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CARBIDE END MILLS

CARBIDE DRILLS

CARBIDE THREAD MILLS

CARBIDE BURS

INDEX

Tolerances for Solid Carbide End Mills

Cutting Diameter: 1/32" through 1/4" +.000 - .002
 17/64" through 1" +.000 - .003

Shank Diameter: h6

High-Performance End Mills for Aluminum



Operating Parameters: HPAM High-Performance End Mills for Aluminum

Type of Cut	Aluminum Alloys 6061-T6, 7075-T6, 440, 356, 380, C61300	Depth of Cut % of tool diameter	SFM (speed)	End Mill Diameter Chip Load per Tooth					
				1/4"	3/8"	1/2"	5/8"	3/4"	1"
shallow slotting	< 32 HRC	< 50%	1200 +	.0045	.0071	.0100	.0123	.0149	.0200
	> 32 HRC		600 +	.0036	.0057	.0080	.0098	.0119	.0160
deep slotting	< 32 HRC	75-100%	1200 +	.0036	.0057	.0080	.0098	.0119	.0160
	> 32 HRC		600 +	.0027	.0043	.0060	.0074	.0089	.0120
medium radial 1.0 x dia depth	< 32 HRC	30% x dia. radial	1200 +	.0045	.0071	.0100	.0123	.0149	.0200
	> 32 HRC		600 +	.0036	.0057	.0080	.0098	.0119	.0160
heavy radial 1.0 x dia depth	< 32 HRC	50% x dia. radial	1200 +	.0036	.0057	.0080	.0098	.0119	.016
medium radial 2.0 x dia depth	< 32 HRC	30% x dia. radial	1200 +	.0045	.0071	.0100	.0123	.0149	.0200
	> 32 HRC		600 +	.0036	.0057	.0080	.0098	.0119	.0160
heavy radial 2.0 x dia depth	< 32 HRC	50% x dia. radial	1200 +	.0036	.0057	.0080	.0098	.0119	.0160
finishing medium radial	< 32 HRC	< 25% of dia.	1200 +	.0045	.0071	.0100	.0123	.0149	.0200
	> 32 HRC		600 +	.0036	.0057	.0080	.0098	.0119	.0160
finishing light radial	< 32HRC	< 10% of dia.	1200 +	.0045	.00713	.0100	.01225	.01485	.0200
finishing	< 32 HRC	< .010 radial depth	1200 +	.0054	.0086	.0120	.0147	.0178	.0240
	> 32 HRC		600 +	.0045	.0071	.0100	.0123	.0149	.0200

This chart represents starting points based on a coated tool. Reduce rates up to 50% when using an uncoated tool.

These speed and feed rates are suggested as general guidelines. Machine type, horsepower, spindle speed limitations, toolholding and workholding devices all may impact a cutting tool's ability to perform properly. Greenfield Industries is not responsible for tool failure, part damage, or injury that may be caused by following these general recommendations..

Formulae

$$RPM = (SFM \times 3.82) / \text{tool diameter}$$

$$IPM = \text{number of flutes} \times RPM \times \text{chip load per tooth}$$

Series HPAM for aluminum and nonferrous materials

Features and Benefits of HPAM End Mills

- Delivers superior performance, providing increased tool life and improved part finish.
- Concentric margins stabilize the tool in the cut and reduce chatter at elevated speeds.
- Greater resistance to chipping with increased feed and speed rates over conventional carbide tools.
- Design incorporates rake enhancements in the flute for improved chip flow and higher feed rates at high and low spindle speeds.
- Tool design eliminates excess pressure that causes chip packing.

Applications for HPAM End Mills

- 2-flute square end offers excellent performance in roughing and finishing, in ramp cutting and in plunging.
- 2-flute ball nose designed for contouring aluminum, copper, and other non-ferrous materials.
- 3-flute square end gives superior surface finishes without sacrificing metal removal rates in high-speed slotting, profiling, and ramping.

High-Performance End Mills for Aluminum

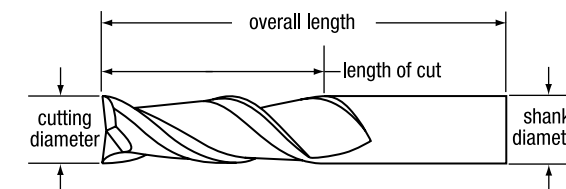
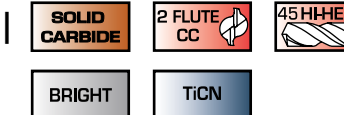


Series HPAM-2 • square end

Applications |



Features |



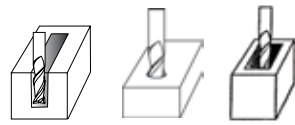
cutting diameter	fractional			shank diameter	length of cut	overall length	no. of flutes	corner radius	EDP Number	
	fractional	decimal	metric						bright	TiCN
1/8	1/8	.1250	3.18	1/8	1/4	1 1/2	2	0.000	B04440	B06440
1/8	1/8	.1250	3.18	1/8	3/8	1 1/2	2	0.000	B04405	B06405
3/16	3/16	.1875	4.76	3/16	5/16	2	2	0.000	B04444	B06444
3/16	3/16	.1875	4.76	3/16	9/16	2	2	0.000	B04409	B06409
1/4	1/4	.2500	6.35	1/4	3/8	2 1/2	2	0.000	B04448	B06448
1/4	1/4	.2500	6.35	1/4	3/4	2 1/2	2	0.000	B04413	B06413
1/4	1/4	.2500	6.35	1/4	1 1/4	3	2	0.000	B04548	B06548
5/16	5/16	.3125	7.94	5/16	7/16	2 1/2	2	0.000	B04452	B06452
5/16	5/16	.3125	7.94	5/16	13/16	2 1/2	2	0.000	B04417	B06417
5/16	5/16	.3125	7.94	5/16	1 1/4	3 1/2	2	0.000	B04552	B06552
5/16	5/16	.3125	7.94	5/16	2 1/8	4	2	0.000	B04617	B06617
3/8	3/8	.3750	9.53	3/8	1/2	2 1/2	2	0.000	B04456	B06456
3/8	3/8	.3750	9.53	3/8	1	2 1/2	2	0.000	B04421	B06421
3/8	3/8	.3750	9.53	3/8	1 1/2	4	2	0.000	B04556	B06556
3/8	3/8	.3750	9.53	3/8	2 1/2	6	2	0.000	B04621	B06621
7/16	7/16	.4375	11.11	7/16	9/16	2 1/2	2	0.000	B04460	B06460
7/16	7/16	.4375	11.11	7/16	1	2 1/2	2	0.000	B04425	B06425
7/16	7/16	.4375	11.11	7/16	2	4	2	0.000	B04560	B06560
1/2	1/2	.5000	12.70	1/2	5/8	3	2	0.000	B04464	B06464
1/2	1/2	.5000	12.70	1/2	1 1/4	3	2	0.000	B04429	B06429
1/2	1/2	.5000	12.70	1/2	2	4	2	0.000	B04564	B06564
1/2	1/2	.5000	12.70	1/2	3 1/8	6	2	0.000	B04629	B06629
5/8	5/8	.6250	15.88	5/8	3/4	3 1/2	2	0.000	B04466	B06466
5/8	5/8	.6250	15.88	5/8	1 5/8	4	2	0.000	B04431	B06431
5/8	5/8	.6250	15.88	5/8	2 1/2	5	2	0.000	B04566	B06566
5/8	5/8	.6250	15.88	5/8	3 3/4	6	2	0.000	B04631	B06631
3/4	3/4	.7500	19.05	3/4	1	4	2	0.000	B04467	B06467
3/4	3/4	.7500	19.05	3/4	1 5/8	4	2	0.000	B04432	B06432
3/4	3/4	.7500	19.05	3/4	3 1/4	6	2	0.000	B04567	B06567
3/4	3/4	.7500	19.05	3/4	4	6 1/2	2	0.000	B04632	B06632
1	1	1.0000	25.40	1	1 1/4	5	2	0.000	B04469	B06469
1	1	1.0000	25.40	1	2	5	2	0.000	B04434	B06434
1	1	1.0000	25.40	1	3 1/4	6	2	0.000	B04569	B06569
1	1	1.0000	25.40	1	4 1/8	7	2	0.000	B04634	B06634

High-Performance End Mills for Aluminum

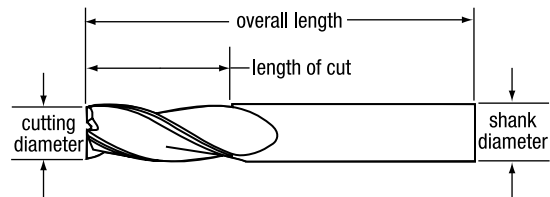
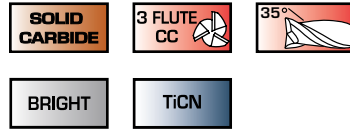


Series **HPAM-3** • square end

Applications |



Features |



cutting diameter			shank diameter	length of cut	overall length	no. of flutes	corner radius	EDP Number	
fractional	decimal	metric						bright	TiCN
1/8	.1250	3.18	1/8	1/4	1 1/2	3	0.000	B04005	B06005
1/8	.1250	3.18	1/8	3/8	1 1/2	3	0.000	B04040	B06040
3/16	.1875	4.76	3/16	5/16	2	3	0.000	B04009	B06009
3/16	.1875	4.76	3/16	9/16	2	3	0.000	B04044	B06044
1/4	.2500	6.35	1/4	3/8	2	3	0.000	B04013	B06013
1/4	.2500	6.35	1/4	5/8	2 1/2	3	0.000	B04048	B06048
1/4	.2500	6.35	1/4	1 1/4	3	3	0.000	B04148	B06148
5/16	.3125	7.94	5/16	7/16	2	3	0.000	B04017	B06017
5/16	.3125	7.94	5/16	5/8	2 1/2	3	0.000	B04052	B06052
5/16	.3125	7.94	5/16	1 1/4	3 1/2	3	0.000	B04152	B06152
5/16	.3125	7.94	5/16	2 1/8	4	3	0.000	B04217	B06217
3/8	.3750	9.53	3/8	1/2	2	3	0.000	B04021	B06021
3/8	.3750	9.53	3/8	1	2 1/2	3	0.000	B04056	B06056
3/8	.3750	9.53	3/8	1 1/2	3 1/2	3	0.000	B04156	B06156
3/8	.3750	9.53	3/8	2 1/2	6	3	0.000	B04221	B06221
7/16	.4375	11.11	7/16	9/16	2 1/2	3	0.000	B04025	B06025
7/16	.4375	11.11	7/16	1 1/4	2 1/2	3	0.000	B04060	B06060
7/16	.4375	11.11	7/16	2	4	3	0.000	B04160	B06160
1/2	.5000	12.70	1/2	5/8	2 1/2	3	0.000	B04029	B06029
1/2	.5000	12.70	1/2	1 1/4	3	3	0.000	B04064	B06064
1/2	.5000	12.70	1/2	2	4	3	0.000	B04164	B06164
1/2	.5000	12.70	1/2	3 1/8	6	3	0.000	B04229	B06229
5/8	.6250	15.88	5/8	3/4	3	3	0.000	B04031	B06031
5/8	.6250	15.88	5/8	1 5/8	4	3	0.000	B04066	B06066
5/8	.6250	15.88	5/8	2 1/2	5	3	0.000	B04166	B06166
5/8	.6250	15.88	5/8	3 3/4	6	3	0.000	B04231	B06231
3/4	.7500	19.05	3/4	1	3	3	0.000	B04032	B06032
3/4	.7500	19.05	3/4	1 5/8	4	3	0.000	B04067	B06067
3/4	.7500	19.05	3/4	3 1/4	6	3	0.000	B04167	B06167
1	1.0000	25.40	1	1 1/4	4	3	0.000	B04034	B06034
1	1.0000	25.40	1	2	5	3	0.000	B04069	B06069
1	1.0000	25.40	1	3 1/4	6	3	0.000	B04169	B06169

High-Performance Roughers

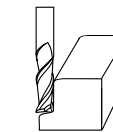


Operating Parameters for High-Performance Roughers

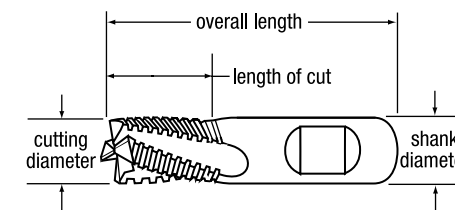
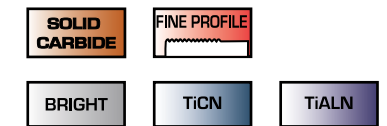
Material	Hardness		Surface Feet per Minute			Chip Load per Tooth	
	Brinell	HRc	Uncoated	TiCN	TiAlN	1/4" to 1/2"	1/2" - 1"
low and plain carbon, alloy, and tool steels	<220 HB	<19	-	325 - 500	430 - 575	.0015 - .0030	.0030 - .0045
plain carbon, alloy and tool steels	225 - 286	20 - 30	-	215 - 375	350 - 430	.0015 - .0030	.0030 - .0045
	294 - 371	31 - 40	-	180 - 280	210 - 320	.0011 - .0021	.0021 - .0032
austenitic stainless steels 200 and 300 series	135 - 275	<28	-	215 - 440	250 - 500	.0010 - .0025	.0025 - .0040
ferritic, martensitic, 400/500 series and PH stainless steels	135 - 330	<35	-	190 - 375	225 - 430	.0015 - .0030	.0030 - .0045
aluminum, low silicon and other non-ferrous alloys	50 - 150	600	2000	2400 - 2500	-	.0020 - .0038	.0038 - .0077
aluminum, high silicon			600 - 2000	720 - 2500	-	.0018 - .0035	.0035 - .0071

Series **MRS** Rougher • multi-flute • center cutting • square end

Applications |



Features |



cutting diameter			shank diameter	length of cut	overall length	no. of flutes	corner radius	EDP Number		
fractional	decimal	metric						bright	TiCN	TiAlN
1/4	.2500	6.35	1/4 *	3/8	2	3	0.000	B03416	B03816	B66416
1/4	.2500	6.35	1/4 *	3/4	2 1/2	3	0.000	B03216	B03316	B66215
3/8	.3750	9.53	3/8 *	1/2	2	4	0.000	B03424	B03824	B66424
3/8	.3750	9.53	3/8 *	7/8	2 1/2	4	0.000	B03224	B03324	B66223
1/2	.5000	12.70	1/2 *	5/8	2 1/2	4	0.000	B03432	B03832	B66432
1/2	.5000	12.70	1/2 *	1	3	4	0.000	B03232	B03332	B66232
5/8	.6250	15.88	5/8 *	3/4	3	4	0.000	B03440	B03840	B66440
5/8	.6250	15.88	5/8 *	1-1/4	3 1/2	4	0.000	B03240	B03340	B66240
3/4	.7500	19.05	3/4 *	7/8	3 1/2	4	0.000	B03448	B03848	B66448
3/4	.7500	19.05	3/4 *	1-1/2	4	4	0.000	B03248	B03348	B66248
1	1.0000	25.40	1 *	1	3 1/2	4	0.000	B03464	B03864	B66464
1	1.0000	25.40	1 *	1-1/2	4	4	0.000	B03264	B03364	B66264

* Weldon shank