-204-12	NR-204-12-**NF**	NR-204-12-**DLC**	NR-204-12-**NF-DLC**
25/64"	7/16"	1"	2-3/4"	–	NR-204-12.5	–	NR-204-12.5-**DLC**
13/32"	7/16"	1"	2-3/4"	–	NR-204-13	–	NR-204-13-**DLC**
27/64"	7/16"	1"	2-3/4"	–	NR-204-13.5	–	NR-204-13.5-**DLC**
7/16"	7/16"	1"	2-3/4"	–	NR-204-14	–	NR-204-14-**DLC**
29/64"	1/2"	1"	3"	NR-204-14.5	NR-204-14.5-**NF**	NR-204-14.5-**DLC**	NR-204-14.5-**NF-DLC**
15/32"	1/2"	1"	3"	NR-204-15	NR-204-15-**NF**	NR-204-15-**DLC**	NR-204-15-**NF-DLC**
31/64"	1/2"	1"	3"	NR-204-15.5	NR-204-15.5-**NF**	NR-204-15.5-**DLC**	NR-204-15.5-**NF-DLC**
1/2"	1/2"	1"	3"	NR-204-16	NR-204-16-**NF**	NR-204-16-**DLC**	NR-204-16-**NF-DLC**
33/64"	1/2"	1"	3"	NR-204-16.5	NR-204-16.5-**NF**	NR-204-16.5-**DLC**	NR-204-16.5-**NF-DLC**
9/16"	9/16"	1-1/4"	3-1/2"	–	NR-204-18	–	NR-204-18-**DLC**
5/8"	5/8"	1-1/4"	3-1/2"	NR-204-20	NR-204-20-**NF**	NR-204-20-**DLC**	NR-204-20-**NF-DLC**
3/4"	3/4"	1-1/2"	4"	NR-204-24	NR-204-24-**NF**	NR-204-24-**DLC**	NR-204-24-**NF-DLC**
1"	1"	1-1/2"	4"	NR-204-32	NR-204-32-**NF**	NR-204-32-**DLC**	NR-204-32-**NF-DLC**

C-2 Grade Carbide End Mills NR/MNR

Slotting Side Milling Helical Interpolation

+ Tolerances

MNR-204 Metric 2 Flute C-2 Grade Standard Length METRIC

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Flats, Uncoated	Tool Number No Flats, Uncoated	Tool Number Flats, DLC Coated	Tool Number No Flats, DLC Coated
2mm	3mm	8mm	38mm	–	MNR-204-02	–	MNR-204-02-**DLC**
3mm	3mm	12mm	38mm	–	MNR-204-03	–	MNR-204-03-**DLC**
4mm	4mm	12mm	50mm	–	MNR-204-04	–	MNR-204-04-**DLC**
5mm	5mm	14mm	50mm	–	MNR-204-05	–	MNR-204-05-**DLC**
6mm	6mm	14mm	57mm	–	MNR-204-06	–	MNR-204-06-**DLC**
8mm	8mm	16mm	63mm	–	MNR-204-08	–	MNR-204-08-**DLC**
10mm	10mm	20mm	72mm	–	MNR-204-10	–	MNR-204-10-**DLC**
12mm	12mm	25mm	83mm	–	MNR-204-12	–	MNR-204-12-**DLC**
16mm	16mm	32mm	92mm	–	MNR-204-16	–	MNR-204-16-**DLC**
20mm	20mm	38mm	104mm	–	MNR-204-20	–	MNR-204-20-**DLC**
25mm	25mm	38mm	104mm	–	MNR-204-25	–	MNR-204-25-**DLC**

NOTE: Metric tools do not have flats.

+ Tolerances

Flats!

NR-303 3 Flute C-2 Grade Standard Length

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Flats, Uncoated	Tool Number No Flats, Uncoated	Tool Number Flats, DLC Coated	Tool Number No Flats, DLC Coated
1/16"	1/8"	3/16"	1-1/2"	–	NR-303-02	–	NR-303-02-**DLC**
5/64"	1/8"	1/4"	1-1/2"	Flats!	NR-303-02.5	–	NR-303-02.5-**DLC**
3/32"	1/8"	3/8"	1-1/2"	–	NR-303-03	–	NR-303-03-**DLC**
7/64"	1/8"	7/16"	1-1/2"	–	NR-303-03.5	–	NR-303-03.5-**DLC**
1/8"	1/8"	1/2"	1-1/2"	–	NR-303-04	–	NR-303-04-**DLC**
5/32"	3/16"	9/16"	2"	–	NR-303-05	–	NR-303-05-**DLC**
3/16"	3/16"	5/8"	2"	–	NR-303-06	–	NR-303-06-**DLC**
7/32"	1/4"	5/8"	2-1/2"	–	NR-303-07	–	NR-303-07-**DLC**
1/4"	1/4"	3/4"	2-1/2"	–	NR-303-08	–	NR-303-08-**DLC**
9/32"	5/16"	3/4"	2-1/2"	–	NR-303-09	–	NR-303-09-**DLC**
5/16"	5/16"	13/16"	2-1/2"	–	NR-303-10	–	NR-303-10-**DLC**
3/8"	3/8"	7/8"	2-1/2"	NR-303-12	NR-303-12-**NF**	NR-303-12-**DLC**	NR-303-12-**NF-DLC**
7/16"	7/16"	1"	2-3/4"	–	NR-303-14	–	NR-303-14-**DLC**
1/2"	1/2"	1"	3"	NR-303-16	NR-303-16-**NF**	NR-303-16-**DLC**	NR-303-16-**NF-DLC**
9/16"	9/16"	1-1/4"	3-1/2"	–	NR-303-18	–	NR-303-18-**DLC**
5/8"	5/8"	1-1/4"	3-1/2"	NR-303-20	NR-303-20-**NF**	NR-303-20-**DLC**	NR-303-20-**NF-DLC**
3/4"	3/4"	1-1/2"	4"	NR-303-24	NR-303-24-**NF**	NR-303-24-**DLC**	NR-303-24-**NF-DLC**

MNR-303 Metric 3 Flute C-2 Grade Standard Length METRIC

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Flats, Uncoated	Tool Number No Flats, Uncoated	Tool Number Flats, DLC Coated	Tool Number No Flats, DLC Coated
2mm	3mm	8mm	38mm	–	MNR-303-02	–	MNR-303-02-**DLC**
3mm	3mm	12mm	38mm	–	MNR-303-03	–	MNR-303-03-**DLC**
4mm	4mm	12mm	50mm	–	MNR-303-04	–	MNR-303-04-**DLC**
5mm	5mm	14mm	50mm	–	MNR-303-05	–	MNR-303-05-**DLC**
6mm	6mm	14mm	57mm	–	MNR-303-06	–	MNR-303-06-**DLC**
8mm	8mm	16mm	63mm	–	MNR-303-08	–	MNR-303-08-**DLC**
10mm	10mm	20mm	72mm	–	MNR-303-10	–	MNR-303-10-**DLC**
12mm	12mm	25mm	83mm	–	MNR-303-12	–	MNR-303-12-**DLC**
16mm	16mm	32mm	92mm	–	MNR-303-16	–	MNR-303-16-**DLC**
20mm	20mm	38mm	104mm	–	MNR-303-20	–	MNR-303-20-**DLC**
25mm	25mm	38mm	104mm	–	MNR-303-25	–	MNR-303-25-**DLC**

NOTE: Metric tools do not have flats.

NR C-2 Grade Carbide End Mills

NR-404 4 Flute C-2 Grade Standard Length

Flats!

Flats!

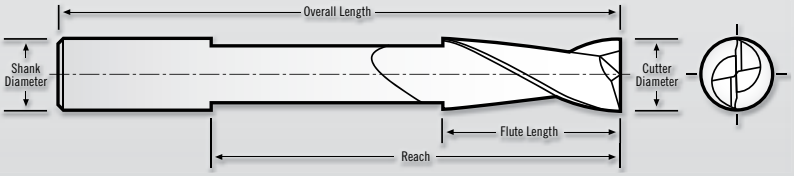
Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Flats, Uncoated	Tool Number No Flats, Uncoated	Tool Number Flats, DLC Coated	Tool Number No Flats, DLC Coated
1/16"	1/8"	3/16"	1-1/2"	–	NR-404-02	–	NR-404-02-**DLC**
5/64"	1/8"	1/4"	1-1/2"	–	NR-404-02.5	–	NR-404-02.5-**DLC**
3/32"	1/8"	3/8"	1-1/2"	–	NR-404-03	–	NR-404-03-**DLC**
7/64"	1/8"	7/16"	1-1/2"	–	NR-404-03.5	–	NR-404-03.5-**DLC**
1/8"	1/8"	1/2"	1-1/2"	–	NR-404-04	–	NR-404-04-**DLC**
9/64"	3/16"	1/2"	2"	–	NR-404-04.5	–	NR-404-04.5-**DLC**
5/32"	3/16"	9/16"	2"	–	NR-404-05	–	NR-404-05-**DLC**
11/64"	3/16"	5/8"	2"	–	NR-404-05.5	–	NR-404-05.5-**DLC**
3/16"	3/16"	5/8"	2"	–	NR-404-06	–	NR-404-06-**DLC**
13/64"	1/4"	5/8"	2-1/2"	–	NR-404-06.5	–	NR-404-06.5-**DLC**
7/32"	1/4"	5/8"	2-1/2"	–	NR-404-07	–	NR-404-07-**DLC**
15/64"	1/4"	5/8"	2-1/2"	–	NR-404-07.5	–	NR-404-07.5-**DLC**
1/4"	1/4"	3/4"	2-1/2"	–	NR-404-08	–	NR-404-08-**DLC**
17/64"	5/16"	3/4"	2-1/2"	–	NR-404-08.5	–	NR-404-08.5-**DLC**
9/32"	5/16"	3/4"	2-1/2"	–	NR-404-09	–	NR-404-09-**DLC**
19/64"	5/16"	3/4"	2-1/2"	–	NR-404-09.5	–	NR-404-09.5-**DLC**
5/16"	5/16"	13/16"	2-1/2"	–	NR-404-10	–	NR-404-10-**DLC**
21/64"	3/8"	13/16"	2-1/2"	NR-404-10.5	NR-404-10.5-**NF**	NR-404-10.5-**DLC**	NR-404-10.5-**NF-DLC**
11/32"	3/8"	13/16"	2-1/2"	NR-404-11	NR-404-11-**NF**	NR-404-11-**DLC**	NR-404-11-**NF-DLC**
23/64"	3/8"	7/8"	2-1/2"	NR-404-11.5	NR-404-11.5-**NF**	NR-404-11.5-**DLC**	NR-404-11.5-**NF-DLC**
3/8"	3/8"	7/8"	2-1/2"	NR-404-12	NR-404-12-**NF**	NR-404-12-**DLC**	NR-404-12-**NF-DLC**
25/64"	7/16"	1"	2-3/4"	–	NR-404-12.5	–	NR-404-12.5-**DLC**
13/32"	7/16"	1"	2-3/4"	–	NR-404-13	–	NR-404-13-**DLC**
27/64"	7/16"	1"	2-3/4"	–	NR-404-13.5	–	NR-404-13.5-**DLC**
7/16"	7/16"	1"	2-3/4"	–	NR-404-14	–	NR-404-14-**DLC**
29/64"	1/2"	1"	3"	NR-404-14.5	NR-404-14.5-**NF**	NR-404-14.5-**DLC**	NR-404-14.5-**NF-DLC**
15/32"	1/2"	1"	3"	NR-404-15	NR-404-15-**NF**	NR-404-15-**DLC**	NR-404-15-**NF-DLC**
31/64"	1/2"	1"	3"	NR-404-15.5	NR-404-15.5-**NF**	NR-404-15.5-**DLC**	NR-404-15.5-**NF-DLC**
1/2"	1/2"	1"	3"	NR-404-16	NR-404-16-**NF**	NR-404-16-**DLC**	NR-404-16-**NF-DLC**
33/64"	1/2"	1"	3"	NR-404-16.5	NR-404-16.5-**NF**	NR-404-16.5-**DLC**	NR-404-16.5-**NF-DLC**
9/16"	9/16"	1-1/4"	3-1/2"	–	NR-404-18	–	NR-404-18-**DLC**
5/8"	5/8"	1-1/4"	3-1/2"	NR-404-20	NR-404-20-**NF**	NR-404-20-**DLC**	NR-404-20-**NF-DLC**
3/4"	3/4"	1-1/2"	4"	NR-404-24	NR-404-24-**NF**	NR-404-24-**DLC**	NR-404-24-**NF-DLC**
1"	1"	1-1/2"	4"	NR-404-32	NR-404-32-**NF**	NR-404-32-**DLC**	NR-404-32-**NF-DLC**

Tuffy Grade Carbide End Mills EX

Characteristics Square End · 2 Flute · 30° Helix · Necked · Flats

Applications Slotting · Side Milling · Helical Interpolation · Roughing · Semi-Finishing · Finishing · Wet · Cold Air · Spray Mist

Materials Aluminum · Copper · Magnesium · Plastics · Brass · Wood



EX Series Tolerances
Cutting Dia. = +.001/–.000"
Shank Dia. = –.0001/–.0002"
Flute Length = +.060/–.000"
OAL = ±.060"

+ Tolerances

Flats!

EX-204 2 Flute Tuffy Grade Extra Length

Cutting Diameter	Shank Diameter	Flute Length	Reach	Overall Length	Tool Number Flats	Tool Number No Flats
1/8"	1/8"	3/8"	2"	3"	–	EX-204-04
3/16"	3/16"	1/2"	2"	3"	–	EX-204-06
1/4"	1/4"	5/8"	2"	3"	–	EX-204-08
5/16"	5/16"	3/4"	2-1/8"	3-1/8"	–	EX-204-10
3/8"	3/8"	3/4"	2"	3-1/2"	EX-204-12	EX-204-12-**NF**
7/16"	7/16"	3/4"	2-1/4"	3-3/4"	–	EX-204-14
1/2"	1/2"	1"	2-1/2"	4"	EX-204-16	EX-204-16-**NF**

+ Tolerances

EX-206 2 Flute Tuffy Grade Extra Length Extended Reach

Cutting Diameter	Shank Diameter	Flute Length	Reach	Overall Length	Tool Number
1/2"	1/2"	1"	4"	6"	EX-206-16
5/8"	5/8"	1-3/8"	4"	6"	EX-206-20
3/4"	3/4"	1-5/8"	4"	6"	EX-206-24
1"	1"	2"	4"	6"	EX-206-32

Have Chatter?

See Robblack's FM Series (p.16)!

ET Engraving Tools

NEW!

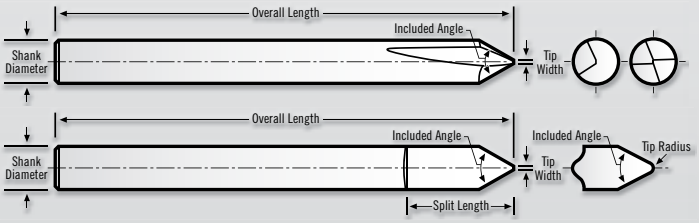
NEW Coatings Available!

TiN TiCN AlTiN

Characteristics: 1 Flute, 2 Flute

Applications: Slotting, Side Milling, Semi-Finishing, Finishing, Dry, Wet, Cold Air, Spray Mist

Materials: Aluminum, Copper, Titanium, Magnesium, Cast Iron, Steel, Stainless Steel, Super Alloys, Plastics, Composites, 40 HRc Hardness, Brass, Wood



ET1 Double Lip Engraving Tool for Tougher Materials

Tip Width	Shank Diameter	Included Angle	Split Length	Overall Length	Tool Number
.010"	1/4"	30°	—	2"	ET1-01030
.015"	1/4"	30°	—	2"	ET1-01530
.020"	1/4"	30°	—	2"	ET1-02030
.030"	1/4"	30°	—	2"	ET1-03030
.040"	1/4"	30°	—	2"	ET1-04030
.050"	1/4"	30°	—	2"	ET1-05030
.060"	1/4"	30°	—	2"	ET1-06030
.010"	1/4"	45°	—	2"	ET1-01045
.015"	1/4"	45°	—	2"	ET1-01545
.020"	1/4"	45°	—	2"	ET1-02045
.030"	1/4"	45°	—	2"	ET1-03045
.040"	1/4"	45°	—	2"	ET1-04045
.050"	1/4"	45°	—	2"	ET1-05045
.060"	1/4"	45°	—	2"	ET1-06045

NOTE: Specially designed to maximize the tip strength of the tool by removing the minimum amount of material from the end.

ET3 Ball Tip Engraving Tool

Tip Radius	Shank Diameter	Included Angle	Split Length	Overall Length	Tool Number
.005"	1/4"	30°	.650"	2"	ET3-00530
.010"	1/4"	30°	.650"	2"	ET3-01030
.020"	1/4"	30°	.650"	2"	ET3-02030
.030"	1/4"	30°	.650"	2"	ET3-03030
.005"	1/4"	60°	.650"	2"	ET3-00560
.010"	1/4"	60°	.650"	2"	ET3-01060
.020"	1/4"	60°	.650"	2"	ET3-02060
.030"	1/4"	60°	.650"	2"	ET3-03060

NOTE: Ball shaped radius on the tip, excellent results for high speed engraving and 3D engraving applications

ET2 Plunge Tip Engraving Tool for Drill & Engrave

Tip Width	Shank Diameter	Included Angle	Split Length	Overall Length	Tool Number
.010"	1/4"	60°	—	2"	ET2-01060
.020"	1/4"	60°	—	2"	ET2-02060
.010"	1/4"	90°	—	2"	ET2-01090
.020"	1/4"	90°	—	2"	ET2-02090

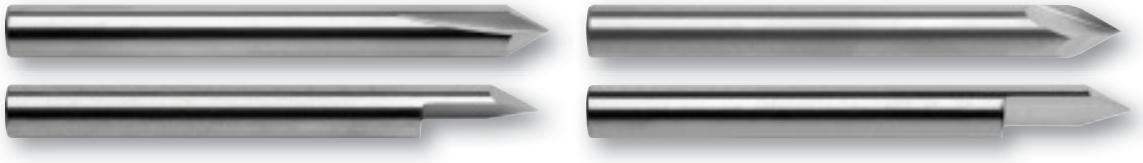
NOTE: Two flute tool serves as a multipurpose tool, which can be used for engraving, chamfering, spot-drilling and countersinking.

ET4 Standard Engraving Tool for Most Applications

Tip Width	Shank Diameter	Included Angle	Split Length	Overall Length	Tool Number
.010"	1/4"	60°	.650"	2"	ET4-01060
.020"	1/4"	60°	.650"	2"	ET4-02060
.030"	1/4"	60°	.650"	2"	ET4-03060
.050"	1/4"	60°	.650"	2"	ET4-05060
.060"	1/4"	60°	.650"	2"	ET4-06060
.010"	1/4"	90°	.650"	2"	ET4-01060
.020"	1/4"	90°	.650"	2"	ET4-02090
.030"	1/4"	90°	.650"	2"	ET4-03090
.050"	1/4"	90°	.650"	2"	ET4-05090
.060"	1/4"	90°	.650"	2"	ET4-06090

NOTE: Utilized in a wide variety of machines, including top loading engraving machines, CNC milling machines and industrial engraving marking systems.

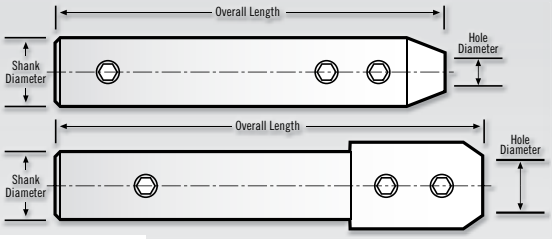
Engraving Tools ET



ET SPEEDS & FEEDS

Material	5000 RPM	7500 RPM	10,000 RPM
	in/min	in/min	in/min
NON-FERROUS METALS			
Aluminum/Aluminum Alloys	10 ipm	15 ipm	20 ipm
Brass/Bronze	10 ipm	15 ipm	20 ipm
Copper/Copper Alloys	10 ipm	15 ipm	20 ipm
Magnesium	10 ipm	15 ipm	20 ipm
COMPOSITES			
G10 Fiberglass	15 ipm	22.5 ipm	30 ipm
Graphite	15 ipm	22.5 ipm	30 ipm
Carbon Fiber	15 ipm	22.5 ipm	30 ipm
Plastics	15 ipm	22.5 ipm	30 ipm
FERROUS METALS			
Cast Iron	5 ipm	7.5 ipm	10 ipm
Steel, Low Carbon	5 ipm	7.5 ipm	10 ipm
Steel, Medium Carbon	7.5 ipm	11.25 ipm	15 ipm
Steel, Hardened	2.5 ipm	3.75 ipm	5 ipm
Stainless Steel, Soft	5 ipm	7.5 ipm	10 ipm
Stainless Steel, Hard	2.5 ipm	3.75 ipm	5 ipm
Inconel	4 ipm	6 ipm	8 ipm
Titanium, Soft	5 ipm	7.5 ipm	10 ipm
Titanium, Hard	2.5 ipm	3.75 ipm	5 ipm

Accuhold End Mill Extension Holder ACH/MAH



ACH Tolerances
Hole Dia. = +.00015/–.00000"
Shank Dia. = –.0001/–.0003"
OAL = ±.060"

MAH Tolerances
Hole Dia. = +.004/–.000 mm
Shank Dia. = +.000/–.007 mm
OAL = ±1.5 mm

ACH Accuhold – End Mill Extension Holder

Hole Diameter	Shank Diameter	Overall Length	Tool Number
1/8"	3/8"	3-1/4"	ACH-04
3/16"	1/2"	3-1/2"	ACH-06
1/4"	5/8"	4-1/4"	ACH-08
3/8"	3/4"	4-1/2"	ACH-12
* 1/2"	3/4"	4-3/4"	ACH-16
* 1/2"	1"	4-3/4"	ACH-16L

** 1" Diameter x 1.5" Long Head*

MAH Accuhold – Metric End Mill Extension Holder METRIC

Hole Diameter	Shank Diameter	Overall Length	Tool Number
3mm	10mm	82.5mm	MAH-03
4mm	12mm	110mm	MAH-04
5mm	12mm	110mm	MAH-05
6mm	16mm	125mm	MAH-06
8mm	20mm	135mm	MAH-08
10mm	20mm	135mm	MAH-10
* 12mm	25mm	150mm	MAH-12

TOOLS FOR

Saw Applications

Saws

Scan this code to:

- Watch Videos
- How to Assemble a Saw and Arbor
- Tips and Tricks
- And More...

Featured Tools:

The K-Series Solves ALL Your Saw Problems

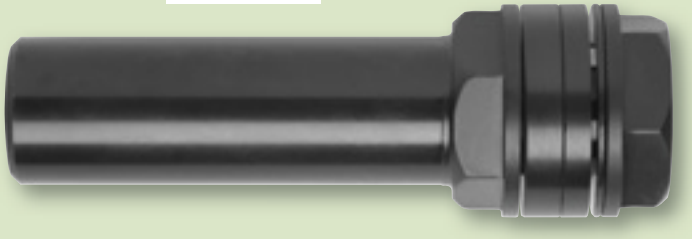
"The best saw we have ever used! It solved all our problems."

- Use any time the saw depth is more than 5x the saw thickness
- Double Concavity
- Alternate Tooth Chamfer
- Flat and Parallel Hubs

NAB

Page 136

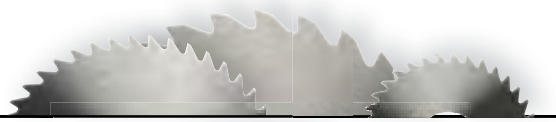
15X Gripping Force

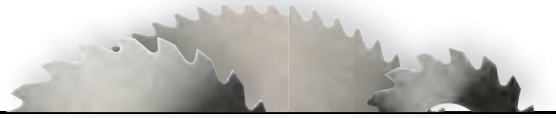


- 15X Gripping Force
- Built-In Spacers
- Keyways Available

TOOLS FOR Saw Applications

SAWS Standard	Coarse and Fine Pitch	121
SAWS Metric	Coarse and Fine Pitch	132
AB Arbors	Precision Stub Arbors	136
MSA Arbors	Precision Metric Stub Arbors	136
NAB Arbors	Precision Arbors NEW! 15X Gripping Force	136
CAPS	Extension Caps for AB Arbors NEW!	137
FLANGES	Gauge Tolerance Arbor Flanges	137





Quantity Discount

1–2 of a size . . . . . .Net

3–6 . . . . . Less 5%

7–24 . . . . . Less 10%

25 or more . . . . . Less 15%

Pricing Special Decimal Thicknesses

To price a saw thickness not listed in the catalog, use the price of the closest thicker standard saw.

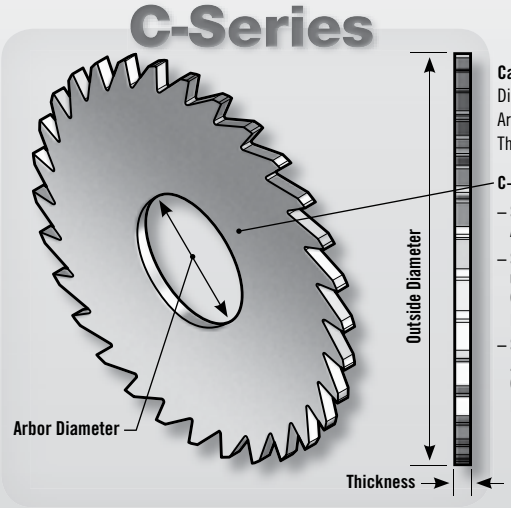
Quantity discounts apply to special thicknesses.

Saws made for gangs with special tolerances are priced on application.

Special Note: Saws under .008" or .19 mm thickness are non-returnable.

SAWS

C-Series



Carbide Saw Tolerances

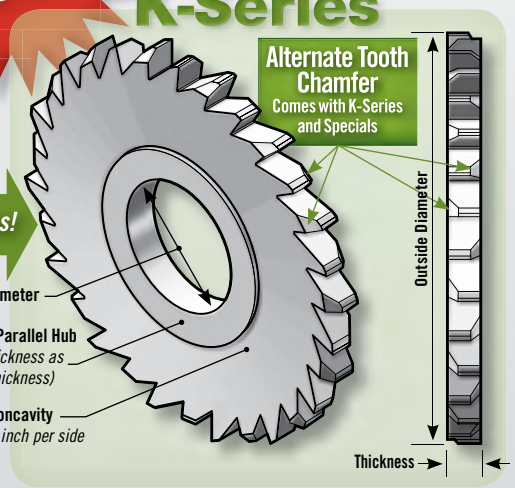
Diameter	= +.002"/-.000"
Arbor Diameter	= +.0002"/+.0004"
Thickness	= +.0002"/-.0000"

C-Series Concavity

- **Saws .010" and under:** Are flat and parallel
- **Saw thickness (T) under .020":** Concavity (c) = .001" per inch per side
- **Saw thickness (T) .020" and over:** Concavity (c) = .002" per inch per side

NEW! K-Series

Use the K-Series if DOC is more than 5X saw thickness!



Formulas

INCH SIZES		
Surface Feet per Minute	=	RPM x .262 x Tool Diameter
RPM	=	Surface Feet per Minute x 3.82 / Tool Diameter
Feed Rate (in/min.)	=	RPM x Chip Load per Tooth x Number of Teeth
Chip Load Per Tooth	=	in/min. / RPM x Number of Teeth
in³/min	=	Width x Depth x Inches per Minute
Horsepower	=	1.341 x kW

METRIC SIZES		
Surface Meters per Minute	=	RPM x .00314 x Tool Diameter
RPM	=	Surface Meters per Minute x 318.057 / Tool Diameter
Feed Rate (mm/min.)	=	RPM x Chip Load per Tooth x Number of Teeth
Chip Load Per Tooth	=	mm/min. / RPM x Number of Teeth
cm³/min	=	Width (mm) x Depth (mm) x mm per Minute / 1000
Horsepower	=	1.341 x kW
kW	=	.7457 x Horsepower

RobbJack Saw Features

All RobbJack saws are designed for use individually and have concavity (dish). Saws which are to be assembled in gangs should have flat hubs (plus concavity to depth of cut) to assure spacing accuracy.

O.D. Tolerances:	+.002"/-.000"
Concavity:	See drawing above
Coarse Pitch:	(10º rake) for non-ferrous material
Fine Pitch:	(5º rake) for ferrous material
Gang Saws:	With integral hubs available
I.D. Tolerance:	+.0002"/+.0004" to assure proper arbor fit and for reduced O.D. runout
48 Hour Availability:	Any thickness from .008" to .250"
Thickness Tolerance:	+.0002"/-.000" to assure accuracy

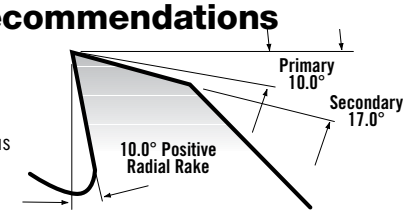
Application Guidelines

For standard side concavity:	See C-Series diagram above
If depth of cut exceeds 3 times saw thickness:	Use Double standard concavity (.004" per inch per side) or K-Series
If depth of cut exceeds 5 times saw thickness:	Use K-Series Saws
Saw diameter concentricity:	Should be within .001" when assembled on arbor
When using more than one saw at a time:	A flat and parallel hub is used to ensure proper spacing
If steel flanges are used:	Select the largest diameter possible (see page 124)
Keyways:	Generally not used with solid carbide slitting saws, but are available upon request

Tooth Recommendations

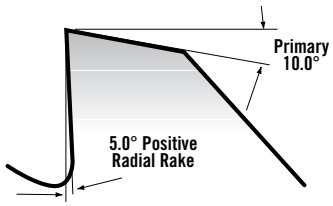
Coarse Pitch

Coarse Tooth recommended for use in non-ferrous materials.



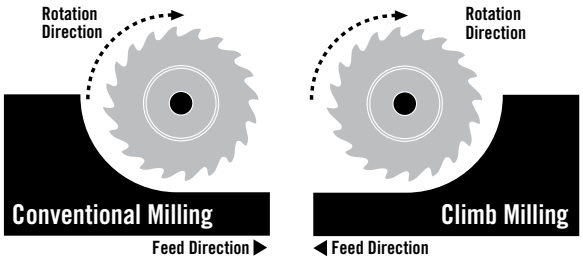
Fine Pitch

Fine Tooth recommended for use in ferrous materials.



Conventional Milling vs. Climb Milling

RobbJack recommends Climb Milling (as opposed to Conventional Milling) for most applications (assuming back-lash control in the machine). Climb Milling generally allows better flute engagement in the material, resulting in more efficient machining and superior part finishes. Conventional Milling can lead to work hardening in some ferrous materials.



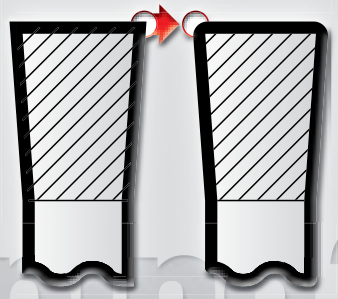
Saw Speeds & Feeds

Material	Max Axial Depth/Pass (Times Thickness)	Teeth	Inch: SFM Surface Feet/Minute	Inch: Chip Load per Tooth – Standard: Saw Thickness .002"-.031"	Inch: Chip Load per Tooth – Standard: Saw Thickness .031"-.100"	Inch: Chip Load per Tooth – Standard: Saw Thickness >.100"	Metric: SMM Surface Meters/Minute	Metric: Chip Load per Tooth – Metric: Saw Thickness .05mm-1.0mm	Metric: Chip Load per Tooth – Metric: Saw Thickness 1.0mm-3.0mm	Metric: Chip Load per Tooth – Metric: Saw Thickness >3.0mm
Aluminum / Non-Ferrous										
Ferrous										
2024	4	Coarse	3600	.000234"/.000273"	.000273"/.00052"	0.00052"	1100	.0059mm/.0069mm	.0069mm/.013mm	0.013mm
6061 (T1–T3)	4	Coarse	3600	.000234"/.000273"	.000273"/.00052"	0.00052"	1100	.0059mm/.0069mm	.0069mm/.013mm	0.013mm
6061 (T4–T6)	4	Coarse	3600	.000234"/.000273"	.000273"/.00052"	0.00052"	1100	.0059mm/.0069mm	.0069mm/.013mm	0.013mm
7075	4	Coarse	3600	.000234"/.000273"	.000273"/.00052"	0.00052"	1100	.0059mm/.0069mm	.0069mm/.013mm	0.013mm
Non-Ferrous										
Brass	4	Coarse	750	.000234"/.000273"	.000273"/.00052"	0.00052"	230	.0059mm/.0069mm	.0069mm/.013mm	0.013mm
Copper	4	Coarse	600	.000234"/.000273"	.000273"/.00052"	0.00052"	190	.0059mm/.0069mm	.0069mm/.013mm	0.013mm
Magnesium	4	Coarse	3600	.000234"/.000273"	.000273"/.00052"	0.00052"	1100	.0059mm/.0069mm	.0069mm/.013mm	0.013mm
Titanium, Steel and High-Temp Alloys										
Titanium										
Commercially Pure	2	Fine	700	.00018"/.00021"	.00021"/.0004"	0.0004"	210	.0046mm/.0053mm	.0053mm/.010mm	0.010mm
6AL-4V	2	Fine	350	.00018"/.00021"	.00021"/.0004"	0.0004"	105	.0046mm/.0053mm	.0053mm/.010mm	0.010mm
6AL-6V	2	Fine	230	.00018"/.00021"	.00021"/.0004"	0.0004"	70	.0046mm/.0053mm	.0053mm/.010mm	0.010mm
Steel										
1018–1020	4	Fine	350	.00018"/.00021"	.00021"/.0004"	0.0004"	110	.0046mm/.0053mm	.0053mm/.010mm	0.010mm
4130	2	Fine	260	.00018"/.00021"	.00021"/.0004"	0.0004"	80	.0046mm/.0053mm	.0053mm/.010mm	0.010mm
4140	2	Fine	220	.00018"/.00021"	.00021"/.0004"	0.0004"	70	.0046mm/.0053mm	.0053mm/.010mm	0.010mm
4340	2	Fine	280	.00018"/.00021"	.00021"/.0004"	0.0004"	90	.0046mm/.0053mm	.0053mm/.010mm	0.010mm
Tool Steel Annealed										
A2	2	Fine	350	.00018"/.00021"	.00021"/.0004"	0.0004"	110	.0046mm/.0053mm	.0053mm/.010mm	0.010mm
D2	2	Fine	260	.00018"/.00021"	.00021"/.0004"	0.0004"	80	.0046mm/.0053mm	.0053mm/.010mm	0.010mm
H13	2	Fine	230	.00018"/.00021"	.00021"/.0004"	0.0004"	70	.0046mm/.0053mm	.0053mm/.010mm	0.010mm
P20	2	Fine	350	.00018"/.00021"	.00021"/.0004"	0.0004"	110	.0046mm/.0053mm	.0053mm/.010mm	0.010mm
Stainless Steel										
303	2	Fine	500	.00018"/.00021"	.00021"/.0004"	0.0004"	150	.0046mm/.0053mm	.0053mm/.010mm	0.010mm
304	2	Fine	200	.00018"/.00021"	.00021"/.0004"	0.0004"	70	.0046mm/.0053mm	.0053mm/.010mm	0.010mm
316	2	Fine	240	.00018"/.00021"	.00021"/.0004"	0.0004"	75	.0046mm/.0053mm	.0053mm/.010mm	0.010mm
15-5/17-4 PH	2	Fine	200	.00018"/.00021"	.00021"/.0004"	0.0004"	60	.0046mm/.0053mm	.0053mm/.010mm	0.010mm
440C	2	Fine	200	.00018"/.00021"	.00021"/.0004"	0.0004"	60	.0046mm/.0053mm	.0053mm/.010mm	0.010mm
Inconel										
625 / 718	2	Fine	100	.00018"/.00021"	.00021"/.0004"	0.0004"	30	.0046mm/.0053mm	.0053mm/.010mm	0.010mm
Composites										
G10 Fiberglass/Polyester	4	Coarse	1000	.000234"/.000273"	.000273"/.00052"	0.00052"	300	.0059mm/.0069mm	.0069mm/.013mm	0.013mm
Graphite	4	Coarse	1000	.000234"/.000273"	.000273"/.00052"	0.00052"	300	.0059mm/.0069mm	.0069mm/.013mm	0.013mm
Graphite Fiber/Epoxy	4	Coarse	800	.000234"/.000273"	.000273"/.00052"	0.00052"	250	.0059mm/.0069mm	.0069mm/.013mm	0.013mm
Other Material Applications										
Cast Iron										
Ductile Iron	2	Fine	350	.00018"/.00021"	.00021"/.0004"	0.0004"	110	.0046mm/.0053mm	.0053mm/.010mm	0.010mm
Gray Cast Iron	2	Fine	500	.00018"/.00021"	.00021"/.0004"	0.0004"	150	.0046mm/.0053mm	.0053mm/.010mm	0.010mm
Wood & Plastics										
Wood	4	Coarse	3600	.000234"/.000273"	.000273"/.00052"	0.00052"	1100	.0059mm/.0069mm	.0069mm/.013mm	0.013mm
Plastics	4	Coarse	1600	.000234"/.000273"	.000273"/.00052"	0.00052"	400	.0059mm/.0069mm	.0069mm/.013mm	0.013mm

Saw Modifications

T-Process

T-Process is a honed edge we put on a saw to help eliminate chipping.



Chipping?

Pros: T-Process strengthens the edge, helps eliminate chipping and gives a smooth edge.
Cons: T-Process will bring up a burr in certain materials, it is not for materials that like a sharp edge, such as aluminum and plastics.

To order a RobbJack saw with a **T-Process**, use the existing standard *Part Number*, and add *-TP.*

Example: A 4" saw with a T-Process is Part Number:

C40-032-32-36-TP
See price sheet for pricing

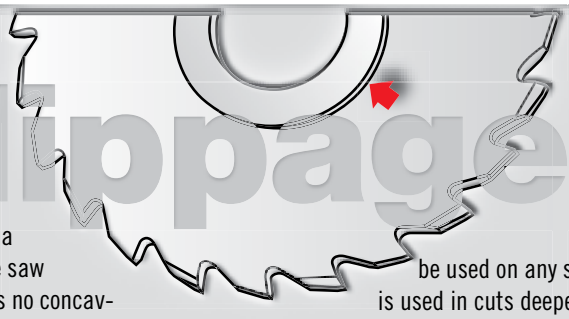
Alternate Tooth Chamfer

Binding?

Alternate Tooth Chamfer is an alternating 45° grind on the teeth of the saw. It helps the saw from binding and aids in chip evacuation. Alternate Tooth Chamfer should be used on saws when the depth of cut is more than 5× the saw thickness and the saw is thicker than .020"

Use the New K-Series Part Number
(Please see Saw Section)

Hub



Slippage?

A saw Hub is a section of the saw where there is no concavity. It is a flat and parallel area that is the same thickness as the tooth cutting near the ID of the saw where the flange contacts the saw. Should be used on any saw that is used in cuts deeper than 3× the saw thickness. If the depth is more than 5× the saw thickness use with Alternate Tooth Chamfer, specify the K-Series Part Number.

Pros: Better surface contact with the flange of the arbor, saws run very true, reduces slippage problems

Cons: None

To order a RobbJack saw with a **Hub**, use the existing standard *Part Number*, and add *-H,* followed by *Hub Diameter.*

Example:
4" saw with a 2.000" diameter hub

C40-032-32-36-H 2.000"
See price sheet for pricing

Keyway

A saw Keyway not usually recommended on saws thinner than .125" thick. If there are slippage problems you may first want to try a hub if the thickness is less than .125" thick.

High Torque Cuts?

Pros: Helps eliminate slippage problems on thick saws in high torque cuts

Cons: Can cause stress risers and cracks in saws thinner than .125" thick

To order a RobbJack saw with a **Keyway**, use the existing standard *Part Number*, and add *-K.*

Example:
4" saw with a 1/4" keyway

C40-125-32-36-K
See price sheet for pricing

Solid Carbide SAWS

3/4" Diameter 1/4" Arbor

Proper Max Depth of Cut:
Using AB Arbor = .075"
Using NAB Arbor = .040"

Al Aluminum | Cu Copper | Mg Magnesium | Plastics | Composites | Brass

Use if DOC is more than 5X saw thickness

10 TEETH

Saw Thickness	Standard Concavity	Double Concavity Alternative Tooth Chamfer ½" HUB Diameter
.0020"	C07-002-08-10	
.0040"	C07-004-08-10	
.0060"	C07-006-08-10	
.0080"	C07-008-08-10	
.0100"	C07-010-08-10	
.0120"	C07-012-08-10	–
.0140"	C07-014-08-10	–
.0156"	C07-016-08-10	–
.0180"	C07-018-08-10	–
.0200"	C07-020-08-10	K07-020-08-10
.0230"	C07-023-08-10	K07-023-08-10
.0250"	C07-025-08-10	K07-025-08-10
.0280"	C07-028-08-10	K07-028-08-10
.0312"	C07-032-08-10	K07-032-08-10
.0350"	C07-035-08-10	K07-035-08-10
.0400"	C07-040-08-10	K07-040-08-10
.0468"	C07-045-08-10	K07-045-08-10
.0510"	C07-051-08-10	K07-051-08-10
.0625"	C07-062-08-10	K07-062-08-10
.0781"	C07-078-08-10	K07-078-08-10
.0937"	C07-092-08-10	K07-092-08-10
.1250"	C07-125-08-10	K07-125-08-10
.1562"	C07-156-08-10	K07-156-08-10
.1875"	C07-187-08-10	K07-187-08-10
.2500"	C07-250-08-10	K07-250-08-10

Any Saw Thickness Available

Ti Titanium | Cast Iron | Steel | Stainless Steel | Super Alloys

Use if DOC is more than 5X saw thickness

20 TEETH

Saw Thickness	Standard Concavity	Double Concavity Alternative Tooth Chamfer ½" HUB Diameter
.0020"	C07-002-08-20	
.0040"	C07-004-08-20	
.0060"	C07-006-08-20	
.0080"	C07-008-08-20	
.0100"	C07-010-08-20	
.0120"	C07-012-08-20	–
.0140"	C07-014-08-20	–
.0156"	C07-016-08-20	–
.0180"	C07-018-08-20	–
.0200"	C07-020-08-20	K07-020-08-20
.0230"	C07-023-08-20	K07-023-08-20
.0250"	C07-025-08-20	K07-025-08-20
.0280"	C07-028-08-20	K07-028-08-20
.0312"	C07-032-08-20	K07-032-08-20
.0350"	C07-035-08-20	K07-035-08-20
.0400"	C07-040-08-20	K07-040-08-20
.0468"	C07-045-08-20	K07-045-08-20
.0510"	C07-051-08-20	K07-051-08-20
.0625"	C07-062-08-20	K07-062-08-20
.0781"	C07-078-08-20	K07-078-08-20
.0937"	C07-092-08-20	K07-092-08-20
.1250"	C07-125-08-20	K07-125-08-20
.1562"	C07-156-08-20	K07-156-08-20
.1875"	C07-187-08-20	K07-187-08-20
.2500"	C07-250-08-20	K07-250-08-20

Any Saw Thickness Available

Solid carbide spacers and flanges for 3/4" saws are available with 1/4" arbor holes in diameters ranging from .500" to .700" and thicknesses from .002" to .250". Call for price and delivery.

1" Diameter 3/8" Arbor

Proper Max Depth of Cut:
Using AB Arbor = .1375"
Using NAB Arbor = .095"

Al Aluminum | Cu Copper | Mg Magnesium | Plastics | Composites | Brass

Use if DOC is more than 5X saw thickness

12 TEETH

Saw Thickness	Standard Concavity	Double Concavity Alternative Tooth Chamfer 5/8" HUB Diameter
.0020"	C10-002-12-12	
.0040"	C10-004-12-12	
.0060"	C10-006-12-12	
.0080"	C10-008-12-12	
.0100"	C10-010-12-12	
.0120"	C10-012-12-12	–
.0140"	C10-014-12-12	–
.0156"	C10-016-12-12	–
.0180"	C10-018-12-12	–
.0200"	C10-020-12-12	K10-020-12-12
.0230"	C10-023-12-12	K10-023-12-12
.0250"	C10-025-12-12	K10-025-12-12
.0280"	C10-028-12-12	K10-028-12-12
.0312"	C10-032-12-12	K10-032-12-12
.0350"	C10-035-12-12	K10-035-12-12
.0400"	C10-040-12-12	K10-040-12-12
.0468"	C10-045-12-12	K10-045-12-12
.0510"	C10-051-12-12	K10-051-12-12
.0625"	C10-062-12-12	K10-062-12-12
.0781"	C10-078-12-12	K10-078-12-12
.0937"	C10-092-12-12	K10-092-12-12
.1250"	C10-125-12-12	K10-125-12-12
.1562"	C10-156-12-12	K10-156-12-12
.1875"	C10-187-12-12	K10-187-12-12
.2500"	C10-250-12-12	K10-250-12-12

Ti Titanium | Cast Iron | Steel | Stainless Steel | Super Alloys

Use if DOC is more than 5X saw thickness

24 TEETH

Saw Thickness	Standard Concavity	Double Concavity Alternative Tooth Chamfer 5/8" HUB Diameter
.0020"	C10-002-12-24	
.0040"	C10-004-12-24	
.0060"	C10-006-12-24	
.0080"	C10-008-12-24	
.0100"	C10-010-12-24	
.0120"	C10-012-12-24	–
.0140"	C10-014-12-24	–
.0156"	C10-016-12-24	–
.0180"	C10-018-12-24	–
.0200"	C10-020-12-24	K10-020-12-24
.0230"	C10-023-12-24	K10-023-12-24
.0250"	C10-025-12-24	K10-025-12-24
.0280"	C10-028-12-24	K10-028-12-24
.0312"	C10-032-12-24	K10-032-12-24
.0350"	C10-035-12-24	K10-035-12-24
.0400"	C10-040-12-24	K10-040-12-24
.0468"	C10-045-12-24	K10-045-12-24
.0510"	C10-051-12-24	K10-051-12-24
.0625"	C10-062-12-24	K10-062-12-24
.0781"	C10-078-12-24	K10-078-12-24
.0937"	C10-092-12-24	K10-092-12-24
.1250"	C10-125-12-24	K10-125-12-24
.1562"	C10-156-12-24	K10-156-12-24
.1875"	C10-187-12-24	K10-187-12-24
.2500"	C10-250-12-24	K10-250-12-24

Solid carbide spacers and flanges for 1" saws are available with 3/8" arbor holes in diameters ranging from .650" to .950" and thicknesses from .002" to .250". Call for price and delivery.

SAWS Solid Carbide

1¼" Diameter ½" Arbor

Proper Max Depth of Cut:
Using AB Arbor = .200"
Using NAB Arbor = .1475"

Al Aluminum | Cu Copper | Mg Magnesium | Plastics Plastics | Composites | Brass Brass

Use if DOC is more than 5X saw thickness

16 TEETH		Double Concavity Alternative Tooth Chamfer 3/4" HUB Diameter
Saw Thickness	Standard Concavity	
.0020"	C12-002-16-16	
.0040"	C12-004-16-16	
.0060"	C12-006-16-16	
.0080"	C12-008-16-16	
.0100"	C12-010-16-16	
.0120"	C12-012-16-16	–
.0140"	C12-014-16-16	–
.0156"	C12-016-16-16	–
.0180"	C12-018-16-16	–
.0200"	C12-020-16-16	K12-020-16-16
.0230"	C12-023-16-16	K12-023-16-16
.0250"	C12-025-16-16	K12-025-16-16
.0280"	C12-028-16-16	K12-028-16-16
.0312"	C12-032-16-16	K12-032-16-16
.0350"	C12-035-16-16	K12-035-16-16
.0400"	C12-040-16-16	K12-040-16-16
.0468"	C12-045-16-16	K12-045-16-16
.0510"	C12-051-16-16	K12-051-16-16
.0625"	C12-062-16-16	K12-062-16-16
.0781"	C12-078-16-16	K12-078-16-16
.0937"	C12-092-16-16	K12-092-16-16
.1250"	C12-125-16-16	K12-125-16-16
.1562"	C12-156-16-16	K12-156-16-16
.1875"	C12-187-16-16	K12-187-16-16
.2500"	C12-250-16-16	K12-250-16-16

Any Saw Thickness Available

Ti Titanium | Cast Iron Cast Iron | Steel Steel | Stainless Steel Stainless Steel | SUPER Alloys Super Alloys

Use if DOC is more than 5X saw thickness

36 TEETH		Double Concavity Alternative Tooth Chamfer 3/4" HUB Diameter
Saw Thickness	Standard Concavity	
.0020"	C12-002-16-36	
.0040"	C12-004-16-36	
.0060"	C12-006-16-36	
.0080"	C12-008-16-36	
.0100"	C12-010-16-36	
.0120"	C12-012-16-36	–
.0140"	C12-014-16-36	–
.0156"	C12-016-16-36	–
.0180"	C12-018-16-36	–
.0200"	C12-020-16-36	K12-020-16-36
.0230"	C12-023-16-36	K12-023-16-36
.0250"	C12-025-16-36	K12-025-16-36
.0280"	C12-028-16-36	K12-028-16-36
.0312"	C12-032-16-36	K12-032-16-36
.0350"	C12-035-16-36	K12-035-16-36
.0400"	C12-040-16-36	K12-040-16-36
.0468"	C12-045-16-36	K12-045-16-36
.0510"	C12-051-16-36	K12-051-16-36
.0625"	C12-062-16-36	K12-062-16-36
.0781"	C12-078-16-36	K12-078-16-36
.0937"	C12-092-16-36	K12-092-16-36
.1250"	C12-125-16-36	K12-125-16-36
.1562"	C12-156-16-36	K12-156-16-36
.1875"	C12-187-16-36	K12-187-16-36
.2500"	C12-250-16-36	K12-250-16-36

Any Saw Thickness Available

Solid carbide spacers and flanges for 1-1/4" saws are available with 1/2" arbor holes in diameters ranging from .750" to 1.200" and thicknesses from .002" to .250". Call for price and delivery.

1½" Diameter ½" Arbor

Proper Max Depth of Cut:
Using AB Arbor = .325"
Using NAB Arbor = .2725"

Al Aluminum | Cu Copper | Mg Magnesium | Plastics Plastics | Composites | Brass Brass

Use if DOC is more than 5X saw thickness

16 TEETH		Double Concavity Alternative Tooth Chamfer 3/4" HUB Diameter
Saw Thickness	Standard Concavity	
.0020"	C15-002-16-16	
.0040"	C15-004-16-16	
.0060"	C15-006-16-16	
.0080"	C15-008-16-16	
.0100"	C15-010-16-16	
.0120"	C15-012-16-16	–
.0140"	C15-014-16-16	–
.0156"	C15-016-16-16	–
.0180"	C15-018-16-16	–
.0200"	C15-020-16-16	K15-020-16-16
.0230"	C15-023-16-16	K15-023-16-16
.0250"	C15-025-16-16	K15-025-16-16
.0280"	C15-028-16-16	K15-028-16-16
.0312"	C15-032-16-16	K15-032-16-16
.0350"	C15-035-16-16	K15-035-16-16
.0400"	C15-040-16-16	K15-040-16-16
.0468"	C15-045-16-16	K15-045-16-16
.0510"	C15-051-16-16	K15-051-16-16
.0625"	C15-062-16-16	K15-062-16-16
.0781"	C15-078-16-16	K15-078-16-16
.0937"	C15-092-16-16	K15-092-16-16
.1250"	C15-125-16-16	K15-125-16-16
.1562"	C15-156-16-16	K15-156-16-16
.1875"	C15-187-16-16	K15-187-16-16
.2500"	C15-250-16-16	K15-250-16-16

Ti Titanium | Cast Iron Cast Iron | Steel Steel | Stainless Steel Stainless Steel | SUPER Alloys Super Alloys

Use if DOC is more than 5X saw thickness

36 TEETH		Double Concavity Alternative Tooth Chamfer 3/4" HUB Diameter
Saw Thickness	Standard Concavity	
.0020"	C15-002-16-36	
.0040"	C15-004-16-36	
.0060"	C15-006-16-36	
.0080"	C15-008-16-36	
.0100"	C15-010-16-36	
.0120"	C15-012-16-36	–
.0140"	C15-014-16-36	–
.0156"	C15-016-16-36	–
.0180"	C15-018-16-36	–
.0200"	C15-020-16-36	K15-020-16-36
.0230"	C15-023-16-36	K15-023-16-36
.0250"	C15-025-16-36	K15-025-16-36
.0280"	C15-028-16-36	K15-028-16-36
.0312"	C15-032-16-36	K15-032-16-36
.0350"	C15-035-16-36	K15-035-16-36
.0400"	C15-040-16-36	K15-040-16-36
.0468"	C15-045-16-36	K15-045-16-36
.0510"	C15-051-16-36	K15-051-16-36
.0625"	C15-062-16-36	K15-062-16-36
.0781"	C15-078-16-36	K15-078-16-36
.0937"	C15-092-16-36	K15-092-16-36
.1250"	C15-125-16-36	K15-125-16-36
.1562"	C15-156-16-36	K15-156-16-36
.1875"	C15-187-16-36	K15-187-16-36
.2500"	C15-250-16-36	K15-250-16-36

Solid carbide spacers and flanges for 1-1/2" saws are available with 1/2" arbor holes in diameters ranging from .750" to 1.400" and thicknesses from .002" to .250". Call for price and delivery.

Solid Carbide SAWS

1 3/4" Diameter 1/2" Arbor

Proper Max Depth of Cut:
Using AB Arbor = .450"
Using NAB Arbor = .3975"

Al Aluminum · Cu Copper · Mg Magnesium · Plastics · Composites · Brass

Use if DOC is more than 5X saw thickness

24 TEETH		Double Concavity Alternative Tooth Chamfer 3/4" HUB Diameter
Saw Thickness	Standard Concavity	
.0020"	C17-002-16-24	
.0040"	C17-004-16-24	
.0060"	C17-006-16-24	
.0080"	C17-008-16-24	
.0100"	C17-010-16-24	
.0120"	C17-012-16-24	–
.0140"	C17-014-16-24	–
.0156"	C17-016-16-24	–
.0180"	C17-018-16-24	–
.0200"	C17-020-16-24	K17-020-16-24
.0230"	C17-023-16-24	K17-023-16-24
.0250"	C17-025-16-24	K17-025-16-24
.0280"	C17-028-16-24	K17-028-16-24
.0312"	C17-032-16-24	K17-032-16-24
.0350"	C17-035-16-24	K17-035-16-24
.0400"	C17-040-16-24	K17-040-16-24
.0468"	C17-045-16-24	K17-045-16-24
.0510"	C17-051-16-24	K17-051-16-24
.0625"	C17-062-16-24	K17-062-16-24
.0781"	C17-078-16-24	K17-078-16-24
.0937"	C17-092-16-24	K17-092-16-24
.1250"	C17-125-16-24	K17-125-16-24
.1562"	C17-156-16-24	K17-156-16-24
.1875"	C17-187-16-24	K17-187-16-24
.2500"	C17-250-16-24	K17-250-16-24

Any Saw Thickness Available

Ti Titanium · Cast Iron · Steel · Stainless Steel · Super Alloys

Use if DOC is more than 5X saw thickness

36 TEETH		Double Concavity Alternative Tooth Chamfer 3/4" HUB Diameter
Saw Thickness	Standard Concavity	
.0020"	C17-002-16-36	
.0040"	C17-004-16-36	
.0060"	C17-006-16-36	
.0080"	C17-008-16-36	
.0100"	C17-010-16-36	
.0120"	C17-012-16-36	–
.0140"	C17-014-16-36	–
.0156"	C17-016-16-36	–
.0180"	C17-018-16-36	–
.0200"	C17-020-16-36	K17-020-16-36
.0230"	C17-023-16-36	K17-023-16-36
.0250"	C17-025-16-36	K17-025-16-36
.0280"	C17-028-16-36	K17-028-16-36
.0312"	C17-032-16-36	K17-032-16-36
.0350"	C17-035-16-36	K17-035-16-36
.0400"	C17-040-16-36	K17-040-16-36
.0468"	C17-045-16-36	K17-045-16-36
.0510"	C17-051-16-36	K17-051-16-36
.0625"	C17-062-16-36	K17-062-16-36
.0781"	C17-078-16-36	K17-078-16-36
.0937"	C17-092-16-36	K17-092-16-36
.1250"	C17-125-16-36	K17-125-16-36
.1562"	C17-156-16-36	K17-156-16-36
.1875"	C17-187-16-36	K17-187-16-36
.2500"	C17-250-16-36	K17-250-16-36

Any Saw Thickness Available

Solid carbide spacers and flanges for 1-3/4" saws are available with 1/2" arbor holes in diameters ranging from .750" to 1.650" and thicknesses from .002" to .250". Call for price and delivery.

1 3/4" Diameter 5/8" Arbor

Proper Max Depth of Cut:
Using AB Arbor = .325"
Using NAB Arbor = .2875"

Al Aluminum · Cu Copper · Mg Magnesium · Plastics · Composites · Brass

Use if DOC is more than 5X saw thickness

24 TEETH		Double Concavity Alternative Tooth Chamfer 1" HUB Diameter
Saw Thickness	Standard Concavity	
.0020"	C17-002-20-24	
.0040"	C17-004-20-24	
.0060"	C17-006-20-24	
.0080"	C17-008-20-24	
.0100"	C17-010-20-24	
.0120"	C17-012-20-24	–
.0140"	C17-014-20-24	–
.0156"	C17-016-20-24	–
.0180"	C17-018-20-24	–
.0200"	C17-020-20-24	K17-020-20-24
.0230"	C17-023-20-24	K17-023-20-24
.0250"	C17-025-20-24	K17-025-20-24
.0280"	C17-028-20-24	K17-028-20-24
.0312"	C17-032-20-24	K17-032-20-24
.0350"	C17-035-20-24	K17-035-20-24
.0400"	C17-040-20-24	K17-040-20-24
.0468"	C17-045-20-24	K17-045-20-24
.0510"	C17-051-20-24	K17-051-20-24
.0625"	C17-062-20-24	K17-062-20-24
.0781"	C17-078-20-24	K17-078-20-24
.0937"	C17-092-20-24	K17-092-20-24
.1250"	C17-125-20-24	K17-125-20-24
.1562"	C17-156-20-24	K17-156-20-24
.1875"	C17-187-20-24	K17-187-20-24
.2500"	C17-250-20-24	K17-250-20-24

Ti Titanium · Cast Iron · Steel · Stainless Steel · Super Alloys

Use if DOC is more than 5X saw thickness

36 TEETH		Double Concavity Alternative Tooth Chamfer 1" HUB Diameter
Saw Thickness	Standard Concavity	
.0020"	C17-002-20-36	
.0040"	C17-004-20-36	
.0060"	C17-006-20-36	
.0080"	C17-008-20-36	
.0100"	C17-010-20-36	
.0120"	C17-012-20-36	–
.0140"	C17-014-20-36	–
.0156"	C17-016-20-36	–
.0180"	C17-018-20-36	–
.0200"	C17-020-20-36	K17-020-20-36
.0230"	C17-023-20-36	K17-023-20-36
.0250"	C17-025-20-36	K17-025-20-36
.0280"	C17-028-20-36	K17-028-20-36
.0312"	C17-032-20-36	K17-032-20-36
.0350"	C17-035-20-36	K17-035-20-36
.0400"	C17-040-20-36	K17-040-20-36
.0468"	C17-045-20-36	K17-045-20-36
.0510"	C17-051-20-36	K17-051-20-36
.0625"	C17-062-20-36	K17-062-20-36
.0781"	C17-078-20-36	K17-078-20-36
.0937"	C17-092-20-36	K17-092-20-36
.1250"	C17-125-20-36	K17-125-20-36
.1562"	C17-156-20-36	K17-156-20-36
.1875"	C17-187-20-36	K17-187-20-36
.2500"	C17-250-20-36	K17-250-20-36

Solid carbide spacers and flanges for 1-3/4" saws are available with 5/8" arbor holes in diameters ranging from .875" to 1.650" and thicknesses from .002" to .250". Call for price and delivery.

SAWS Solid Carbide

1¾" Diameter 7/8" Arbor

Proper Max Depth of Cut:
Using AB Arbor = .200"
Using NAB Arbor = .108"

Al Aluminum | Cu Copper | Mg Magnesium | Plastics Plastics | Composites | Brass Brass

Use if DOC is more than 5X saw thickness

24 TEETH		Double Concavity Alternative Tooth Chamfer 1-1/4" HUB Diameter
Saw Thickness	Standard Concavity	
.0020"	C17-002-28-24	
.0040"	C17-004-28-24	
.0060"	C17-006-28-24	
.0080"	C17-008-28-24	
.0100"	C17-010-28-24	
.0120"	C17-012-28-24	–
.0140"	C17-014-28-24	–
.0156"	C17-016-28-24	–
.0180"	C17-018-28-24	–
.0200"	C17-020-28-24	K17-020-28-24
.0230"	C17-023-28-24	K17-023-28-24
.0250"	C17-025-28-24	K17-025-28-24
.0280"	C17-028-28-24	K17-028-28-24
.0312"	C17-032-28-24	K17-032-28-24
.0350"	C17-035-28-24	K17-035-28-24
.0400"	C17-040-28-24	K17-040-28-24
.0468"	C17-045-28-24	K17-045-28-24
.0510"	C17-051-28-24	K17-051-28-24
.0625"	C17-062-28-24	K17-062-28-24
.0781"	C17-078-28-24	K17-078-28-24
.0937"	C17-092-28-24	K17-092-28-24
.1250"	C17-125-28-24	K17-125-28-24
.1562"	C17-156-28-24	K17-156-28-24
.1875"	C17-187-28-24	K17-187-28-24
.2500"	C17-250-28-24	K17-250-28-24

Any Saw Thickness Available

Ti Titanium | Cast Iron Cast Iron | Steel Steel | Stainless Steel Stainless Steel | Super Alloys Super Alloys

Use if DOC is more than 5X saw thickness

36 TEETH		Double Concavity Alternative Tooth Chamfer 1-1/4" HUB Diameter
Saw Thickness	Standard Concavity	
.0020"	C17-002-28-36	
.0040"	C17-004-28-36	
.0060"	C17-006-28-36	
.0080"	C17-008-28-36	
.0100"	C17-010-28-36	
.0120"	C17-012-28-36	–
.0140"	C17-014-28-36	–
.0156"	C17-016-28-36	–
.0180"	C17-018-28-36	–
.0200"	C17-020-28-36	K17-020-28-36
.0230"	C17-023-28-36	K17-023-28-36
.0250"	C17-025-28-36	K17-025-28-36
.0280"	C17-028-28-36	K17-028-28-36
.0312"	C17-032-28-36	K17-032-28-36
.0350"	C17-035-28-36	K17-035-28-36
.0400"	C17-040-28-36	K17-040-28-36
.0468"	C17-045-28-36	K17-045-28-36
.0510"	C17-051-28-36	K17-051-28-36
.0625"	C17-062-28-36	K17-062-28-36
.0781"	C17-078-28-36	K17-078-28-36
.0937"	C17-092-28-36	K17-092-28-36
.1250"	C17-125-28-36	K17-125-28-36
.1562"	C17-156-28-36	K17-156-28-36
.1875"	C17-187-28-36	K17-187-28-36
.2500"	C17-250-28-36	K17-250-28-36

Any Saw Thickness Available

Solid carbide spacers and flanges for 1-3/4" saws are available with 7/8" arbor holes in diameters ranging from 1.125" to 1.650" and thicknesses from .002" to .250". Call for price and delivery.

2" Diameter 1/2" Arbor

Proper Max Depth of Cut:
Using AB Arbor = .575"
Using NAB Arbor = .5225"

Al Aluminum | Cu Copper | Mg Magnesium | Plastics Plastics | Composites | Brass Brass

Use if DOC is more than 5X saw thickness

24 TEETH		Double Concavity Alternative Tooth Chamfer 3/4" HUB Diameter
Saw Thickness	Standard Concavity	
.0020"	C20-002-16-24	
.0040"	C20-004-16-24	
.0060"	C20-006-16-24	
.0080"	C20-008-16-24	
.0100"	C20-010-16-24	
.0120"	C20-012-16-24	–
.0140"	C20-014-16-24	–
.0156"	C20-016-16-24	–
.0180"	C20-018-16-24	–
.0200"	C20-020-16-24	K20-020-16-24
.0230"	C20-023-16-24	K20-023-16-24
.0250"	C20-025-16-24	K20-025-16-24
.0280"	C20-028-16-24	K20-028-16-24
.0312"	C20-032-16-24	K20-032-16-24
.0350"	C20-035-16-24	K20-035-16-24
.0400"	C20-040-16-24	K20-040-16-24
.0468"	C20-045-16-24	K20-045-16-24
.0510"	C20-051-16-24	K20-051-16-24
.0625"	C20-062-16-24	K20-062-16-24
.0781"	C20-078-16-24	K20-078-16-24
.0937"	C20-092-16-24	K20-092-16-24
.1250"	C20-125-16-24	K20-125-16-24
.1562"	C20-156-16-24	K20-156-16-24
.1875"	C20-187-16-24	K20-187-16-24
.2500"	C20-250-16-24	K20-250-16-24

Ti Titanium | Cast Iron Cast Iron | Steel Steel | Stainless Steel Stainless Steel | Super Alloys Super Alloys

Use if DOC is more than 5X saw thickness

48 TEETH		Double Concavity Alternative Tooth Chamfer 3/4" HUB Diameter
Saw Thickness	Standard Concavity	
.0020"	C20-002-16-48	
.0040"	C20-004-16-48	
.0060"	C20-006-16-48	
.0080"	C20-008-16-48	
.0100"	C20-010-16-48	
.0120"	C20-012-16-48	–
.0140"	C20-014-16-48	–
.0156"	C20-016-16-48	–
.0180"	C20-018-16-48	–
.0200"	C20-020-16-48	K20-020-16-48
.0230"	C20-023-16-48	K20-023-16-48
.0250"	C20-025-16-48	K20-025-16-48
.0280"	C20-028-16-48	K20-028-16-48
.0312"	C20-032-16-48	K20-032-16-48
.0350"	C20-035-16-48	K20-035-16-48
.0400"	C20-040-16-48	K20-040-16-48
.0468"	C20-045-16-48	K20-045-16-48
.0510"	C20-051-16-48	K20-051-16-48
.0625"	C20-062-16-48	K20-062-16-48
.0781"	C20-078-16-48	K20-078-16-48
.0937"	C20-092-16-48	K20-092-16-48
.1250"	C20-125-16-48	K20-125-16-48
.1562"	C20-156-16-48	K20-156-16-48
.1875"	C20-187-16-48	K20-187-16-48
.2500"	C20-250-16-48	K20-250-16-48

Solid carbide spacers and flanges for 2" saws are available with 1/2" arbor holes in diameters ranging from .750" to 1.900" and thicknesses from .004" to .250". Call for price and delivery.

Solid Carbide SAWS

2" Diameter 1" Arbor

Proper Max Depth of Cut:
Using AB Arbor = .200"
Using NAB Arbor = .210"

Al Aluminum | Cu Copper | Mg Magnesium | Plastics Plastics | Composites | Brass Brass

Use if DOC is more than 5X saw thickness

24 TEETH

Saw Thickness	Standard Concavity	Double Concavity Alternative Tooth Chamfer 1-1/2" HUB Diameter
.0020"	C20-002-32-24	
.0040"	C20-004-32-24	
.0060"	C20-006-32-24	
.0080"	C20-008-32-24	
.0100"	C20-010-32-24	
.0120"	C20-012-32-24	–
.0140"	C20-014-32-24	–
.0156"	C20-016-32-24	–
.0180"	C20-018-32-24	–
.0200"	C20-020-32-24	K20-020-32-24
.0230"	C20-023-32-24	K20-023-32-24
.0250"	C20-025-32-24	K20-025-32-24
.0280"	C20-028-32-24	K20-028-32-24
.0312"	C20-032-32-24	K20-032-32-24
.0350"	C20-035-32-24	K20-035-32-24
.0400"	C20-040-32-24	K20-040-32-24
.0468"	C20-045-32-24	K20-045-32-24
.0510"	C20-051-32-24	K20-051-32-24
.0625"	C20-062-32-24	K20-062-32-24
.0781"	C20-078-32-24	K20-078-32-24
.0937"	C20-092-32-24	K20-092-32-24
.1250"	C20-125-32-24	K20-125-32-24
.1562"	C20-156-32-24	K20-156-32-24
.1875"	C20-187-32-24	K20-187-32-24
.2500"	C20-250-32-24	K20-250-32-24

Any Saw Thickness Available

Ti Titanium | Cast Iron Cast Iron | Steel Steel | Stainless Steel Stainless Steel | Super Alloys Super Alloys

Use if DOC is more than 5X saw thickness

48 TEETH

Saw Thickness	Standard Concavity	Double Concavity Alternative Tooth Chamfer 1-1/2" HUB Diameter
.0020"	C20-002-32-48	
.0040"	C20-004-32-48	
.0060"	C20-006-32-48	
.0080"	C20-008-32-48	
.0100"	C20-010-32-48	
.0120"	C20-012-32-48	–
.0140"	C20-014-32-48	–
.0156"	C20-016-32-48	–
.0180"	C20-018-32-48	–
.0200"	C20-020-32-48	K20-020-32-48
.0230"	C20-023-32-48	K20-023-32-48
.0250"	C20-025-32-48	K20-025-32-48
.0280"	C20-028-32-48	K20-028-32-48
.0312"	C20-032-32-48	K20-032-32-48
.0350"	C20-035-32-48	K20-035-32-48
.0400"	C20-040-32-48	K20-040-32-48
.0468"	C20-045-32-48	K20-045-32-48
.0510"	C20-051-32-48	K20-051-32-48
.0625"	C20-062-32-48	K20-062-32-48
.0781"	C20-078-32-48	K20-078-32-48
.0937"	C20-092-32-48	K20-092-32-48
.1250"	C20-125-32-48	K20-125-32-48
.1562"	C20-156-32-48	K20-156-32-48
.1875"	C20-187-32-48	K20-187-32-48
.2500"	C20-250-32-48	K20-250-32-48

Any Saw Thickness Available

Solid carbide spacers and flanges for 2" saws are available with 1" arbor holes in diameters ranging from 1.250" to 1.900" and thicknesses from .004" to .250". Call for price and delivery.

2¼" Diameter 5/8" Arbor

Proper Max Depth of Cut:
Using AB Arbor = .575"
Using NAB Arbor = .5375"

Al Aluminum | Cu Copper | Mg Magnesium | Plastics Plastics | Composites | Brass Brass

Use if DOC is more than 5X saw thickness

28 TEETH

Saw Thickness	Standard Concavity	Double Concavity Alternative Tooth Chamfer 1" HUB Diameter
.0020"	C22-002-20-28	
.0040"	C22-004-20-28	
.0060"	C22-006-20-28	
.0080"	C22-008-20-28	
.0100"	C22-010-20-28	
.0120"	C22-012-20-28	–
.0140"	C22-014-20-28	–
.0156"	C22-016-20-28	–
.0180"	C22-018-20-28	–
.0200"	C22-020-20-28	K22-020-20-28
.0230"	C22-023-20-28	K22-023-20-28
.0250"	C22-025-20-28	K22-025-20-28
.0280"	C22-028-20-28	K22-028-20-28
.0312"	C22-032-20-28	K22-032-20-28
.0350"	C22-035-20-28	K22-035-20-28
.0400"	C22-040-20-28	K22-040-20-28
.0468"	C22-045-20-28	K22-045-20-28
.0510"	C22-051-20-28	K22-051-20-28
.0625"	C22-062-20-28	K22-062-20-28
.0781"	C22-078-20-28	K22-078-20-28
.0937"	C22-092-20-28	K22-092-20-28
.1250"	C22-125-20-28	K22-125-20-28
.1562"	C22-156-20-28	K22-156-20-28
.1875"	C22-187-20-28	K22-187-20-28
.2500"	C22-250-20-28	K22-250-20-28

Ti Titanium | Cast Iron Cast Iron | Steel Steel | Stainless Steel Stainless Steel | Super Alloys Super Alloys

Use if DOC is more than 5X saw thickness

56 TEETH

Saw Thickness	Standard Concavity	Double Concavity Alternative Tooth Chamfer 1" HUB Diameter
.0020"	C22-002-20-56	
.0040"	C22-004-20-56	
.0060"	C22-006-20-56	
.0080"	C22-008-20-56	
.0100"	C22-010-20-56	
.0120"	C22-012-20-56	–
.0140"	C22-014-20-56	–
.0156"	C22-016-20-56	–
.0180"	C22-018-20-56	–
.0200"	C22-020-20-56	K22-020-20-56
.0230"	C22-023-20-56	K22-023-20-56
.0250"	C22-025-20-56	K22-025-20-56
.0280"	C22-028-20-56	K22-028-20-56
.0312"	C22-032-20-56	K22-032-20-56
.0350"	C22-035-20-56	K22-035-20-56
.0400"	C22-040-20-56	K22-040-20-56
.0468"	C22-045-20-56	K22-045-20-56
.0510"	C22-051-20-56	K22-051-20-56
.0625"	C22-062-20-56	K22-062-20-56
.0781"	C22-078-20-56	K22-078-20-56
.0937"	C22-092-20-56	K22-092-20-56
.1250"	C22-125-20-56	K22-125-20-56
.1562"	C22-156-20-56	K22-156-20-56
.1875"	C22-187-20-56	K22-187-20-56
.2500"	C22-250-20-56	K22-250-20-56

Solid carbide spacers and flanges for 2-1/4" saws are available with 5/8" arbor holes in diameters ranging from .875" to 2.150" and thicknesses from .004" to .250". Call for price and delivery.

SAWS Solid Carbide

2½" Diameter 1" Arbor

Proper Max Depth of Cut:
Using AB Arbor = .450"
Using NAB Arbor = .460"

Al Aluminum | Cu Copper | Mg Magnesium | Plastics | Composites | Brass

Use if DOC is more than 5X saw thickness

28 TEETH

Saw Thickness	Standard Concavity	Double Concavity Alternative Tooth Chamfer 1-1/2" HUB Diameter
.0020"	C25-002-32-28	
.0040"	C25-004-32-28	
.0060"	C25-006-32-28	
.0080"	C25-008-32-28	
.0100"	C25-010-32-28	
.0120"	C25-012-32-28	–
.0140"	C25-014-32-28	–
.0156"	C25-016-32-28	–
.0180"	C25-018-32-28	–
.0200"	C25-020-32-28	K25-020-32-28
.0230"	C25-023-32-28	K25-023-32-28
.0250"	C25-025-32-28	K25-025-32-28
.0280"	C25-028-32-28	K25-028-32-28
.0312"	C25-032-32-28	K25-032-32-28
.0350"	C25-035-32-28	K25-035-32-28
.0400"	C25-040-32-28	K25-040-32-28
.0468"	C25-045-32-28	K25-045-32-28
.0510"	C25-051-32-28	K25-051-32-28
.0625"	C25-062-32-28	K25-062-32-28
.0781"	C25-078-32-28	K25-078-32-28
.0937"	C25-092-32-28	K25-092-32-28
.1250"	C25-125-32-28	K25-125-32-28
.1562"	C25-156-32-28	K25-156-32-28
.1875"	C25-187-32-28	K25-187-32-28
.2500"	C25-250-32-28	K25-250-32-28

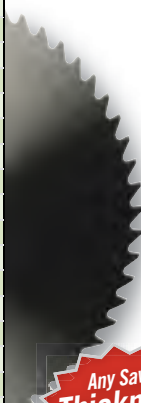
Any Saw Thickness Available

Ti Titanium | Cast Iron | Steel | Stainless Steel | Super Alloys

Use if DOC is more than 5X saw thickness

56 TEETH

Saw Thickness	Standard Concavity	Double Concavity Alternative Tooth Chamfer 1-1/2" HUB Diameter
.0020"	C25-002-32-56	
.0040"	C25-004-32-56	
.0060"	C25-006-32-56	
.0080"	C25-008-32-56	
.0100"	C25-010-32-56	
.0120"	C25-012-32-56	–
.0140"	C25-014-32-56	–
.0156"	C25-016-32-56	–
.0180"	C25-018-32-56	–
.0200"	C25-020-32-56	K25-020-32-56
.0230"	C25-023-32-56	K25-023-32-56
.0250"	C25-025-32-56	K25-025-32-56
.0280"	C25-028-32-56	K25-028-32-56
.0312"	C25-032-32-56	K25-032-32-56
.0350"	C25-035-32-56	K25-035-32-56
.0400"	C25-040-32-56	K25-040-32-56
.0468"	C25-045-32-56	K25-045-32-56
.0510"	C25-051-32-56	K25-051-32-56
.0625"	C25-062-32-56	K25-062-32-56
.0781"	C25-078-32-56	K25-078-32-56
.0937"	C25-092-32-56	K25-092-32-56
.1250"	C25-125-32-56	K25-125-32-56
.1562"	C25-156-32-56	K25-156-32-56
.1875"	C25-187-32-56	K25-187-32-56
.2500"	C25-250-32-56	K25-250-32-56



Any Saw Thickness Available

Solid carbide spacers and flanges for 2-1/2" saws are available with 1" arbor holes in diameters ranging from 1.250" to 2.400" and thicknesses from .004" to .250". Call for price and delivery.

2¾" Diameter 1" Arbor

Proper Max Depth of Cut:
Using AB Arbor = .575"
Using NAB Arbor = .585"

Al Aluminum | Cu Copper | Mg Magnesium | Plastics | Composites | Brass

Use if DOC is more than 5X saw thickness

30 TEETH

Saw Thickness	Standard Concavity	Double Concavity Alternative Tooth Chamfer 1-1/2" HUB Diameter
.0020"	C27-002-32-30	
.0040"	C27-004-32-30	
.0060"	C27-006-32-30	
.0080"	C27-008-32-30	
.0100"	C27-010-32-30	
.0120"	C27-012-32-30	–
.0140"	C27-014-32-30	–
.0156"	C27-016-32-30	–
.0180"	C27-018-32-30	–
.0200"	C27-020-32-30	K27-020-32-30
.0230"	C27-023-32-30	K27-023-32-30
.0250"	C27-025-32-30	K27-025-32-30
.0280"	C27-028-32-30	K27-028-32-30
.0312"	C27-032-32-30	K27-032-32-30
.0350"	C27-035-32-30	K27-035-32-30
.0400"	C27-040-32-30	K27-040-32-30
.0468"	C27-045-32-30	K27-045-32-30
.0510"	C27-051-32-30	K27-051-32-30
.0625"	C27-062-32-30	K27-062-32-30
.0781"	C27-078-32-30	K27-078-32-30
.0937"	C27-092-32-30	K27-092-32-30
.1250"	C27-125-32-30	K27-125-32-30
.1562"	C27-156-32-30	K27-156-32-30
.1875"	C27-187-32-30	K27-187-32-30
.2500"	C27-250-32-30	K27-250-32-30

Ti Titanium | Cast Iron | Steel | Stainless Steel | Super Alloys

Use if DOC is more than 5X saw thickness

60 TEETH

Saw Thickness	Standard Concavity	Double Concavity Alternative Tooth Chamfer 1-1/2" HUB Diameter
.0020"	C27-002-32-60	
.0040"	C27-004-32-60	
.0060"	C27-006-32-60	
.0080"	C27-008-32-60	
.0100"	C27-010-32-60	
.0120"	C27-012-32-60	–
.0140"	C27-014-32-60	–
.0156"	C27-016-32-60	–
.0180"	C27-018-32-60	–
.0200"	C27-020-32-60	K27-020-32-60
.0230"	C27-023-32-60	K27-023-32-60
.0250"	C27-025-32-60	K27-025-32-60
.0280"	C27-028-32-60	K27-028-32-60
.0312"	C27-032-32-60	K27-032-32-60
.0350"	C27-035-32-60	K27-035-32-60
.0400"	C27-040-32-60	K27-040-32-60
.0468"	C27-045-32-60	K27-045-32-60
.0510"	C27-051-32-60	K27-051-32-60
.0625"	C27-062-32-60	K27-062-32-60
.0781"	C27-078-32-60	K27-078-32-60
.0937"	C27-092-32-60	K27-092-32-60
.1250"	C27-125-32-60	K27-125-32-60
.1562"	C27-156-32-60	K27-156-32-60
.1875"	C27-187-32-60	K27-187-32-60
.2500"	C27-250-32-60	K27-250-32-60

Solid carbide spacers and flanges for 2-3/4" saws are available with 1" arbor holes in diameters ranging from 1.250" to 2.65" and thicknesses from .004" to .250". Call for price and delivery.

Solid Carbide SAWS

3" Diameter 1" Arbor

Proper Max Depth of Cut:
Using AB Arbor = .700"
Using NAB Arbor = .710"

Al Aluminum | Cu Copper | Mg Magnesium | Plastics Plastics | Composites | Brass Brass

Use if DOC is more than 5X saw thickness

30 TEETH

Saw Thickness	Standard Concavity	Double Concavity Alternative Tooth Chamfer 1-1/2" HUB Diameter
.0020"	C30-002-32-30	
.0040"	C30-004-32-30	
.0060"	C30-006-32-30	
.0080"	C30-008-32-30	
.0100"	C30-010-32-30	
.0120"	C30-012-32-30	–
.0140"	C30-014-32-30	–
.0156"	C30-016-32-30	–
.0180"	C30-018-32-30	–
.0200"	C30-020-32-30	K30-020-32-30
.0230"	C30-023-32-30	K30-023-32-30
.0250"	C30-025-32-30	K30-025-32-30
.0280"	C30-028-32-30	K30-028-32-30
.0312"	C30-032-32-30	K30-032-32-30
.0350"	C30-035-32-30	K30-035-32-30
.0400"	C30-040-32-30	K30-040-32-30
.0468"	C30-045-32-30	K30-045-32-30
.0510"	C30-051-32-30	K30-051-32-30
.0625"	C30-062-32-30	K30-062-32-30
.0781"	C30-078-32-30	K30-078-32-30
.0937"	C30-092-32-30	K30-092-32-30
.1250"	C30-125-32-30	K30-125-32-30
.1562"	C30-156-32-30	K30-156-32-30
.1875"	C30-187-32-30	K30-187-32-30
.2500"	C30-250-32-30	K30-250-32-30

Any Saw Thickness Available

Ti Titanium | Cast Iron Cast Iron | Steel Steel | Stainless Steel Stainless Steel | Super Alloys Super Alloys

Use if DOC is more than 5X saw thickness

60 TEETH

Saw Thickness	Standard Concavity	Double Concavity Alternative Tooth Chamfer 1-1/2" HUB Diameter
.0020"	C30-002-32-60	
.0040"	C30-004-32-60	
.0060"	C30-006-32-60	
.0080"	C30-008-32-60	
.0100"	C30-010-32-60	
.0120"	C30-012-32-60	–
.0140"	C30-014-32-60	–
.0156"	C30-016-32-60	–
.0180"	C30-018-32-60	–
.0200"	C30-020-32-60	K30-020-32-60
.0230"	C30-023-32-60	K30-023-32-60
.0250"	C30-025-32-60	K30-025-32-60
.0280"	C30-028-32-60	K30-028-32-60
.0312"	C30-032-32-60	K30-032-32-60
.0350"	C30-035-32-60	K30-035-32-60
.0400"	C30-040-32-60	K30-040-32-60
.0468"	C30-045-32-60	K30-045-32-60
.0510"	C30-051-32-60	K30-051-32-60
.0625"	C30-062-32-60	K30-062-32-60
.0781"	C30-078-32-60	K30-078-32-60
.0937"	C30-092-32-60	K30-092-32-60
.1250"	C30-125-32-60	K30-125-32-60
.1562"	C30-156-32-60	K30-156-32-60
.1875"	C30-187-32-60	K30-187-32-60
.2500"	C30-250-32-60	K30-250-32-60

Any Saw Thickness Available

Solid carbide spacers and flanges for 3" saws are available with 1" arbor holes in diameters ranging from 1.250" to 2.900" and thicknesses from .006" to .250". Call for price and delivery.

4" Diameter 1" Arbor

Proper Max Depth of Cut:
Using AB Arbor = 1.200"
Using NAB Arbor = 1.210"

Al Aluminum | Cu Copper | Mg Magnesium | Plastics Plastics | Composites | Brass Brass

Use if DOC is more than 5X saw thickness

36 TEETH

Saw Thickness	Standard Concavity	Double Concavity Alternative Tooth Chamfer 1-1/2" HUB Diameter
.0020"	C40-002-32-36	
.0040"	C40-004-32-36	
.0060"	C40-006-32-36	
.0080"	C40-008-32-36	
.0100"	C40-010-32-36	
.0120"	C40-012-32-36	–
.0140"	C40-014-32-36	–
.0156"	C40-016-32-36	–
.0180"	C40-018-32-36	–
.0200"	C40-020-32-36	K40-020-32-36
.0230"	C40-023-32-36	K40-023-32-36
.0250"	C40-025-32-36	K40-025-32-36
.0280"	C40-028-32-36	K40-028-32-36
.0312"	C40-032-32-36	K40-032-32-36
.0350"	C40-035-32-36	K40-035-32-36
.0400"	C40-040-32-36	K40-040-32-36
.0468"	C40-045-32-36	K40-045-32-36
.0510"	C40-051-32-36	K40-051-32-36
.0625"	C40-062-32-36	K40-062-32-36
.0781"	C40-078-32-36	K40-078-32-36
.0937"	C40-092-32-36	K40-092-32-36
.1250"	C40-125-32-36	K40-125-32-36
.1562"	C40-156-32-36	K40-156-32-36
.1875"	C40-187-32-36	K40-187-32-36
.2500"	C40-250-32-36	K40-250-32-36

Ti Titanium | Cast Iron Cast Iron | Steel Steel | Stainless Steel Stainless Steel | Super Alloys Super Alloys

Use if DOC is more than 5X saw thickness

72 TEETH

Saw Thickness	Standard Concavity	Double Concavity Alternative Tooth Chamfer 1-1/2" HUB Diameter
.0020"	C40-002-32-72	
.0040"	C40-004-32-72	
.0060"	C40-006-32-72	
.0080"	C40-008-32-72	
.0100"	C40-010-32-72	
.0120"	C40-012-32-72	–
.0140"	C40-014-32-72	–
.0156"	C40-016-32-72	–
.0180"	C40-018-32-72	–
.0200"	C40-020-32-72	K40-020-32-72
.0230"	C40-023-32-72	K40-023-32-72
.0250"	C40-025-32-72	K40-025-32-72
.0280"	C40-028-32-72	K40-028-32-72
.0312"	C40-032-32-72	K40-032-32-72
.0350"	C40-035-32-72	K40-035-32-72
.0400"	C40-040-32-72	K40-040-32-72
.0468"	C40-045-32-72	K40-045-32-72
.0510"	C40-051-32-72	K40-051-32-72
.0625"	C40-062-32-72	K40-062-32-72
.0781"	C40-078-32-72	K40-078-32-72
.0937"	C40-092-32-72	K40-092-32-72
.1250"	C40-125-32-72	K40-125-32-72
.1562"	C40-156-32-72	K40-156-32-72
.1875"	C40-187-32-72	K40-187-32-72
.2500"	C40-250-32-72	K40-250-32-72

Solid carbide spacers and flanges for 4" saws are available with 1" arbor holes in diameters ranging from 1.250" to 3.900" and thicknesses from .006" to .250". Call for price and delivery.

SAWS Solid Carbide

20 mm Diameter 5 mm Arbor

Proper Max Depth of Cut: Using MSA Arbor = 3.5 mm

Al Aluminum | Cu Copper | Mg Magnesium | Plastics | Composites | Brass

Use if DOC is more than 5X saw thickness

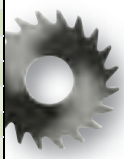
10 TEETH METRIC		Double Concavity Alternative Tooth Chamfer 12mm HUB Diameter
Saw Thickness	Standard Concavity	
.05 mm	M20-005-05-10	
.10 mm	M20-010-05-10	
.15 mm	M20-015-05-10	
.20 mm	M20-020-05-10	
.40 mm	M20-040-05-10	
.60 mm	M20-060-05-10	MK20-060-05-10
1.00 mm	M20-100-05-10	MK20-100-05-10
1.20 mm	M20-120-05-10	MK20-120-05-10
1.60 mm	M20-160-05-10	MK20-160-05-10
2.00 mm	M20-200-05-10	MK20-200-05-10
2.50 mm	M20-250-05-10	MK20-250-05-10
3.00 mm	M20-300-05-10	MK20-300-05-10
4.00 mm	M20-400-05-10	MK20-400-05-10
5.00 mm	M20-500-05-10	MK20-500-05-10
6.00 mm	M20-600-05-10	MK20-600-05-10

Any Saw Thickness Available

Ti Titanium | Cast Iron | Steel | Stainless Steel | Super Alloys

Use if DOC is more than 5X saw thickness

20 TEETH METRIC		Double Concavity Alternative Tooth Chamfer 12mm HUB Diameter
Saw Thickness	Standard Concavity	
.05 mm	M20-005-05-20	
.10 mm	M20-010-05-20	
.15 mm	M20-015-05-20	
.20 mm	M20-020-05-20	
.40 mm	M20-040-05-20	
.60 mm	M20-060-05-20	MK20-060-05-20
1.00 mm	M20-100-05-20	MK20-100-05-20
1.20 mm	M20-120-05-20	MK20-120-05-20
1.60 mm	M20-160-05-20	MK20-160-05-20
2.00 mm	M20-200-05-20	MK20-200-05-20
2.50 mm	M20-250-05-20	MK20-250-05-20
3.00 mm	M20-300-05-20	MK20-300-05-20
4.00 mm	M20-400-05-20	MK20-400-05-20
5.00 mm	M20-500-05-20	MK20-500-05-20
6.00 mm	M20-600-05-20	MK20-600-05-20



Solid carbide spacers and flanges available. See back of Saws section.

25 mm Diameter 8 mm Arbor

Proper Max Depth of Cut: Using MSA Arbor = 4.0 mm

Al Aluminum | Cu Copper | Mg Magnesium | Plastics | Composites | Brass

Use if DOC is more than 5X saw thickness

12 TEETH METRIC		Double Concavity Alternative Tooth Chamfer 16mm HUB Diameter
Saw Thickness	Standard Concavity	
.05 mm	M25-005-08-12	
.10 mm	M25-010-08-12	
.15 mm	M25-015-08-12	
.20 mm	M25-020-08-12	
.40 mm	M25-040-08-12	
.60 mm	M25-060-08-12	MK25-060-08-12
1.00 mm	M25-100-08-12	MK25-100-08-12
1.20 mm	M25-120-08-12	MK25-120-08-12
1.60 mm	M25-160-08-12	MK25-160-08-12
2.00 mm	M25-200-08-12	MK25-200-08-12
2.50 mm	M25-250-08-12	MK25-250-08-12
3.00 mm	M25-300-08-12	MK25-300-08-12
4.00 mm	M25-400-08-12	MK25-400-08-12
5.00 mm	M25-500-08-12	MK25-500-08-12
6.00 mm	M25-600-08-12	MK25-600-08-12

Ti Titanium | Cast Iron | Steel | Stainless Steel | Super Alloys

Use if DOC is more than 5X saw thickness

24 TEETH METRIC		Double Concavity Alternative Tooth Chamfer 16mm HUB Diameter
Saw Thickness	Standard Concavity	
.05 mm	M25-005-08-24	
.10 mm	M25-010-08-24	
.15 mm	M25-015-08-24	
.20 mm	M25-020-08-24	
.40 mm	M25-040-08-24	
.60 mm	M25-060-08-24	MK25-060-08-24
1.00 mm	M25-100-08-24	MK25-100-08-24
1.20 mm	M25-120-08-24	MK25-120-08-24
1.60 mm	M25-160-08-24	MK25-160-08-24
2.00 mm	M25-200-08-24	MK25-200-08-24
2.50 mm	M25-250-08-24	MK25-250-08-24
3.00 mm	M25-300-08-24	MK25-300-08-24
4.00 mm	M25-400-08-24	MK25-400-08-24
5.00 mm	M25-500-08-24	MK25-500-08-24
6.00 mm	M25-600-08-24	MK25-600-08-24

Solid carbide spacers and flanges available. See back of Saws section.

See Price Sheet for Quantity Discount

Info on Page 108

Solid Carbide SAWS

Any Saw Thickness Available

32 mm Diameter 8 mm Arbor

Proper Max Depth of Cut: Using MSA Arbor = 7.5 mm

Al Aluminum | Cu Copper | Mg Magnesium | Plastics | Composites | Brass

Use if DOC is more than 5X saw thickness

16 TEETH METRIC		Double Concavity Alternative Tooth Chamfer 16mm HUB Diameter
Saw Thickness	Standard Concavity	
.10 mm	M32-010-08-16	–
.15 mm	M32-015-08-16	–
.20 mm	M32-020-08-16	–
.40 mm	M32-040-08-16	–
.60 mm	M32-060-08-16	MK32-060-08-16
1.00 mm	M32-100-08-16	MK32-100-08-16
1.20 mm	M32-120-08-16	MK32-120-08-16
1.60 mm	M32-160-08-16	MK32-160-08-16
2.00 mm	M32-200-08-16	MK32-200-08-16
2.50 mm	M32-250-08-16	MK32-250-08-16
3.00 mm	M32-300-08-16	MK32-300-08-16
4.00 mm	M32-400-08-16	MK32-400-08-16
5.00 mm	M32-500-08-16	MK32-500-08-16
6.00 mm	M32-600-08-16	MK32-600-08-16

Ti Titanium | Cast Iron | Steel | Stainless Steel | Super Alloys

Use if DOC is more than 5X saw thickness

36 TEETH METRIC		Double Concavity Alternative Tooth Chamfer 16mm HUB Diameter
Saw Thickness	Standard Concavity	
.10 mm	M32-010-08-36	–
.15 mm	M32-015-08-36	–
.20 mm	M32-020-08-36	–
.40 mm	M32-040-08-36	–
.60 mm	M32-060-08-36	MK32-060-08-36
1.00 mm	M32-100-08-36	MK32-100-08-36
1.20 mm	M32-120-08-36	MK32-120-08-36
1.60 mm	M32-160-08-36	MK32-160-08-36
2.00 mm	M32-200-08-36	MK32-200-08-36
2.50 mm	M32-250-08-36	MK32-250-08-36
3.00 mm	M32-300-08-36	MK32-300-08-36
4.00 mm	M32-400-08-36	MK32-400-08-36
5.00 mm	M32-500-08-36	MK32-500-08-36
6.00 mm	M32-600-08-36	MK32-600-08-36

Solid carbide spacers and flanges available. See back of Saws section.

40 mm Diameter 10 mm Arbor

Proper Max Depth of Cut: Using MSA Arbor = 10.5 mm

Al Aluminum | Cu Copper | Mg Magnesium | Plastics | Composites | Brass

Use if DOC is more than 5X saw thickness

16 TEETH METRIC		Double Concavity Alternative Tooth Chamfer 18mm HUB Diameter
Saw Thickness	Standard Concavity	
.10 mm	M40-010-10-16	–
.15 mm	M40-015-10-16	–
.20 mm	M40-020-10-16	–
.40 mm	M40-040-10-16	–
.60 mm	M40-060-10-16	MK40-060-10-16
1.00 mm	M40-100-10-16	MK40-100-10-16
1.20 mm	M40-120-10-16	MK40-120-10-16
1.60 mm	M40-160-10-16	MK40-160-10-16
2.00 mm	M40-200-10-16	MK40-200-10-16
2.50 mm	M40-250-10-16	MK40-250-10-16
3.00 mm	M40-300-10-16	MK40-300-10-16
4.00 mm	M40-400-10-16	MK40-400-10-16
5.00 mm	M40-500-10-16	MK40-500-10-16
6.00 mm	M40-600-10-16	MK40-600-10-16

Ti Titanium | Cast Iron | Steel | Stainless Steel | Super Alloys

Use if DOC is more than 5X saw thickness

36 TEETH METRIC		Double Concavity Alternative Tooth Chamfer 18mm HUB Diameter
Saw Thickness	Standard Concavity	
.10 mm	M40-010-10-36	–
.15 mm	M40-015-10-36	–
.20 mm	M40-020-10-36	–
.40 mm	M40-040-10-36	–
.60 mm	M40-060-10-36	MK40-060-10-36
1.00 mm	M40-100-10-36	MK40-100-10-36
1.20 mm	M40-120-10-36	MK40-120-10-36
1.60 mm	M40-160-10-36	MK40-160-10-36
2.00 mm	M40-200-10-36	MK40-200-10-36
2.50 mm	M40-250-10-36	MK40-250-10-36
3.00 mm	M40-300-10-36	MK40-300-10-36
4.00 mm	M40-400-10-36	MK40-400-10-36
5.00 mm	M40-500-10-36	MK40-500-10-36
6.00 mm	M40-600-10-36	MK40-600-10-36

Solid carbide spacers and flanges available. See back of Saws section.

NEW Coatings Available!

TiN TiCN AlTiN

Any Thickness Available! JUST ASK!

SAWS Solid Carbide

Any Saw Thickness Available

50 mm Diameter 13 mm Arbor

Proper Max Depth of Cut: MSA Arbor = 14.5 mm

Al Aluminum | Cu Copper | Mg Magnesium | Plastics | Composites | Brass

Use if DOC is more than 5X saw thickness

24 TEETH METRIC		Double Concavity Alternative Tooth Chamfer 20mm HUB Diameter
Saw Thickness	Standard Concavity	
.15 mm	M50-015-13-24	–
.20 mm	M50-020-13-24	–
.40 mm	M50-040-13-24	–
.60 mm	M50-060-13-24	MK50-060-13-24
1.00 mm	M50-100-13-24	MK50-100-13-24
1.20 mm	M50-120-13-24	MK50-120-13-24
1.60 mm	M50-160-13-24	MK50-160-13-24
2.00 mm	M50-200-13-24	MK50-200-13-24
2.50 mm	M50-250-13-24	MK50-250-13-24
3.00 mm	M50-300-13-24	MK50-300-13-24
4.00 mm	M50-400-13-24	MK50-400-13-24
5.00 mm	M50-500-13-24	MK50-500-13-24
6.00 mm	M50-600-13-24	MK50-600-13-24

Ti Titanium | Cast Iron | Steel | Stainless Steel | Super Alloys

Use if DOC is more than 5X saw thickness

48 TEETH METRIC		Double Concavity Alternative Tooth Chamfer 20mm HUB Diameter
Saw Thickness	Standard Concavity	
.15 mm	M50-015-13-48	–
.20 mm	M50-020-13-48	–
.40 mm	M50-040-13-48	–
.60 mm	M50-060-13-48	MK50-060-13-48
1.00 mm	M50-100-13-48	MK50-100-13-48
1.20 mm	M50-120-13-48	MK50-120-13-48
1.60 mm	M50-160-13-48	MK50-160-13-48
2.00 mm	M50-200-13-48	MK50-200-13-48
2.50 mm	M50-250-13-48	MK50-250-13-48
3.00 mm	M50-300-13-48	MK50-300-13-48
4.00 mm	M50-400-13-48	MK50-400-13-48
5.00 mm	M50-500-13-48	MK50-500-13-48
6.00 mm	M50-600-13-48	MK50-600-13-48

Solid carbide spacers and flanges available. See back of Saws section.

63 mm Diameter 16 mm Arbor

Proper Max Depth of Cut: MSA Arbor = 18.5 mm

Al Aluminum | Cu Copper | Mg Magnesium | Plastics | Composites | Brass

Use if DOC is more than 5X saw thickness

28 TEETH METRIC		Double Concavity Alternative Tooth Chamfer 25mm HUB Diameter
Saw Thickness	Standard Concavity	
.15 mm	M63-015-16-28	–
.20 mm	M63-020-16-28	–
.40 mm	M63-040-16-28	–
.60 mm	M63-060-16-28	MK63-060-16-28
1.00 mm	M63-100-16-28	MK63-100-16-28
1.20 mm	M63-120-16-28	MK63-120-16-28
1.60 mm	M63-160-16-28	MK63-160-16-28
2.00 mm	M63-200-16-28	MK63-200-16-28
2.50 mm	M63-250-16-28	MK63-250-16-28
3.00 mm	M63-300-16-28	MK63-300-16-28
4.00 mm	M63-400-16-28	MK63-400-16-28
5.00 mm	M63-500-16-28	MK63-500-16-28
6.00 mm	M63-600-16-28	MK63-600-16-28

Ti Titanium | Cast Iron | Steel | Stainless Steel | Super Alloys

Use if DOC is more than 5X saw thickness

56 TEETH METRIC		Double Concavity Alternative Tooth Chamfer 25mm HUB Diameter
Saw Thickness	Standard Concavity	
.15 mm	M63-015-16-56	–
.20 mm	M63-020-16-56	–
.40 mm	M63-040-16-56	–
.60 mm	M63-060-16-56	MK63-060-16-56
1.00 mm	M63-100-16-56	MK63-100-16-56
1.20 mm	M63-120-16-56	MK63-120-16-56
1.60 mm	M63-160-16-56	MK63-160-16-56
2.00 mm	M63-200-16-56	MK63-200-16-56
2.50 mm	M63-250-16-56	MK63-250-16-56
3.00 mm	M63-300-16-56	MK63-300-16-56
4.00 mm	M63-400-16-56	MK63-400-16-56
5.00 mm	M63-500-16-56	MK63-500-16-56
6.00 mm	M63-600-16-56	MK63-600-16-56

Solid carbide spacers and flanges available. See back of Saws section.

Solid Carbide SAWS

Any Saw Thickness Available

80 mm Diameter 22 mm Arbor

Proper Max Depth of Cut: MSA Arbor = 24.5 mm

Al Aluminum · Cu Copper · Mg Magnesium · Plastics · Composites · Brass

Use if DOC is more than 5X saw thickness

30 TEETH METRIC		Double Concavity Alternative Tooth Chamfer 35mm HUB Diameter
Saw Thickness	Standard Concavity	
.20 mm	M80-020-22-30	–
.40 mm	M80-040-22-30	–
.60 mm	M80-060-22-30	MK80-060-22-30
1.00 mm	M80-100-22-30	MK80-100-22-30
1.20 mm	M80-120-22-30	MK80-120-22-30
1.60 mm	M80-160-22-30	MK80-160-22-30
2.00 mm	M80-200-22-30	MK80-200-22-30
2.50 mm	M80-250-22-30	MK80-250-22-30
3.00 mm	M80-300-22-30	MK80-300-22-30
4.00 mm	M80-400-22-30	MK80-400-22-30
5.00 mm	M80-500-22-30	MK80-500-22-30
6.00 mm	M80-600-22-30	MK80-600-22-30

Ti Titanium · Cast Iron · Steel · Stainless Steel · Super Alloys

Use if DOC is more than 5X saw thickness

60 TEETH METRIC		Double Concavity Alternative Tooth Chamfer 35mm HUB Diameter
Saw Thickness	Standard Concavity	
.20 mm	M80-020-22-60	–
.40 mm	M80-040-22-60	–
.60 mm	M80-060-22-60	MK80-060-22-60
1.00 mm	M80-100-22-60	MK80-100-22-60
1.20 mm	M80-120-22-60	MK80-120-22-60
1.60 mm	M80-160-22-60	MK80-160-22-60
2.00 mm	M80-200-22-60	MK80-200-22-60
2.50 mm	M80-250-22-60	MK80-250-22-60
3.00 mm	M80-300-22-60	MK80-300-22-60
4.00 mm	M80-400-22-60	MK80-400-22-60
5.00 mm	M80-500-22-60	MK80-500-22-60
6.00 mm	M80-600-22-60	MK80-600-22-60

Solid carbide spacers and flanges available. See back of Saws section.

100 mm Diameter 22 mm Arbor

Proper Max Depth of Cut: MSA Arbor = 34.5 mm

Al Aluminum · Cu Copper · Mg Magnesium · Plastics · Composites · Brass

Use if DOC is more than 5X saw thickness

36 TEETH METRIC		Double Concavity Alternative Tooth Chamfer 35mm HUB Diameter
Saw Thickness	Standard Concavity	
.20 mm	M100-020-22-36	–
.40 mm	M100-040-22-36	–
.60 mm	M100-060-22-36	MK100-060-22-36
1.00 mm	M100-100-22-36	MK100-100-22-36
1.20 mm	M100-120-22-36	MK100-120-22-36
1.60 mm	M100-160-22-36	MK100-160-22-36
2.00 mm	M100-200-22-36	MK100-200-22-36
2.50 mm	M100-250-22-36	MK100-250-22-36
3.00 mm	M100-300-22-36	MK100-300-22-36
4.00 mm	M100-400-22-36	MK100-400-22-36
5.00 mm	M100-500-22-36	MK100-500-22-36
6.00 mm	M100-600-22-36	MK100-600-22-36

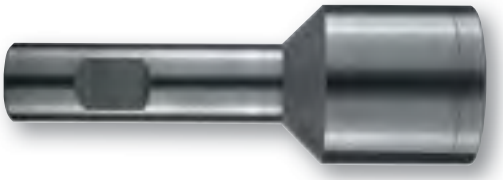
Ti Titanium · Cast Iron · Steel · Stainless Steel · Super Alloys

Use if DOC is more than 5X saw thickness

72 TEETH METRIC		Double Concavity Alternative Tooth Chamfer 35mm HUB Diameter
Saw Thickness	Standard Concavity	
.20 mm	M100-020-22-72	–
.40 mm	M100-040-22-72	–
.60 mm	M100-060-22-72	MK100-060-22-72
1.00 mm	M100-100-22-72	MK100-100-22-72
1.20 mm	M100-120-22-72	MK100-120-22-72
1.60 mm	M100-160-22-72	MK100-160-22-72
2.00 mm	M100-200-22-72	MK100-200-22-72
2.50 mm	M100-250-22-72	MK100-250-22-72
3.00 mm	M100-300-22-72	MK100-300-22-72
4.00 mm	M100-400-22-72	MK100-400-22-72
5.00 mm	M100-500-22-72	MK100-500-22-72
6.00 mm	M100-600-22-72	MK100-600-22-72

Solid carbide spacers and flanges available. See back of Saws section.

SAWS Arbors & Flanges for Saws

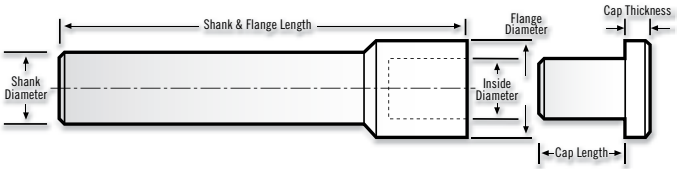


AB Arbors

Arbor Size	Shank Diameter	Flange Diameter	Cap Length	Shank & Flange Length	Cap Thickness	Screw Size (Included)	Hex Key Size (Included)	Part Number
1/4"	1/2"	1/2"	3/8"	2-7/8"	3/16"	8-32 × 1" Flat head Socket head cap screw	3/32"	AB-250
3/8"	1/2"	5/8"	3/8"	2-7/8"	1/4"	10-32 × 1.5" Flat head Socket head cap screw	1/8"	AB-375
1/2"	1/2"	3/4"	1/2"	2-7/8"	1/4"	1/4-20 × 1.5" Socket head cap screw	5/32"	AB-500
5/8"	3/4"	1"	7/8"	4"	1/4"	1/4-20 × 2" Socket head cap screw	3/16"	AB-625
7/8"	3/4"	1-1/4"	1"	4"	1/4"	5/16-18 × 2.5" Socket head cap screw	1/4"	AB-875
1"	3/4"	1-1/2"	1"	4"	1/4"	5/16-18 × 2.5" Socket head cap screw	1/4"	AB-1000
1"	1"	1-1/2"	1"	5"	1/4"	5/16-18 × 2.5" Socket head cap screw	1/4"	AB-1000-1
1-1/4"	1"	1-3/4"	1-3/8"	5"	1/4"	1/2-13 × 3" Socket head cap screw	3/8"	AB-1250

MSA Arbors METRIC

Arbor Size	Shank Diameter	Flange Diameter	Cap Length	Shank & Flange Length	Cap Thickness	Screw Size (Included)	Hex Key Size (Included)	Part Number
5mm	12mm	12mm	10mm	75mm	4.5mm	M3 × 25 Flat head Socket head cap screw	2mm	MSA-05
8mm	12mm	16mm	10mm	75mm	6mm	M3 × 25 Flat head Socket head cap screw	2mm	MSA-08
10mm	12mm	18mm	10mm	75mm	6mm	M5 × 30 Flat head Socket head cap screw	3mm	MSA-10
13mm	12mm	20mm	10mm	75mm	6mm	M5 × 30 Flat head Socket head cap screw	3mm	MSA-13
16mm	16mm	25mm	22mm	100mm	6mm	M5 × 45 Flat head Socket head cap screw	4mm	MSA-16
22mm	20mm	35mm	22mm	100mm	6mm	M6 × 45 Flat head Socket head cap screw	5mm	MSA-22



AB Arbor Tolerances
Inside Dia. = +.0001/+.0003"
Flange Dia. = ±.003"
Shank Dia. = –.0001/–.0003"
OAL = ±.060"
Cap Dia. = +.0000/–.0002"
Cap Length = +.060/–.000"
Cap Thickness = +.060/–.000"

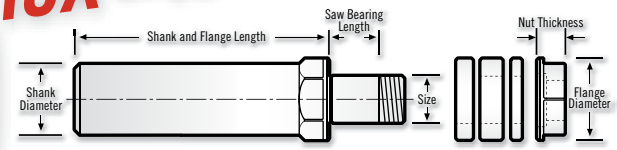
MSA Arbor Tolerances
Inside Dia. = +.005/+.008mm
Flange Dia. = ±.076mm
Shank Dia. = –.0025/–.0076mm
OAL = ±1.5mm
Cap Dia. = +.0000/–.005mm
Cap Length = +1.5/–.000mm
Cap Thickness = +1.5/–.000mm

Inside Diameter concentric to Shank Diameter within .005 mm

Notes:
Total thickness of saws/spacers should not exceed 50% of LOC dimension.

Arbor caps with longer Cap Length dimension available.

NEW! 15X Gripping Force



NAB Arbors

Arbor Size	Shank Diameter	Flange Diameter	Saw Bearing Length	Shank & Flange Length	Nut Thickness	Spacers Included	Part Number Without Keyway	Part Number With Keyway
.25"	.5"	0.57"	0.26"	2.2"	.250"	.0625" .125" .1875"	NAB-250	–
0.375"	.625"	0.71"	.375"	2.4"	.280"	.0625" .125" .1875"	NAB-375	–
.5"	.75"	0.855"	.5"	3.0"	.325"	.0625" .1875" .25"	NAB-500	–
.625"	.875"	1.075"	.5"	3.15"	.390"	.0625" .1875" .25"	–	NAB-625
.75"	1.0"	1.215"	.5"	3.4"	.440"	.0625" .1875" .25"	–	NAB-750
.875"	1.0"	1.434"	.5"	3.4"	.440"	.0625" .1875" .25"	–	NAB-875
1.0"	1.0"	1.48"	.5"	3.5"	.440"	.0625" .1875" .25"	–	NAB-1000
1.25"	1-1/4"	2"	.5"	3.5"	.440"	.0625" .1875" .25"	–	NAB-1250

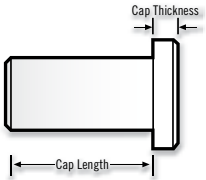
FLANGES (Any diameter between 2–4")

Flange Diameter	Flange Part Number
1.75–2"	FLANGES-2
2.125–2.5"	FLANGES-2.5
2.5–3"	FLANGES-3
3–3.5"	FLANGES-3.5
3.5–4"	FLANGES-4

Flange Tolerances

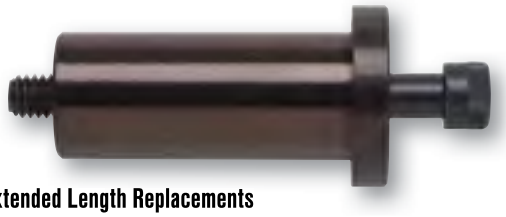
Steel flanges are heat treated and ground flat and parallel within plus or minus .00005". All steel flanges have 1" arbor hole. Steel flanges are custom ground as to diameter. Please specify exact diameter (see range).

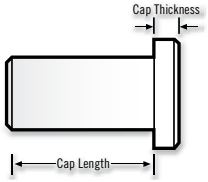
Carbide spacers available.



CAPS Standard Length Replacements

Arbor Number	Cap Length	Screw Size (Included)	Hex Key Size	Standard Cap Part Number
AB-250	3/8"	8-32 × 1" Flat head Socket head cap screw	3/32"	CP-AB-250
AB-375	3/8"	10-32 × 1.5" Flat head Socket head cap screw	1/8"	CP-AB-375
AB-500	1/2"	1/4-20 × 1.5" Socket head cap screw	5/32"	CP-AB-500
AB-625	7/8"	1/4-20 × 2" Socket head cap screw	3/16"	CP-AB-625
AB-875	1"	5/16-18 × 2.5" Socket head cap screw	1/4"	CP-AB-875
AB-1000	1"	5/16-18 × 2.5" Socket head cap screw	1/4"	CP-AB-1000
AB-1000-1	1"	5/16-18 × 2.5" Socket head cap screw	1/4"	CP-AB-1000

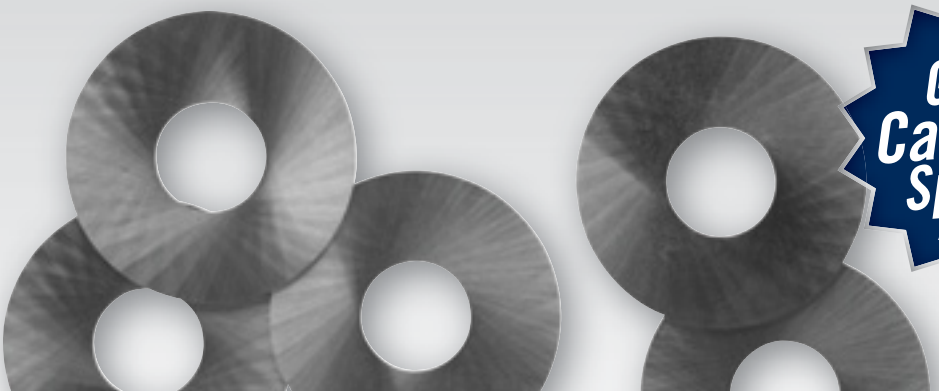




NEW!

CAPS Extended Length Replacements

Arbor Number	Cap Length	Screw Size (Included)	Hex Key Size	Extended Cap Part Number
AB-250	3/4"	8-32 × 1.5" Flat head Socket head cap screw	3/32"	XCP-AB-250
AB-375	7/8"	10-32 × 2" Flat head Socket head cap screw	1/8"	XCP-AB-375
AB-500	3/4"	1/4-20 × 1.75" Socket head cap screw	5/32"	XCP-AB-500
AB-625	1-3/4"	1/4-20 × 2.5" Socket head cap screw	3/16"	XCP-AB-625
AB-875	2"	5/16-18 × 3" Socket head cap screw	1/4"	XCP-AB-875
AB-1000	2"	5/16-18 × 3" Socket head cap screw	1/4"	XCP-AB-1000
AB-1000-1	2"	5/16-18 × 3" Socket head cap screw	1/4"	XCP-AB-1000



Special Gang Carbide Spacers Available!

TOOLS FOR

Wood & Plastic Applications

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- Get Tips and Tricks
- And More...

Miniatures

Shell Inlays
and Inlay
Pockets

Saws

Fret Slots
Use K-Series
Saws

WRU, WRD Series

Roughing

WU1 Series

Pocketing

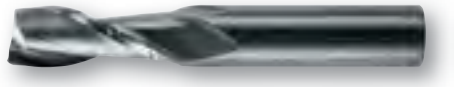
B Series

Ridge and Bridge Saddle
Bodies and Shaping
Neck and Carving

WD1 Series

Purfling and Binding

Wood & Plastic Tools

WU / WD / WTL 201/203/303	2 & 3 Flute		140
WRU / WRD 303	3 Flute		141
C8 / CD8 201/202/301/303	2 & 3 Flute		142
HB 401/402/404	2 Flute		144
PM / MPM / PMD Routers	1 Flute		145
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ACH / MAH	Accuhold End Mill Extension Holder		147
MINIATURES	(See Miniatures Applications)		89
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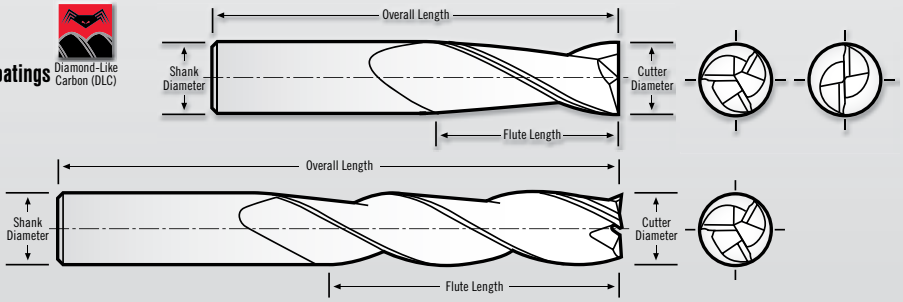
W Precision Spiral Routers for CNC Production

Characteristics Square End · Chamfer · 2 Flute · 3 Flute · 30° Helix

Applications Slotting · Side Milling · Helical Interpolation · Ramping · Roughing · Semi-Finishing · Dry · Wet · Cold Air · Spray Mist

Materials Wood · Aluminum · Copper · Magnesium · Brass · Plastics

Coatings Diamond-Like Carbon (DLC)



WU/WD Tolerances
Cutting Dia. (1/16" to 1/4") = +.000/–.002"
(9/32" to 3/4") = +.000/–.003"
Shank Dia. = –.0001/–.0002"
Flute Length (1/16" to 5/16") = +.030/–.000"
(3/8" to 3/4") = +.060/–.000"
OAL = ±.060"

WTL Tolerances
Cutting Dia. = –.000/+.001"
Shank Dia. = –.0001/–.0002"
Flute Length (1/16" to 5/16") = +.030/–.000"
(3/8" to 3/4") = +.060/–.000"
OAL = ±.060"

UP Shear

WU1-201 2 Flute Stub Length Upshear

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated
3/16"	3/16"	3/8"	2"	WU1-201-06
1/4"	1/4"	1/2"	2"	WU1-201-08
3/8"	3/8"	5/8"	2"	WU1-201-12
1/2"	1/2"	1-1/4"	3-1/4"	WU1-201-16
5/8"	5/8"	1-1/2"	3-1/2"	WU1-201-20
3/4"	3/4"	1-1/2"	4"	WU1-201-24

Shear DN

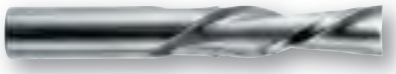
WD1-201 2 Flute Stub Length Downshear

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated
3/16"	3/16"	3/8"	2"	WD1-201-06
1/4"	1/4"	1/2"	2"	WD1-201-08
3/8"	3/8"	5/8"	2"	WD1-201-12
1/2"	1/2"	1-1/4"	3-1/4"	WD1-201-16
5/8"	5/8"	1-1/2"	3-1/2"	WD1-201-20
3/4"	3/4"	1-1/2"	4"	WD1-201-24

UP Shear

WU1-203 2 Flute Standard Length Upshear

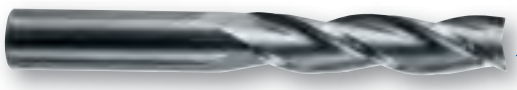
Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated
1/8"	1/8"	1/2"	1-1/2"	WU1-203-04
3/16"	3/16"	5/8"	2"	WU1-203-06
1/4"	1/4"	3/4"	2-1/2"	WU1-203-08
3/8"	3/8"	1"	2-1/2"	WU1-203-12
1/2"	1/2"	1-1/2"	3-1/2"	WU1-203-16
16mm	16mm	55mm	118mm	WU1-203-16mm
5/8"	5/8"	2"	4-5/8"	WU1-203-20
3/4"	3/4"	2-3/16"	5-1/4"	WU1-203-24



Shear DN

WD1-203 2 Flute Standard Length Downshear

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated
1/8"	1/8"	1/2"	1-1/2"	WD1-203-04
3/16"	3/16"	5/8"	2"	WD1-203-06
1/4"	1/4"	3/4"	2-1/2"	WD1-203-08
3/8"	3/8"	1"	2-1/2"	WD1-203-12
1/2"	1/2"	1-1/2"	3-1/2"	WD1-203-16
16mm	16mm	55mm	118mm	WD1-203-16mm
5/8"	5/8"	2"	4-5/8"	WD1-203-20
3/4"	3/4"	2-3/16"	5-1/4"	WD1-203-24



UP Shear

+ Tolerances

WTL-303 3 Flute Extra Long Length Upshear

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated
1/8"	1/8"	1"	3"	WTL-303-04
3/16"	3/16"	1-1/8"	3"	WTL-303-06
1/4"	1/4"	1-1/4"	3-1/8"	WTL-303-08
5/16"	5/16"	1-3/8"	3-1/8"	WTL-303-10
3/8"	3/8"	1-1/2"	3-1/2"	WTL-303-12
1/2"	1/2"	2"	4"	WTL-303-16
5/8"	5/8"	2-1/2"	4-5/8"	WTL-303-20
3/4"	3/4"	3"	5-1/4"	WTL-303-24

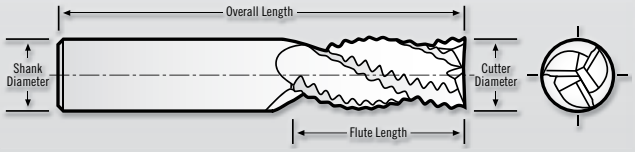
Spiral Routers for Rough Cutting WR

Characteristics Square End, Chamfer, 3 Flute, 30° Helix

Applications Slotting, Side Milling, Helical Interpolation, Ramping, Roughing, Semi-Finishing, Dry, Wet, Cold Air, Spray Mist

Materials Wood, Aluminum, Copper, Magnesium, Brass

Coatings Diamond-Like Carbon (DLC)



WRU/WRD Tolerances

Cutting Dia. (1/16" to 1/4") = +.000/–.002"
(9/32" to 3/4") = +.000/–.003"
Shank Dia. = –.0001/–.0002"
Flute Length (1/16" to 5/16") = +.030/–.000"
(3/8" to 3/4") = +.060/–.000"
OAL = ±.060"

UP Shear

WRU-301 3 Flute Stub Length Ruffer Upshear

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated
1/2"	1/2"	1-1/2"	3-1/2"	WRU-301-16
5/8"	5/8"	2-3/16"	4-5/8"	WRU-301-20
3/4"	3/4"	2-3/16"	5-1/4"	WRU-301-24

Shear DN

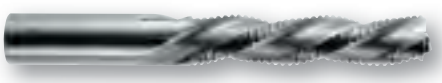
WRD-301 3 Flute Stub Length Downshear

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated
1/2"	1/2"	1-1/2"	3-1/2"	WRD-301-16
5/8"	5/8"	2-3/16"	4-5/8"	WRD-301-20
3/4"	3/4"	2-3/16"	5-1/4"	WRD-301-24

UP Shear

WRU-303 3 Flute Standard Length Upshear

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated
1/2"	1/2"	2-3/16"	4"	WRU-303-16
16mm	16mm	55mm	118mm	WRU-303-16mm
5/8"	5/8"	2-1/2"	4-5/8"	WRU-303-20
3/4"	3/4"	2-1/2"	5-1/4"	WRU-303-24



Shear DN

WRD-303 3 Flute Standard Length Downshear

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated
1/2"	1/2"	2-3/16"	4"	WRD-303-16
16mm	16mm	55mm	118mm	WRD-303-16mm
5/8"	5/8"	2-1/2"	4-5/8"	WRD-303-20
3/4"	3/4"	2-1/2"	5-1/4"	WRD-303-24

Another Popular Wood Tool

Page 113

B-333 3 Flute Tuffy Ball End Standard Length

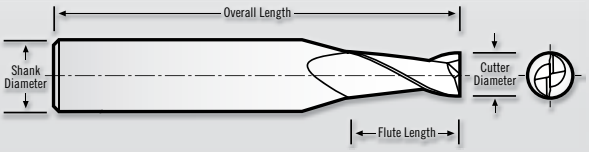
C8 2 Flute Spiral Routers for Signmaking and Engraving

Characteristics Square End, Chamfer, 2 Flute, 3 Flute, 30° Helix

Applications Slotting, Side Milling, Helical Interpolation, Ramping, Roughing, Semi-Finishing, Dry, Wet, Cold Air, Spray Mist

Materials Wood, Aluminum, Copper, Magnesium, Brass

Coatings Diamond-Like Carbon (DLC)



C8/CD8 Tolerances

Cutting Dia. (1/16" to 1/4") = +.000/–.002"
(9/32" to 3/4") = +.000/–.003"
Shank Dia. = –.0001/–.0002"
Flute Length (1/16" to 5/16") = +.030/–.000"
(3/8" to 3/4") = +.060/–.000"
OAL = ±.060"

UP
Shear

C8-201 2 Flute Stub Length Upshear

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated
1/8"	1/4"	1/4"	2"	C8-201-04
3/16"	1/4"	3/8"	2"	C8-201-06
1/4"	1/4"	1/2"	2"	C8-201-08

All Sizes on 1/4" Shanks to Fit Router Collets

Shear
DN

CD8-201 2 Flute Stub Length Downshear

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated
1/8"	1/4"	1/4"	2"	CD8-201-04
3/16"	1/4"	3/8"	2"	CD8-201-06
1/4"	1/4"	1/2"	2"	CD8-201-08

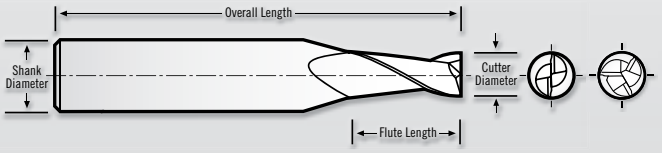
2 & 3 Flute Spiral Routers for CNC Production C8

Characteristics Square End, Chamfer, 2 Flute, 3 Flute, 30° Helix

Applications Slotting, Side Milling, Helical Interpolation, Ramping, Roughing, Semi-Finishing, Dry, Wet, Cold Air, Spray Mist

Materials Wood, Aluminum, Copper, Magnesium, Brass

Coatings Diamond-Like Carbon (DLC)



C8/CD8 Tolerances

Cutting Dia. (1/16" to 1/4") = +.000/–.002"
(9/32" to 3/4") = +.000/–.003"
Shank Dia. = –.0001/–.0002"
Flute Length (1/16" to 5/16") = +.030/–.000"
(3/8" to 3/4") = +.060/–.000"
OAL = ±.060"

C8-203 2 Flute Regular Length Upshear

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated
1/8"	1/4"	1/2"	2-1/2"	CD-203-04
3/16"	1/4"	5/8"	2-1/ 2"	CD-203-06
1/4"	1/4"	3/4"	2-1/2"	CD-203-08

C8-301 3 Flute Stub Length Upshear

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated
1/8"	1/4"	1/4"	2"	C8-301-04
3/16"	1/4"	3/8"	2"	C8-301-06
1/4"	1/4"	1/2"	2"	C8-301-08

CD8-203 2 Flute Regular Length Downshear

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated
1/8"	1/4"	1/2"	2-1/2"	CD8-203-04
3/16"	1/4"	5/8"	2-1/2"	CD8-203-06
1/4"	1/4"	3/4"	2-1/2"	CD8-203-08

C8-303 3 Flute Regular Length Upshear

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated
1/8"	1/4"	1/2"	2-1/2"	C8-303-04
3/16"	1/4"	5/8"	2-1/2"	C8-303-06
1/4"	1/4"	3/4"	2-1/2"	C8-303-08

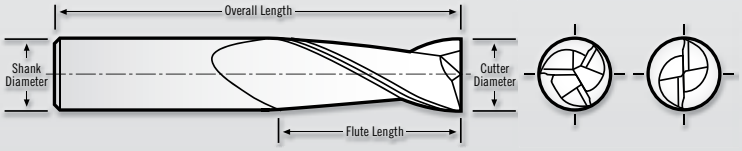
HB 2+2 Herringbone Routers

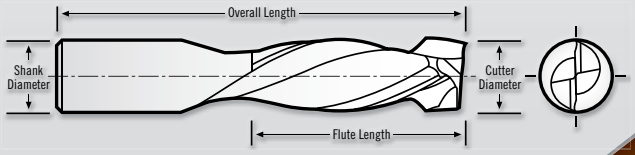
Characteristics Square End, Chamfer, 2 Flute, 30° Helix

Applications Slotting, Side Milling, Helical Interpolation, Ramping, Roughing, Semi-Finishing, Dry, Wet, Cold Air, Spray Mist

Materials Wood, Aluminum, Copper, Magnesium, Brass

Coatings Diamond-Like Carbon (DLC)

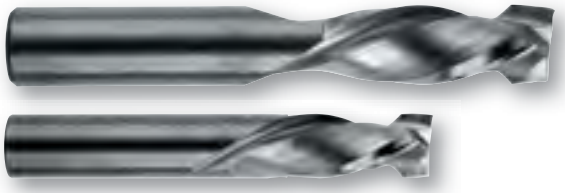




HB Tolerances

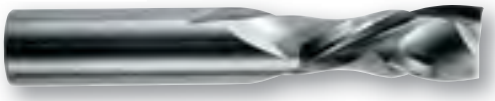
Cutting Dia. (1/16" to 1/4") = +.000/–.002"
(9/32" to 3/4") = +.000/–.003"
Shank Dia. = –.0001/–.0002"
Flute Length (1/16" to 5/16") = +.030/–.000"
(3/8" to 3/4") = +.060/–.000"
OAL = ±.060"

Short Upshear Length for Thin Materials



HB-401 2+2 Flute Herringbone Routers

Cutting Diameter	Shank Diameter	Flute Length	Upshear Length	Overall Length	Tool Number Uncoated
1/4”	1/4”	3/4”	3/16”	2-1/2”	HB-401-08
3/8”	3/8”	1”	1/4”	2-1/2”	HB-401-12
1/2”	1/2”	1-1/8”	1/4”	3”	HB-401-16
5/8”	5/8”	1-5/16”	5/16”	4”	HB-401-20
3/4”	3/4”	1-5/16”	3/8”	4”	HB-401-24



HB-402 2+2 Flute Herringbone Routers

Cutting Diameter	Shank Diameter	Flute Length	Upshear Length	Overall Length	Tool Number Uncoated
1/4”	1/4”	3/4”	1/2”	2-1/2”	HB-402-08
3/8”	3/8”	1”	5/8”	2-1/2”	HB-402-12
1/2”	1/2”	1-1/8”	9/16”	3”	HB-402-16
5/8”	5/8”	1-5/16”	3/4”	4”	HB-402-20
3/4”	3/4”	1-5/16”	3/4”	4”	HB-402-24

HB-404 2+2 Flute Extra Length Herringbone Routers

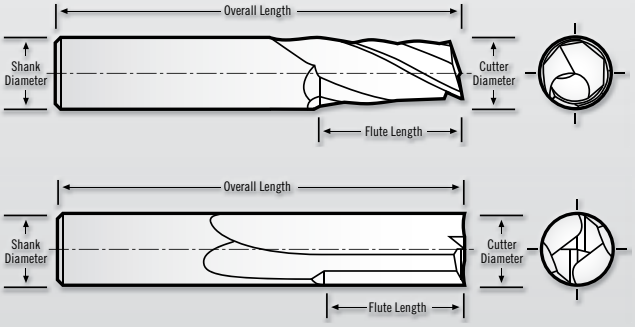
Cutting Diameter	Shank Diameter	Flute Length	Upshear Length	Overall Length	Tool Number Uncoated
1/2”	1/2”	1-5/16”	3/4”	3-1/2”	HB-404-16

Tuffy Grade Carbide Router Bits PM/MPM/GTS

Characteristics Square End · 1 Flute · 2 Flute · Polished

Applications Slotting · Side Milling · Helical Interpolation · Ramping · Roughing · Semi-Finishing · Finishing · Dry · Wet · Cold Air · Spray Mist

Materials Wood · Aluminum · Plastics



PM/PMD Series Tolerances
Cutting Dia. = +0.000/–0.002"
Shank Dia. = –0.0001/–0.0002"
Flute Length = +0.060/ –0.000"
OAL = ±0.060"

MPM Tolerances
Cutting Dia. = +.000/–.075mm
Shank Dia. = –.002/–.005mm
Flute Length = +0.500/+1.500mm
OAL = ±1.000mm

GTS Series Tolerances
Cutting Dia. = +.000/–.002"
Shank Dia. = –.0001/–.0002"
Flute Length = +.060/–.000"
OAL = ±.060"

Polished
Best Tool for Plastics
Eliminates Material Sticking to Tool and Melting in the Cut

1 Flute · Polished · UP Shear

PM Up Shear 1 Flute Tuffy Grade

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number
1/8"	1/8"	1/2"	2"	PM-104-04
1/8"	1/4"	1/2"	2"	PM-108-04
3/16"	3/16"	5/8"	2"	PM-106-06
3/16"	1/4"	5/8"	2"	PM-108-06
3/16"	1/4"	1-1/4"	3"	PM-108-06L
1/4"	1/4"	3/4"	2"	PM-108-08
1/4"	1/4"	1-1/2"	3"	PM-108-08L
3/8"	3/8"	1-1/4"	3"	PM-112-12
1/2"	1/2"	1-1/2"	4"	PM-116-16

1 Flute · Polished · UP Shear · NEW

MPM Up Shear 1 Flute Tuffy Grade METRIC

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number
4mm	3mm	12mm	50mm	MPM-104-04
6mm	4mm	12mm	50mm	MPM-106-04
6mm	6mm	14mm	50mm	MPM-106-05
6mm	6mm	14mm	57mm	MPM-106-06
8mm	8mm	22mm	63mm	MPM-108-08
10mm	10mm	25mm	72mm	MPM-110-10
12mm	12mm	25mm	83mm	MPM-112-12

1 Flute · Polished · Shear DN

PMD Down Shear 1 Flute Tuffy Grade

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number
1/8"	1/4"	1/2"	2"	PMD-108-04
3/16"	1/4"	5/8"	2"	PMD-108-06
1/4"	1/4"	3/4"	2"	PMD-108-08

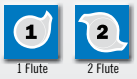
2 Flute · 0° Helix Straight · *Best Used in Plastics*

GTS 2 Flute Tuffy Grade Straight Flute

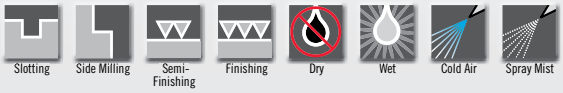
Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number
1/8"	1/4"	1/2"	2"	GTS-201-04
1/4"	1/4"	3/4"	2-1/2"	GTS-201-08
3/8"	3/8"	7/8"	2-1/2"	GTS-201-12
1/2"	1/2"	1"	3"	GTS-201-16

ET Engraving Tools

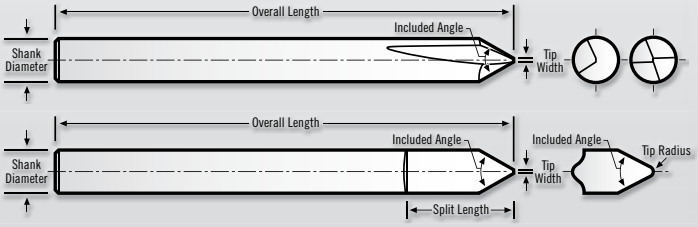
Characteristics



Applications



Materials



ET1 Double Lip Engraving Tool for Tougher Materials

Tip Width	Shank Diameter	Included Angle	Split Length	Overall Length	Tool Number
.010"	1/4"	30°	—	2"	ET1-01030
.015"	1/4"	30°	—	2"	ET1-01530
.020"	1/4"	30°	—	2"	ET1-02030
.030"	1/4"	30°	—	2"	ET1-03030
.040"	1/4"	30°	—	2"	ET1-04030
.050"	1/4"	30°	—	2"	ET1-05030
.060"	1/4"	30°	—	2"	ET1-06030
.010"	1/4"	45°	—	2"	ET1-01045
.015"	1/4"	45°	—	2"	ET1-01545
.020"	1/4"	45°	—	2"	ET1-02045
.030"	1/4"	45°	—	2"	ET1-03045
.040"	1/4"	45°	—	2"	ET1-04045
.050"	1/4"	45°	—	2"	ET1-05045
.060"	1/4"	45°	—	2"	ET1-06045

NOTE: Specially designed to maximize the tip strength of the tool by removing the minimum amount of material from the end.

ET3 Ball Tip Engraving Tool

Tip Radius	Shank Diameter	Included Angle	Split Length	Overall Length	Tool Number
.005"	1/4"	30°	.650"	2"	ET3-00530
.010"	1/4"	30°	.650"	2"	ET3-01030
.020"	1/4"	30°	.650"	2"	ET3-02030
.030"	1/4"	30°	.650"	2"	ET3-03030
.005"	1/4"	60°	.650"	2"	ET3-00560
.010"	1/4"	60°	.650"	2"	ET3-01060
.020"	1/4"	60°	.650"	2"	ET3-02060
.030"	1/4"	60°	.650"	2"	ET3-03060

NOTE: Ball shaped radius on the tip, excellent results for high speed engraving and 3D engraving applications

ET2 Plunge Tip Engraving Tool for Drill & Engrave

Tip Width	Shank Diameter	Included Angle	Split Length	Overall Length	Tool Number
.010"	1/4"	60°	—	2"	ET2-01060
.020"	1/4"	60°	—	2"	ET2-02060
.010"	1/4"	90°	—	2"	ET2-01090
.020"	1/4"	90°	—	2"	ET2-02090

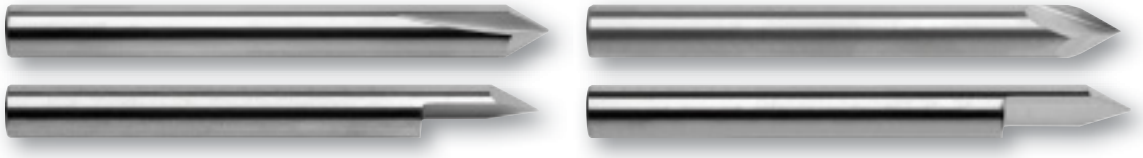
NOTE: Two flute tool serves as a multipurpose tool, which can be used for engraving, chamfering, spot-drilling and countersinking.

ET4 Standard Engraving Tool for Most Applications

Tip Width	Shank Diameter	Included Angle	Split Length	Overall Length	Tool Number
.010"	1/4"	60°	.650"	2"	ET4-01060
.020"	1/4"	60°	.650"	2"	ET4-02060
.030"	1/4"	60°	.650"	2"	ET4-03060
.050"	1/4"	60°	.650"	2"	ET4-05060
.060"	1/4"	60°	.650"	2"	ET4-06060
.010"	1/4"	90°	.650"	2"	ET4-01060
.020"	1/4"	90°	.650"	2"	ET4-02090
.030"	1/4"	90°	.650"	2"	ET4-03090
.050"	1/4"	90°	.650"	2"	ET4-05090
.060"	1/4"	90°	.650"	2"	ET4-06090

NOTE: Utilized in a wide variety of machines, including top loading engraving machines, CNC milling machines and industrial engraving marking systems.

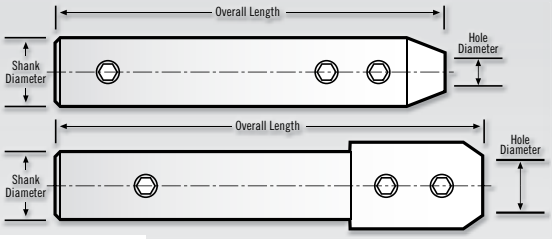
Engraving Tools ET



ET SPEEDS & FEEDS

Material	5000 RPM	7500 RPM	10,000 RPM
	in/min	in/min	in/min
NON-FERROUS METALS			
Aluminum/Aluminum Alloys	10 ipm	15 ipm	20 ipm
Brass/Bronze	10 ipm	15 ipm	20 ipm
Copper/Copper Alloys	10 ipm	15 ipm	20 ipm
Magnesium	10 ipm	15 ipm	20 ipm
COMPOSITES			
G10 Fiberglass	15 ipm	22.5 ipm	30 ipm
Graphite	15 ipm	22.5 ipm	30 ipm
Carbon Fiber	15 ipm	22.5 ipm	30 ipm
Plastics	15 ipm	22.5 ipm	30 ipm
FERROUS METALS			
Cast Iron	5 ipm	7.5 ipm	10 ipm
Steel, Low Carbon	5 ipm	7.5 ipm	10 ipm
Steel, Medium Carbon	7.5 ipm	11.25 ipm	15 ipm
Steel, Hardened	2.5 ipm	3.75 ipm	5 ipm
Stainless Steel, Soft	5 ipm	7.5 ipm	10 ipm
Stainless Steel, Hard	2.5 ipm	3.75 ipm	5 ipm
Inconel	4 ipm	6 ipm	8 ipm
Titanium, Soft	5 ipm	7.5 ipm	10 ipm
Titanium, Hard	2.5 ipm	3.75 ipm	5 ipm

Accuhold End Mill Extension Holder ACH/MAH



ACH Tolerances
Hole Dia. = +.00015/–.00000"
Shank Dia. = –.0001/–.0003"
OAL = ±.060"

MAH Tolerances
Hole Dia. = +.004/–.000 mm
Shank Dia. = +.000/–.007 mm
OAL = ±1.5 mm

ACH Accuhold – End Mill Extension Holder

Hole Diameter	Shank Diameter	Overall Length	Tool Number
1/8"	3/8"	3-1/4"	ACH-04
3/16"	1/2"	3-1/2"	ACH-06
1/4"	5/8"	4-1/4"	ACH-08
3/8"	3/4"	4-1/2"	ACH-12
* 1/2"	3/4"	4-3/4"	ACH-16
* 1/2"	1"	4-3/4"	ACH-16L

** 1" Diameter x 1.5" Long Head*

MAH Accuhold – Metric End Mill Extension Holder METRIC

Hole Diameter	Shank Diameter	Overall Length	Tool Number
3mm	10mm	82.5mm	MAH-03
4mm	12mm	110mm	MAH-04
5mm	12mm	110mm	MAH-05
6mm	16mm	125mm	MAH-06
8mm	20mm	135mm	MAH-08
10mm	20mm	135mm	MAH-10
* 12mm	25mm	150mm	MAH-12

Speeds & Feeds

WOOD SERIES SPEEDS & FEEDS

Material	RPM (1/4")	Feed Inches/Minute
Wood		
Hardwoods	18,000	180–250
Softwoods	18,000	180–250
MDF	18,000	150–250
Laminated Materials	18,000	150–250

Material	RPM (1/4")	Feed Inches/Minute
Plastics, Others		
Solid Surface	15,300	70–130
Fiberglass	15,300	80–150
Phenolic	15,300	80–150
Aluminum (Soft)	18,000	90–120
Aluminum (Aircraft Grade)	18,000	180–230
Copper	9,200	45–60
Foam	18,000	150–300
Plastics (Soft)	18,000	180–250
Plastics (Hard)	18,000	150–200

General Guidelines

- Select the shortest flute length possible for the application. Shorter flute length router tools offer better stability and increased feed rates.
- Select the largest diameter tool for the job. Increasing diameter by 10% provides 25% more strength.
- Adjust RPM and feed rate to reduce vibration. Vibration will cause poor finish and chip tools. Too slow a feed rate can also cause vibration and poor tool life.
- Regular cleaning of tool holders and collets help ensure the tool's performance and life.
- Securing the part as rigidly as possible will improve finishes and tool life.

Wood Tools in Other Sections

MINIATURES	(See Miniatures Applications)		89
SAWS	(See Saws Applications)		121
S1 / MS1 301	2, 3 and 4 Flute		36
A1 / MA1 201	(See Aluminum Applications)		18
C1 201/301	2 & 3 Flute on ¼" Shank (See Multiple Applications)		38
SB / B 201/203 **MSB / MB** 201/203	2 Flute Ball End (See Multiple Applications)		110
PCD 203 Routers	2 Flute PCD Diamond (See Composites)		71
PM / MPM / PMD Routers	Single Flute		145

Custom End Mills

DON'T SEE WHAT YOU NEED?

RobbJack manufactures a wide variety of end mills in addition to those listed in our catalog. We can make tools for your specific needs by modifying standard tools or through custom manufacture. We can work directly from your prints to design and build the exact tool for your requirements. Contact us if you need:

- **Special Cutting and/or Shank Diameters**
- **Special Cutting Length and/or Overall Lengths**
- **Corner Radii, Full Ball or Corner Chamfer Configurations**
- **Chip Breakers or Roughing Cutters**
- **Special Tolerances**
- **Tapered End Mills, Constant Helix or Constant Lead.**
- **Special Coatings Available**.

To get a quote or more information about a custom tool, fax or call us with your specifications and any other pertinent information (photocopy the form below). If you are not sure of the best configuration for your application, we will be glad to help you.

Remember, to obtain the best performance in all end mill applications:

- Use the largest diameter possible.
- Use the shortest flute length possible.
- Use the correct number of flutes for your application.
- Use recommended speed and feed rates.

Copy this form and fax it to us at (916) 645-0146 or (916) 645-1668 or email: quotes@robbjack.com

RobbJack Custom End Mill

Request for Quote/Information

Description of Application:

Order Quantity:

Cutting Diameter: Tolerance:

Cutting Length: Shank Diameter:

Overall Length: Number of Flutes:

Special Configurations (Radii, Chamfers, Set Screw Flats, Chip Breakers, Coatings, etc.):

For Tapered Tools: Major Diameter: Tip Diameter:

Per Side/Included Angle: Tolerance:

End Configuration (Full Ball, Corner Radii, Square End):

(Note: RobbJack recommends 3 flutes for all tapered applications)

ROBBJACK CORPORATION

Questions?

Delivery is NOW Faster Than Ever

Call us: at (916) 645-6045 or (800) 527-8883

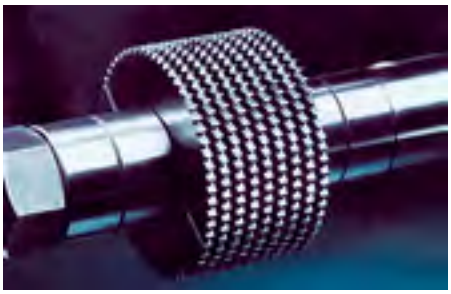
Fax us: at (916) 645-0146 or (916) 645-1668

Visit us: at www.robbjack.com

Email us: quotes@robbjack.com

SPECIAL SAWS TO MEET YOUR SPECIFIC NEEDS

In addition to the broad line of standard saws listed in this catalog, RobbJack is capable of manufacturing a wide variety of special saws. If our standard offerings do not meet your needs, call or fax your specifications to us for quotation. Contact us if you need:



- **Special Cutting Diameters**
- **Special Thicknesses**
- **Special Arbor Hole Sizes and Keyways**
- **Special Chamfers, Angles or Radii**
- **Special Tooth Configurations and Pitches**
- **Special Coatings Available.**
- **Gang Saws** – If your requirements call for the use of more than one saw at a time, contact us for a complete, ready-to-use package, including saws, arbors and spacers. We are experts in ganging saws, which generally require flat and parallel hubs, made to your exacting specifications.

Copy this form and fax it to us at (916) 645-0146 or (916) 645-1668 or email: quotes@robbjack.com

We are frequently able to combine saws and spacers into an integral saw with offset hub, which reduces tolerances buildup by one-half.

Many of these features can be achieved by modifying standard saws. Others require that we start from scratch. We will work directly from your prints or help you design the saws you need from the following information. Simply photocopy the bottom of this page, fill it out and fax it to us along with any other pertinent data. And remember, to obtain the best performance in all saw applications:

- Use the smallest diameter and the greatest thickness possible.
- Choose the number of teeth (tooth count) to meet your specific application (if you are not sure of the best configuration for your application, call us and we'll advise you).
- Ask for feed and speed recommendations to get started right.

RobbJack Custom Saw

Request for Quote/Information

Outside Diameter: _____ Saw Thickness: _____

Inside Diameter: _____ Number of Teeth: _____

Keyway on I.D.: _____ For Gang Use: _____

Special Configurations (such as Chamfers, Angles, Radii or Forms): _____

Order Quantity: _____

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Visit us: at www.robbjack.com

Email us: quotes@robbjack.com

Terms & Conditions

Terms

1% Ten Days, Net 30 Days. Minimum Invoice, $25.00.

Shipping

F.O.B. Lincoln, California. All shipments via **2nd Day Air**, unless otherwise specified.

Claims

Goods are considered sold and our responsibility ceases when delivery is made to the transportation company. In the event of goods being lost in transit, we will make every effort on behalf of customers to have lost goods found or to have the transportation company make proper restitution for loss.

Damage claims must be made against carrier.

Return Policy

Merchandise must be returned within 30 days of date of shipment or returns will not be accepted for credit. Only standard catalog tools that have not been used or damaged and do not exceed RobbJack's annual usage are eligible for return and credit.

No merchandise may be returned without prior authorization from the factory. Credit will not be issued for merchandise returned without a return authorization number. Call 800 527-8883 for a return authorization number.

All returns must be in their original packaging and should include a copy of the invoice and packing slip. Returned tools will be fully inspected for use and damage before credit is issued.

All merchandise returned for credit will be subject to a 15% restocking charge.

Specials

Orders for special tools, non-catalog or modified tools are sold on a no-cancellation basis and are not returnable. A confirming purchase order is required before any work begins on special tools.

A 10% over or under shipment on a special is acceptable based on industry practices unless no overshipment is stated at time of quoting.

Errors

RobbJack Corporation can not be held responsible for incorrect parts made with our products due to mislabeling or defect. We assume all tools used by our customers are inspected before use and that first part inspections in customer's plant is the rule. We will replace or credit tools in those situations.

Prices

Prices subject to change without notice.

Terms and Conditions

All terms and conditions are subject to periodic changes published to http://robbjack.com/about/terms.

WE PROVIDE
INCREDIBLY EFFECTIVE SOLUTIONS
FOR THE MANUFACTURING INDUSTRY

SOLID CARBIDE END MILLS, SLITTING SAWS, PCD ROUTERS

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www.robbjack.com

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International Fax: (916) 645-1668

RJ ROBBJACK CORPORATION

RobbJack Corporation — Lincoln, California USA

Aluminum
Titanium, Steel & High-Temp Alloys
Composites & Plastics
Die/Mold & Hardened Materials
Miniatures
Multiple Applications
Saws
Wood

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