

SUGGESTED SPEEDS AND FEEDS - 2FL , 4 FL SQUARE END & 2 FL, 4FL CORNER RADIUS RED SERIES CARBIDE END MILLS

Slot Milling - 2 Flute Square End & 2 Flute Corner Radius

Hardness		Tensile Strength: Up to 750N/mm2		Up to 30 HRC		30 to 38 HRC		38 to 45 HRC		45 to 55 HRC		55 to 60 HRC			
Work Material		Cast Iron	Mild Steels, Carbon Steels	Alloy Steels, Tool Steels, Ti Alloys (Annealed)		Hardened Steels, Prehardened Steels, Ti Alloys (Solution Treated and Aged)		Hardened Steels, Prehardened Steels, Stainless Steels, Inconel, Ni Based Alloys		Hardened Steels		Hardened Steels			
Depth of Cut				D < 1/16 1/16 ≤ D < 1/8 1/16 ≤ D		Ad 0.1D 0.3D 0.5D		D < 1/16 1/16 ≤ D		Ad 0.02D 0.05D		D < 1/16 1/16 ≤ D < 1/8 1/8 ≤ D		Ad 0.01D 0.02D 0.05D	
Dia. (in)	(mm)	360 SFM		330 SFM		260 SFM		220 SFM		280 SFM		120 SFM		80 SFM	
		Speed RPM	Feed in/min	Speed RPM	Feed in/min	Speed RPM	Feed in/min	Speed RPM	Feed in/min	Speed RPM	Feed in/min	Speed RPM	Feed in/min	Speed RPM	Feed in/min
1/16	1.5	19,145	6.9	17,405	6.2	13,095	5.9	11,115	4.2	9,915	3.2	6,245	1.7	4,430	1.2
3/32		12,710	8.3	11,550	7.6	9,135	6.3	7,620	4.3	6,750	3.4	4,185	2.0	2,950	1.2
1/8	3	9,450	10.7	8,570	9.8	7,310	7.4	6,135	4.9	5,135	3.7	3,180	2.2	2,300	1.4
5/32	4	7,910	12.2	7,190	11.1	5,930	8.6	5,145	5.8	4,230	4.2	2,655	2.4	1,870	1.4
3/16		7,190	15.4	6,540	14.0	5,325	10.5	4,455	6.0	3,785	4.5	2,360	2.6	1,590	1.4
7/32		6,365	16.3	5,790	14.7	4,690	11.1	3,855	6.1	3,285	4.7	2,045	2.6	1,365	1.3
1/4	6	5,600	16.0	5,090	14.5	4,125	11.1	3,375	6.0	2,870	4.7	1,775	2.6	1,205	1.2
9/32		5,000	15.6	4,545	14.2	3,700	11.1	3,020	6.0	2,585	4.7	1,580	2.5	1,080	1.2
5/16	8	4,395	15.3	4,000	13.9	3,270	11.1	2,660	5.9	2,295	4.7	1,390	2.4	960	1.2
11/32		4,035	15.0	3,670	13.7	2,990	11.1	2,440	5.9	2,100	4.6	1,290	2.4	880	1.2
3/8		3,695	14.7	3,360	13.3	2,735	11.0	2,225	5.9	1,910	4.5	1,200	2.4	800	1.2
13/32	10	3,400	14.5	3,090	13.2	2,505	10.9	2,040	5.9	1,750	4.4	1,110	2.4	735	1.1
7/16		3,160	14.5	2,870	13.2	2,345	10.9	1,895	5.9	1,630	4.4	1,035	2.3	690	1.0
1/2	12	2,760	14.5	2,510	13.2	2,030	10.6	1,655	5.6	1,415	4.4	900	2.1	600	0.9
9/16		2,460	14.2	2,230	13.0	1,770	10.1	1,480	5.1	1,240	4.3	795	1.9	530	0.8
5/8		2,195	12.6	1,995	12.3	1,625	9.5	1,330	4.7	1,150	4.0	720	1.7	470	0.7
11/16		1,980	12.1	1,800	11.2	1,485	8.7	1,215	4.3	1,040	3.7	650	1.5	430	0.7
3/4	20	1,760	11.1	1,605	10.0	1,305	7.6	1,095	3.8	935	3.2	580	1.4	380	0.6
7/8	22	1,565	9.8	1,420	8.9	1,140	6.8	960	3.3	815	2.8	510	1.2	340	0.5
1	25	1,360	8.5	1,240	7.7	1,020	6.0	840	3.0	720	2.6	440	0.9	300	0.5

Note: For side milling, increase Feeds 20% to 50%.

Side Milling - 4 Flute Square End & 4 Flute Corner Radius

Hardness		Tensile Strength: Up to 750N/mm2		Up to 30 HRC		30 to 38 HRC		38 to 45 HRC		45 to 55 HRC		55 to 60 HRC			
Work Material		Cast Iron	Mild Steels, Carbon Steels	Alloy Steels, Tool Steels, Ti Alloys (Annealed)		Hardened Steels, Prehardened Steels, Ti Alloys (Solution Treated and Aged)		Hardened Steels, Prehardened Steels, Stainless Steels, Inconel, Ni Based Alloys		Hardened Steels		Hardened Steels			
Depth of Cut				D < 1/8 1/8 ≤ D		Ad 1.5D 0.05D 1.5D 0.1D		Ad Rd 1D 0.02D							
Dia. (in)	(mm)	390 SFM		330 SFM		270 SFM		220 SFM		190 SFM		120 SFM		80 SFM	
		Speed RPM	Feed in/min	Speed RPM	Feed in/min	Speed RPM	Feed in/min	Speed RPM	Feed in/min	Speed RPM	Feed in/min	Speed RPM	Feed in/min	Speed RPM	Feed in/min
1/16	1.5	20,825	15.4	18,070	12.5	15,670	11.2	10,870	4.7	9,915	4.2	6,740	2.6	5,400	1.6
3/32		16,305	21.5	13,720	18.1	11,550	14.5	8,075	5.4	6,885	4.9	4,185	2.9	2,950	2.0
1/8	3	12,060	28.4	10,205	24.0	8,700	16.9	7,125	5.9	5,475	5.2	3,180	2.9	2,290	2.2
5/32	4	9,630	29.9	8,060	25.0	7,890	17.5	5,170	6.3	4,475	5.3	2,655	3.3	1,815	2.2
3/16		8,075	33.7	6,740	28.3	5,930	19.4	4,455	6.5	3,935	5.7	2,360	3.5	1,565	2.0
7/32		7,580	34.8	5,790	29.1	4,835	20.0	3,855	6.7	3,440	6.0	2,045	3.4	1,360	1.9
1/4	6	7,060	34.4	5,090	28.9	4,235	20.0	3,375	6.9	3,030	6.1	1,775	3.3	1,205	1.9
9/32		5,945	34.0	4,545	28.3	3,785	19.9	3,020	6.9	2,690	6.1	1,580	3.3	1,080	1.8
5/16	8	4,820	33.6	4,000	27.8	3,330	19.8	2,660	6.9	2,360	6.1	1,390	3.2	960	1.7
11/32		4,385	33.6	3,670	27.8	3,050	19.8	2,440	6.9	2,160	6.1	1,290	3.5	880	1.7
3/8		4,005	33.6	3,360	27.8	2,795	19.8	2,225	6.9	1,970	6.1	1,200	3.8	800	1.7
13/32	10	3,680	33.6	3,090	27.8	2,565	19.8	2,040	6.9	1,810	6.1	1,110	3.9	735	1.7
7/16		3,440	33.6	2,870	27.8	2,405	19.8	1,895	6.9	1,690	6.1	1,035	3.4	690	1.5
1/2	12	3,010	32.7	2,510	27.5	2,090	19.7	1,655	6.9	1,475	6.0	900	2.7	600	1.3
9/16		2,645	31.2	2,230	26.9	1,820	19.6	1,470	6.7	1,295	5.8	795	2.4	530	1.1
5/8		2,355	31.4	1,995	26.1	1,630	19.6	1,325	6.1	1,200	5.4	720	2.3	470	0.9
11/16		2,160	31.0	1,800	25.7	1,485	19.2	1,215	5.6	1,090	5.0	650	2.0	430	0.9
3/4	20	1,920	29.7	1,605	24.9	1,350	15.7	1,095	5.0	975	4.5	580	1.7	380	0.9
7/8	22	1,660	26.2	1,420	22.4	1,185	15.9	960	4.3	850	3.9	510	1.4	335	0.8
1	25	1,485	23.3	1,240	19.5	1,050	14.0	840	3.9	750	3.5	440	1.4	300	0.7

Profiling- 2 & 4 Flute Ball Nose

Hardness		Tensile Strength: Up to 750N/mm ²		Up to 30 HRC		30 to 38 HRC		38 to 45 HRC		45 to 55 HRC		55 to 60 HRC			
Work Material		Cast Iron		Mild Steels, Carbon Steels		Alloy Steels, Tool Steels, Ti Alloys (Annealed)		Hardened Steels, Prehardened Steels, Ti Alloys (Solution Treated and Aged)		Hardened Steels, Prehardened Steels, Stainless Steels, Inconel, Ni Based Alloys		Hardened Steels		Hardened Steels	
Depth of Cut												$\frac{Ad}{0.05D}$ $\frac{pf}{0.1D}$			
Dia. (in)	(mm)	575 SFM		460 SFM		375 SFM		310 SFM		260 SFM		230 SFM		165 SFM	
		Speed RPM	Feed in/min	Speed RPM	Feed in/min	Speed RPM	Feed in/min	Speed RPM	Feed in/min	Speed RPM	Feed in/min	Speed RPM	Feed in/min	Speed RPM	Feed in/min
1/16	1.5	32,405	41.0	29,230	36.1	26,520	29.3	21,185	18.9	18,640	13.6	16,095	9.9	11,970	6.6
3/32	1.5	24,540	44.4	19,820	36.1	16,305	29.4	13,145	18.9	11,550	13.7	9,950	9.9	7,480	6.6
1/8	3	17,760	44.4	14,370	36.1	12,060	29.8	9,695	19.5	8,490	14.4	7,280	10.4	5,445	6.9
5/32	4	13,950	44.4	11,505	36.1	9,630	29.8	7,695	20.9	6,725	17.3	5,760	12.7	4,300	8.2
3/16	6	11,100	48.3	9,660	39.4	8,075	29.9	6,425	21.0	5,650	17.5	4,830	13.3	3,615	8.3
7/32	6	10,360	49.6	8,280	40.4	6,915	30.9	5,490	21.5	4,835	18.0	4,120	13.7	3,080	8.5
1/4	6	9,120	51.6	7,280	42.0	6,070	32.6	4,815	22.7	4,235	18.9	3,610	14.2	2,690	8.9
9/32	6	8,165	56.3	6,520	45.6	5,430	34.9	4,310	24.4	3,785	20.2	3,225	14.7	2,405	9.4
5/16	8	7,210	61.0	5,760	49.3	4,785	37.1	3,815	26.1	3,330	21.4	2,850	15.3	2,115	9.9
11/32	8	6,610	59.7	5,280	48.0	4,385	36.5	3,490	25.7	3,050	21.0	2,620	15.5	1,940	9.9
3/8	10	6,040	57.8	4,830	46.3	4,005	35.7	3,180	25.1	2,795	20.6	2,405	15.7	1,775	9.9
13/32	10	5,540	55.9	4,430	44.6	3,680	34.8	2,920	24.5	2,565	20.3	2,205	15.6	1,630	9.8
7/16	12	5,165	54.0	4,120	42.7	3,440	34.0	2,730	23.9	2,405	20.3	2,045	15.2	1,510	9.5
1/2	12	4,505	51.1	3,585	40.7	3,010	32.6	2,390	22.9	2,090	19.7	1,775	14.5	1,310	9.1
9/16	16	4,000	49.6	3,170	40.7	2,645	31.7	2,110	22.4	1,820	18.3	1,580	13.9	1,175	8.9
5/8	16	3,570	49.6	2,840	39.7	2,355	30.5	1,875	22.4	1,630	18.0	1,390	12.8	1,080	8.7
11/16	16	3,275	47.9	2,595	38.1	2,160	29.2	1,725	22.4	1,485	18.0	1,290	12.4	980	8.4
3/4	20	2,915	45.2	2,340	36.5	1,920	27.4	1,545	21.5	1,350	17.6	1,175	11.9	880	8.1
7/8	22	2,540	42.1	2,130	33.8	1,775	24.4	1,365	19.2	1,185	15.9	1,025	10.8	765	7.7
1	25	2,240	36.8	1,775	31.5	1,475	21.8	1,180	16.8	1,050	13.7	900	9.8	670	6.7

Increase Feeds 40% to 50% for 4 Flute Ball Nose

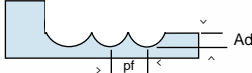
High-Speed Light Milling - 2 & 4 Flute Ball Nose

Hardness		Tensile Strength: Up to 750N/mm ²		Up to 30 HRC		30 to 38 HRC		38 to 45 HRC		45 to 55 HRC		55 to 60 HRC	
Work Material		Mild Steels, Carbon Steels		Alloy Steels, Tool Steels, Ti Alloys (Annealed)		Hardened Steels, Prehardened Steels, Ti Alloys (Solution Treated and Aged)		Hardened Steels, Prehardened Steels, Stainless Steels, Inconel, Ni Based Alloys		Hardened Steels		Hardened Steels	
Depth of Cut												$\frac{Ad}{0.02D}$ $\frac{pf}{0.05D}$	
Dia. (in)	(mm)	985 SFM		855 SFM		740 SFM		590 SFM		590 SFM		400 SFM	
		Speed RPM	Feed in/min	Speed RPM	Feed in/min	Speed RPM	Feed in/min	Speed RPM	Feed in/min	Speed RPM	Feed in/min	Speed RPM	Feed in/min
1/16	1.5	39,125	126.4	35,305	110.2	35,010	98.4	33,400	88.6	23,180	59.4	17,650	39.4
3/32	1.5	27,490	137.8	21,750	110.2	21,250	98.4	20,450	88.6	14,705	61.0	10,950	39.4
1/8	3	20,475	139.2	16,325	114.4	15,825	100.1	15,150	90.0	11,000	63.4	8,355	40.0
5/32	4	18,085	145.4	15,525	133.1	15,025	108.0	13,555	96.2	11,000	74.4	7,960	43.1
3/16	6	16,085	154.6	15,110	153.3	14,230	112.8	11,585	91.9	10,230	80.8	7,675	46.3
7/32	6	15,215	175.0	14,160	164.9	12,600	110.9	10,160	89.4	9,715	85.9	7,035	46.1
1/4	6	14,380	181.0	12,880	161.7	11,050	103.8	9,080	84.8	9,080	84.8	6,305	43.5
9/32	6	12,990	163.1	11,490	144.5	10,035	93.6	8,150	76.2	8,150	76.2	5,650	39.4
5/16	8	11,600	145.1	10,100	127.3	9,025	83.5	7,215	67.6	7,215	67.6	5,000	35.4
11/32	8	10,760	134.3	9,355	117.3	8,285	76.9	6,610	61.9	6,610	61.9	4,575	32.4
3/8	10	9,975	124.2	8,660	108.0	7,575	70.7	6,035	56.4	6,035	56.4	4,180	29.6
13/32	10	9,250	115.0	8,025	99.5	6,950	65.0	5,540	51.6	5,540	51.6	3,840	27.2
7/16	12	8,630	107.1	7,465	92.5	6,475	60.4	5,165	47.6	5,165	47.6	3,580	25.3
1/2	12	7,540	93.6	6,510	80.5	5,650	52.4	4,500	41.5	4,500	41.5	3,125	22.0
9/16	16	6,675	83.2	5,785	71.4	5,000	46.4	3,975	37.5	3,975	37.5	2,740	19.3
5/8	16	6,000	75.4	5,190	63.6	4,485	41.7	3,575	33.7	3,575	33.7	2,465	17.4
11/16	16	5,465	67.6	4,705	58.7	4,075	38.3	3,250	30.7	3,250	30.7	2,260	16.0
3/4	20	4,890	60.6	4,215	52.8	3,650	34.4	2,925	27.6	2,925	27.6	2,010	14.3
7/8	22	4,255	53.2	3,710	46.3	3,190	30.2	2,550	24.0	2,550	24.1	1,755	12.3
1	25	3,740	46.6	3,250	40.8	2,805	26.4	2,215	21.0	2,215	21.0	1,525	10.7

Increase Feeds 40% to 50% for 4 Flute Ball Nose




SUGGESTED SPEEDS & FEEDS MOLD MILLS & 6 FLUTE 50° HIGH SPIRAL RED SERIES

Mold Mills for Profile Milling

Hardness		Tensile Strength: Up to 750N/mm ²		Up to 30 HRC		30 to 38 HRC		38 to 45 HRC		45 to 55 HRC		55 to 60 HRC							
Work Material		Cast Iron		Mild Steels, Carbon Steels		Alloy Steels, Tool Steels, Ti Alloys (Annealed)		Hardened Steels, Prehardened Steels, Ti Alloys (Solution Treated and Aged)		Hardened Steels, Prehardened Steels, Stainless Steels, Inconel, Ni Based Alloys		Hardened Steels							
Depth of Cut																			
		<table border="1"> <tr> <td>$D < 5/8$</td> <td>Ad</td> </tr> <tr> <td>$5/8 \leq D$</td> <td>0.05D</td> </tr> <tr> <td></td> <td>0.03"</td> </tr> </table>												$D < 5/8$	Ad	$5/8 \leq D$	0.05D		0.03"
$D < 5/8$	Ad																		
$5/8 \leq D$	0.05D																		
	0.03"																		
Dia. (in)	(mm)	550 SFM		550 SFM		450 SFM		360 SFM		270 SFM		230 SFM		200 SFM					
		Speed RPM	Feed in/min	Speed RPM	Feed in/min	Speed RPM	Feed in/min	Speed RPM	Feed in/min	Speed RPM	Feed in/min	Speed RPM	Feed in/min	Speed RPM	Feed in/min				
1/8	3	14,400	40.8	14,400	34.8	12,720	28.8	10,200	19.2	7,680	14.4	6,528	10.5	5,683	9.4				
3/16	5	11,520	43.2	11,520	34.8	9,600	28.8	7,680	21.6	5,760	16.8	4,896	12.3	4,262	10.9				
1/4	6	9,120	43.2	9,120	34.8	7,680	28.8	6,120	22.8	4,560	16.8	3,876	12.3	3,374	10.9				
5/16	8	7,680	43.2	7,680	36.0	6,360	28.8	5,040	24.0	3,840	18.0	3,264	13.1	2,842	11.7				
3/8	10	5,760	32.4	5,760	27.6	4,800	22.8	3,840	18.0	2,880	13.2	2,448	9.6	2,131	8.6				
7/16	11	4,560	25.2	4,560	21.6	3,840	18.0	3,000	14.4	2,280	10.8	1,938	7.9	1,687	7.0				
1/2	12	4,200	24.0	4,200	19.2	3,480	16.8	2,760	13.2	2,040	9.6	1,734	7.0	1,510	6.2				
9/16	14	3,840	21.6	3,840	18.0	3,120	15.6	2,520	12.0	1,920	9.6	1,632	7.0	1,421	6.2				
5/8	16	2,880	16.8	2,880	13.2	2,400	10.8	1,920	9.6	1,440	7.2	1,224	5.3	1,066	4.7				
3/4	20	2,280	13.2	2,280	10.8	1,920	9.6	1,560	7.2	1,140	6.0	969	4.4	844	3.9				
1	25	1,800	10.8	1,800	8.4	1,560	7.2	1,200	6.0	912	4.8	775	3.5	675	3.1				

Multi Flute 6 Flute 50° High Spiral Square End

Side Milling

Work Material		Mild Steel Carbon Steel Cast Iron		Alloyed Steels Tool Steels		Hardened Steels Tool Steels		Hardened Steels Tool Steels		Titanium Alloy		Nickel Base High-Temp Alloy	
Hardness		Up to HRC25		HRC25-45		HRC45-55		HRC55-60		HRC30-40		HRC25-45	
Depth of Cut		 Ad = 1.5D Rd = 0.1D				 Ad = 1.5D Rd = 0.05D				 Ad = 1.5D Rd = 0.05D			
Mill Diameter (inch)	mm	312-540 SFM		156-312 SFM		96-156 SFM		60-96 SFM		156-276 SFM		48-80 SFM	
		Speed RPM	Feed in/min	Speed RPM	Feed in/min	Speed RPM	Feed in/min	Speed RPM	Feed in/min	Speed RPM	Feed in/min	Speed RPM	Feed in/min
1/8	3	11,400	70.8	6,360	19.2	3,240	7.2	2,280	4.8	5,040	33.6	1,680	2.4
5/32	4	8,640	70.8	4,800	19.2	2,640	9.6	1,800	4.8	3,840	36.0	1,260	2.4
3/16	5	6,840	61.2	3,840	19.2	2,160	10.8	1,560	4.8	3,000	36.0	984	3.6
1/4	6	6,360	122.4	3,480	39.6	1,920	14.4	1,320	7.2	2,520	42.0	840	4.8
5/16	8	4,800	112.8	2,640	39.6	1,440	14.4	996	7.2	1,920	42.0	624	4.8
3/8	10	3,840	99.6	2,160	39.6	1,152	13.2	804	7.2	1,560	37.2	480	4.8
1/2	12	3,480	99.6	1,920	36.0	960	13.2	672	6.0	1,260	36.0	408	3.6
5/8	16	2,640	75.6	1,440	27.6	720	10.8	528	4.8	960	33.6	312	3.6
3/4	20	2,160	61.2	1,140	21.6	576	7.2	420	3.6	780	28.8	240	3.6
1	25	1,500	56.4	900	22.8	450	8.4	300	3.6	720	24.0	216	2.4