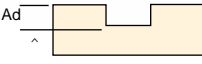


SUGGESTED SPEEDS AND FEEDS - 2 FL. SQUARE END, YELLOW SERIES CARBIDE END MILLS

Slot Milling - 2 fl. Reg length, 2 fl. Stub length, 2 fl. Double End Reg & Stub length

- Notes:**
- Reduce Speeds and Feeds 25% for 2 fl. Long length
 - Reduce Speeds and Feeds 50% for 2 fl. Extra long length

Hardness				Tensile Strength: Up to 750N/mm ²		Up to 30 HRC		30 to 38 HRC		38 to 45 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		Aluminum Alloys	
Depth of Cut						Ad							
						D < 1/8							
Dia. (in)	(mm)	220 SFM		200 SFM		170 SFM		140 SFM		110 SFM		500 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
1/32	0.5	40,000	8.25	37,500	5.63	31,537	2.38	26,687	1.75	21,112	1.50	62,500	11.75
	0.8	25,987	8.25	23,687	5.63	19,875	2.38	16,812	1.75	13,300	1.50	59,625	11.75
	1	21,000	8.25	18,750	5.63	15,750	2.38	13,350	1.75	10,500	1.50	47,250	11.75
3/64		19,031	8.25	16,987	5.63	14,287	2.38	12,075	1.75	9,493	1.50	42,675	11.75
1/16	1.5	14,962	8.25	13,325	5.75	11,250	2.50	9,425	1.75	7,406	1.50	33,150	11.75
5/64	2	10,881	8.25	9,662	5.88	8,212	2.63	6,768	1.75	5,325	1.50	23,625	11.75
3/32		9,350	8.50	8,293	5.88	7,062	3.00	5,812	1.75	4,556	1.50	20,381	11.75
7/64		7,918	8.63	7,012	5.88	5,987	3.25	4,918	1.75	3,843	1.50	17,406	11.75
1/8	3	6,806	8.88	6,018	5.88	5,156	3.75	4,218	1.75	3,300	1.50	15,075	12.88
9/64		6,087	9.13	5,387	5.88	4,625	4.25	3,775	1.75	2,975	1.50	13,556	15.13
5/32	4	5,375	9.38	4,768	5.88	4,087	4.63	3,325	1.75	2,643	1.50	12,037	17.50
11/64		4,931	9.50	4,362	5.88	3,737	4.75	3,050	1.75	2,425	1.50	11,043	17.75
3/16		4,518	9.63	3,975	5.88	3,418	4.75	2,781	1.75	2,218	1.50	10,093	17.75
13/64	5	4,150	10.00	3,650	5.88	3,131	4.75	2,550	1.75	2,037	1.50	9,268	17.75
7/32		3,850	10.75	3,412	5.88	2,931	4.75	2,368	1.75	1,887	1.50	8,643	17.75
1/4	6	3,362	11.88	3,000	5.88	2,575	4.75	2,075	1.75	1,650	1.50	7,587	17.75
9/32		3,006	12.75	2,675	5.88	2,306	4.75	1,862	1.75	1,481	1.50	6,787	17.75
5/16	8	2,643	13.50	2,343	5.88	2,037	4.75	1,662	1.75	1,318	1.50	5,981	17.75
11/32		2,425	13.63	2,156	5.88	1,856	4.75	1,525	1.75	1,212	1.50	5,481	17.75
3/8		2,218	13.63	1,975	5.88	1,675	4.75	1,400	1.75	1,106	1.50	5,006	17.75
13/32	10	2,037	13.63	1,818	5.88	1,537	4.75	1,293	1.75	1,018	1.50	4,600	17.75
7/16		1,887	13.63	1,700	5.88	1,443	4.75	1,206	1.75	943	1.50	4,300	17.75
1/2	12	1,637	13.63	1,487	5.88	1,275	4.75	1,050	1.75	825	1.50	3,762	17.75
9/16		1,468	13.63	1,325	5.88	1,131	4.75	925	1.75	731	1.50	3,306	17.75
5/8	16	1,350	13.88	1,200	5.88	1,018	4.75	837	2.00	650	1.50	2,943	17.75
11/16		1,225	13.88	1,087	5.88	925	4.75	762	2.13	587	1.50	2,700	17.75
3/4	20	1,100	13.88	975	5.88	831	4.75	681	2.13	531	1.50	2,400	17.75
7/8	22	956	13.88	843	5.88	725	4.75	600	2.13	462	1.50	2,075	17.75
1	25	837	13.63	737	5.88	625	4.75	525	2.13	412	1.50	1,843	17.75

- For side milling, increase Feeds 25% or more.

Side Milling - 4 fl. Reg length, 4 fl. Double End Stub length

- Notes:**
- Reduce Speeds and Feeds 25% for 4 fl. **LONG LENGTH**
 - Reduce Speeds and Feeds 50% for 4 fl. **EXTRA LONG LENGTH**

Hardness		Tensile Strength: Up to 750N/mm ²		Up to 30 HRC		30 to 38 HRC		38 to 45 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		Aluminum Alloys	
Depth of Cut													
		Ad = 1.5D		Rd = 0.1D									
Dia. (in)	(mm)	200 SFM		215 SFM		165 SFM		150 SFM		120 SFM		590 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
1/32	0.5	40,000	29.88	40,000	14.75	31,550	13.63	29,125	5.63	24,250	4.38	62,500	49.25
1/32	0.8	26,437	29.88	29,050	14.75	19,875	13.63	18,250	5.63	15,250	4.38	62,500	49.25
1/16	1	19,500	29.88	21,750	14.75	15,750	13.63	14,250	5.63	11,250	4.38	55,500	49.25
3/64	1.5	17,675	29.88	19,600	14.75	14,237	13.63	12,881	5.63	10,181	4.38	50,343	49.25
1/16	1.5	13,893	29.88	15,131	14.75	11,118	13.63	10,056	5.63	7,987	4.38	39,637	49.25
5/64	2	10,112	29.88	10,668	14.75	7,993	13.63	7,225	5.63	5,781	4.38	28,918	49.25
3/32	2	8,712	29.88	9,150	15.75	6,868	13.63	6,206	5.50	4,950	4.25	24,775	50.75
7/64	3	7,400	29.88	7,750	16.88	5,825	13.63	5,256	5.38	4,175	4.25	20,906	52.25
1/8	3	6,362	30.75	6,662	18.00	5,006	13.63	4,512	5.38	3,587	4.13	17,962	53.63
9/64	4	5,681	32.88	5,981	19.25	4,475	13.63	4,031	5.38	3,231	4.13	16,168	54.75
5/32	4	5,000	35.00	5,300	20.50	3,937	13.63	3,562	5.38	2,868	4.13	14,381	56.00
11/64	5	4,587	35.13	4,856	21.13	3,618	14.00	3,275	5.38	2,625	4.13	13,206	56.50
3/16	5	4,200	35.13	4,443	21.50	3,318	14.50	3,006	5.38	2,387	4.13	12,075	57.00
13/64	5	3,862	35.13	4,075	22.00	3,056	14.75	2,756	5.38	2,187	4.13	11,100	57.50
7/32	6	3,587	35.13	3,775	22.38	2,856	14.75	2,556	5.38	2,037	4.13	10,350	57.88
1/4	6	3,150	35.13	3,300	22.75	2,500	14.75	2,218	5.38	1,787	4.13	9,100	58.50
9/32	8	2,825	35.13	2,975	22.88	2,231	14.75	1,975	5.38	1,618	4.13	8,150	58.75
5/16	8	2,493	35.13	2,643	23.00	1,962	14.75	1,737	5.38	1,437	4.13	7,200	59.00
11/32	10	2,275	35.38	2,425	24.25	1,806	14.75	1,612	5.38	1,318	4.13	6,600	59.00
3/8	10	2,068	35.75	2,218	25.50	1,656	14.75	1,500	5.38	1,206	4.13	6,037	59.00
13/32	10	1,893	36.13	2,037	26.25	1,525	14.75	1,387	5.38	1,106	4.13	5,537	60.00
7/16	12	1,775	36.38	1,887	26.38	1,425	14.75	1,293	5.38	1,031	4.13	5,150	62.25
1/2	12	1,562	38.63	1,637	28.13	1,243	15.25	1,125	5.38	900	4.13	4,481	65.00
9/16	16	1,400	42.88	1,468	31.13	1,100	16.38	993	5.38	793	4.13	3,962	65.00
5/8	16	1,256	44.38	1,318	32.13	987	17.25	900	5.38	712	4.13	3,550	65.00
11/16	20	1,143	48.00	1,200	32.38	900	17.38	812	5.38	643	4.13	3,243	65.00
3/4	20	1,025	49.25	1,075	32.88	800	17.38	725	5.13	581	4.13	2,925	65.00
7/8	22	887	44.38	937	29.50	700	15.75	637	4.63	506	3.75	2,518	61.38
1	25	787	39.00	825	25.88	612	13.63	550	4.13	450	3.25	2,218	54.38

- For slot milling, reduce Feeds 20% to 50%.

SUGGESTED SPEEDS AND FEEDS - 2 & 4 FL. BALL NOSE YELLOW SERIES CARBIDE END MILLS

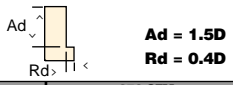
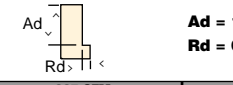
Profiling - 2 fl. Reg length Ball Nose Endmills

% Hardness		Tensile Strength: Up to 750N/mm2		Up to 30 HRC		30 to 38 HRC		38 to 45 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		Aluminum Alloys	
Depth of Cut						$D < 1/8$ $1/8 \leq D$		$0.1D$ $0.3D$		$0.2D$ $0.7D$			
Dia. (in)	(mm)	200 SFM		205 SFM		150 SFM		125 SFM		100 SFM		600 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
1/32	0.5	38,750	6.00	38,750	5.63	29,125	3.13	24,250	1.50	14,375	1.13	62,500	8.50
	0.8	24,500	6.00	24,500	5.63	18,350	3.13	15,250	1.50	12,225	1.13	62,500	8.50
	1	19,500	6.25	19,500	5.88	14,250	3.50	11,925	1.75	9,525	1.13	48,000	8.88
3/64		17,675	6.50	17,675	6.00	12,881	3.75	10,775	1.88	8,606	1.25	44,418	10.00
1/16	1.5	13,893	7.25	13,893	6.38	10,056	4.25	8,400	2.13	6,700	1.50	36,981	12.25
5/64	2	10,112	7.88	10,112	6.75	7,225	4.63	6,012	2.25	4,800	1.75	29,537	14.63
3/32		8,712	8.13	8,712	7.13	6,206	4.88	5,175	2.38	4,112	1.75	25,525	14.75
7/64		7,400	8.38	7,400	7.50	5,256	5.13	4,400	2.38	3,493	1.75	21,656	14.75
1/8	3	6,362	9.00	6,362	7.63	4,512	5.38	3,787	2.38	3,000	1.75	18,681	14.75
9/64		5,681	9.88	5,681	7.75	4,031	5.38	3,362	2.38	2,675	1.75	16,837	14.75
5/32	4	5,000	10.75	5,000	7.88	3,562	5.38	2,950	2.38	2,343	1.75	14,987	14.75
11/64		4,587	11.50	4,587	8.25	3,275	5.38	2,700	2.38	2,156	1.75	13,775	15.88
3/16		4,200	12.00	4,200	8.63	3,006	5.50	2,462	2.38	1,975	1.75	12,612	17.00
13/64	5	3,862	12.63	3,862	8.88	2,756	5.50	2,262	2.38	1,818	1.75	11,593	17.75
7/32		3,587	13.00	3,587	8.88	2,556	5.38	2,112	2.38	1,700	1.75	10,787	17.75
1/4	6	3,150	14.13	3,150	8.63	2,218	5.25	1,862	2.38	1,506	1.75	9,462	18.25
9/32		2,825	15.63	2,825	8.00	1,975	5.13	1,687	2.38	1,350	1.75	8,481	19.38
5/16	8	2,493	17.00	2,493	7.38	1,737	5.00	1,500	2.38	1,200	1.75	7,500	20.50
11/32		2,275	17.13	2,275	7.25	1,612	5.00	1,375	2.38	1,100	1.75	6,868	20.63
3/8		2,068	17.13	2,068	7.13	1,500	5.00	1,256	2.38	1,000	1.75	6,275	20.63
13/32	10	1,893	17.13	1,893	7.00	1,387	4.88	1,150	2.38	918	1.75	5,762	21.13
7/16		1,775	17.13	1,775	6.75	1,293	4.63	1,068	2.38	862	1.75	5,375	22.25
1/2	12	1,562	17.13	1,562	6.50	1,125	4.38	937	2.38	750	1.75	4,687	23.63
9/16		1,400	17.38	1,400	6.50	993	4.38	825	2.38	662	1.75	4,112	23.13
5/8	16	1,256	17.38	1,256	6.50	900	4.38	737	2.38	587	1.75	3,700	20.88
11/16		1,143	17.38	1,143	6.50	812	4.38	675	2.38	537	1.75	3,393	20.63
3/4	20	1,025	16.13	1,025	6.50	725	4.38	606	2.38	475	1.75	3,018	20.63
7/8	22	887	14.00	887	6.50	637	4.38	531	2.25	418	1.75	2,625	20.63
1	25	787	12.25	787	6.38	550	4.38	462	2.00	375	1.75	2,287	20.38

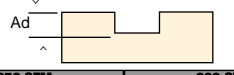
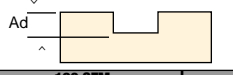
- 2 fl. Notes:**
- Reduce Speeds and Feeds 25% for 2 fl. Ball Nose Long length
 - Reduce Speeds and Feeds 50% for 2 fl. Ball nose Extra long length

- 4 fl. Notes:**
- Increase Speeds and Feeds 40% for 4fl. Ball nose Reg. Length
 - Reduce Speeds 25% and Increase Feeds 10% for 4 fl. Ball Nose Long length
 - Reduce Speeds 50% and Increase Feeds 10% for 4 fl. Ball nose Extra long length

ROUGHING Side Milling

Hardness		Tensile Strength: Up to 750N/mm ²		Up to 30 HRC		30 to 38 HRC		38 to 45 HRC			
Work Material		Cast Iron		Mild Steels Carbon Steels		Alloy Steels, Tool Steels, Ti Alloys (Annealed)		Hardened Steels, Prehardened Steels		Hardened Steels Stainless Steels	
Depth of Cut		 Ad = 1.5D Rd = 0.4D				 Ad = 1.5D Rd = 0.3D					
Dia. (in)	(mm)	420 SFM		350 SFM		300 SFM		225 SFM		175 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
1/4	6	6,350	29.9	5,300	25.2	4,500	14.2	3,450	11.0	2,650	8.3
5/16	8	4,750	29.9	4,000	25.2	3,400	16.1	2,600	12.2	2,000	9.4
3/8	10	3,800	29.9	3,200	25.2	2,700	16.9	2,050	13.0	1,600	10.2
1/2	12	3,200	30.3	2,650	25.2	2,250	17.7	1,700	13.4	1,350	10.6
5/8	16	2,400	30.3	2,000	25.2	1,700	18.9	1,300	14.2	1,000	11.0
3/4	20	1,900	29.9	1,600	24.0	1,350	18.5	1,050	13.8	800	10.2
1	25	1,500	29.9	1,150	24.0	1,000	18.5	800	13.8	600	10.2

ROUGHING Slotting

Hardness		Tensile Strength: Up to 750N/mm ²		Up to 30 HRC		30 to 38 HRC		38 to 45 HRC			
Work Material		Cast Iron		Mild Steels Carbon Steels		Alloy Steels, Tool Steels, Ti Alloys (Annealed)		Hardened Steels, Prehardened Steels		Hardened Steels Stainless Steels	
Depth of Cut		 Ad = 0.75D				 Ad = 0.5D					
Dia. (in)	(mm)	350 SFM		300 SFM		250 SFM		190 SFM		160 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
1/4	6	5,300	25.2	4,500	21.3	3,700	11.8	2,900	9.1	2,400	7.5
5/16	8	4,000	25.2	3,400	21.3	2,800	13.4	2,200	10.2	1,800	8.7
3/8	10	3,200	25.2	2,700	21.3	2,250	14.2	1,750	11.0	1,450	9.1
1/2	12	2,650	25.2	2,250	21.3	1,850	14.6	1,450	11.4	1,200	9.4
5/8	16	2,000	25.2	1,700	21.3	1,400	15.4	1,100	12.2	900	9.8
3/4	20	1,600	25.2	1,350	20.1	1,100	15.4	900	11.8	700	9.1
1	25	1,150	25.2	950	20.1	800	15.4	700	11.8	500	9.1