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Carbide End Mills

G3 TOOLING

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G3 TOOLING

Bright

Micrograin Carbide Bright Finish — Cutting Conditions

Materials Main Group	Materials Sub-Group	Condition	Hardness (HRC)	Cutting Speed (SFM)
Low Carbon	1018, 1010, 1035	Normalized	<25	150-200
Medium Carbon	1045, 1050, 1065	Normalized	<25	150-200
Aluminum	Unalloyed, Cast	–	–	350-600
Brass/Bronze	–	–	–	350-400
Copper	–	–	–	250-300
Cast Iron	–	As Cast	<15	150-225

TiAlN Coated

Micrograin Carbide TiAlN Coated — Cutting Conditions

Materials Main Group	Materials Sub-Group	Condition	Hardness (HRC)	Cutting Speed (SFM)
Stainless Steels	300, 400 Series	Annealed	<29	200-350
Tool Steels	01, A-2, D-2, H-13, P-20	Annealed	<35	150-250
Medium Carbon	1030, 1035, 1038, 1040, 1045, 1050	Normalized	<28	190-275
Alloyed High Carbon	1065, 1070, 1080, 1090,1095, 1561,1572	Normalized	<32	150-250
High Strength	4140, 4340	Normalized	<32	150-250
Titanium	Commercially pure	Annealed	<32	150-250

TYPHOON

TYPHOON Sub-Micrograin Carbide Modified AlTiN — Cutting Conditions

Materials Main Group	Materials Sub-Group	Condition	Hardness (HRC)	Cutting Speed (SFM)
Stainless Steel	17-4PH, 15-5, 17-7PH, AM350	Hardened	<45	150-250
Tool Steels	01, A-2, D-2, H-13, P-20	Hardened	<60	80-270
High Strength	4140, 4340, 50100	Hardened	<60	80-270
Nickel Alloys	Inconel, Hastaloy, Waspaloy, Astraloy, Rene, Monel	Annealed and Hardened	<45	150-225
Titanium	6 AL 4	Annealed/Hardened	<42	175-275

Aluminum Series

Carbide Bright Finish for Aluminum — Cutting Conditions

Materials Main Group	Cutting Speed (SFM)
Aluminum	600-700
Die Cast Aluminum	600-700

2-Flute Regular Length Carbide End Mills

A general purpose carbide end mill with maximum chip clearance added.

For: End milling, Slotting, Sinking
On: Variety of Steels, Cast Iron, Non-Ferrous Metals, Plastics, Abrasive Type Materials

MICRO GRAIN CARBIDE | BRIGHT | TiAlN | REG LENGTH | 30°

Bright: Speeds & Feeds ➤ P. 20
TiAlN: Speeds & Feeds ➤ P. 23

Cutting Dia.	Shank Dia.	Flute Length	Overall Length	Bright Code No.	TiAlN Code No.
Inch					
1/32	1/8	1/8	1-1/2	103770	102677
3/64	1/8	9/64	1-1/2	103772	102799
1/16	1/8	3/16	1-1/2	103848	102800
5/64	1/8	1/4	1-1/2	103773	102801
3/32	1/8	5/16	1-1/2	103849	102802
7/64	1/8	3/8	1-1/2	103775	102803
1/8	1/8	1/2	1-1/2	103850	102804
9/64	3/16	1/2	2	103776	102805
5/32	3/16	9/16	2	103851	102806
11/64	3/16	9/16	2	103777	102807
3/16	3/16	5/8	2	103852	102808
13/64	1/4	5/8	2-1/2	103778	102809
7/32	1/4	5/8	2-1/2	103853	102811
1/4	1/4	3/4	2-1/2	103854	102810
9/32	5/16	3/4	2-1/2	103855	102813
5/16	5/16	13/16	2-1/2	103856	102812
11/32	3/8	7/8	2-1/2	103779	102815
3/8	3/8	1	2-1/2	103857	102814
13/32	7/16	1	2-3/4	103780	102817
7/16	7/16	1	2-3/4	103858	102816
1/2	1/2	1	3	103859	102818
9/16	9/16	1-1/8	3-1/2	103886	102820
5/8	5/8	1-1/4	3-1/2	103887	102822
11/16	3/4	1-3/8	4	103888	102824
3/4	3/4	1-1/2	4	103889	102826
7/8	7/8	1-1/2	4	103890	102828
1	1	1-1/2	4	103891	102830
Metric					
0.5	3	1.5	39	101552	102819
1	3	3	39	101553	102821
1.5	3	5	39	101432	102823
2	3	7	39	102696	102825
2.5	3	7	39	102697	102827
3	3	9	39	102698	102829
3.5	4	12	51	102699	102853
4	4	14	51	102700	102855
4.5	5	14	51	102701	102857
5	5	16	51	102702	102859
6	6	19	64	102703	102861
7	8	19	64	102704	102863
8	8	21	64	102705	102865
9	10	22	70	102706	102867
10	10	22	70	102707	102869
11	11	25	70	102708	102871
12	12	25	76	102709	102873
14	14	30	89	102711	102875
16	16	32	89	102712	102881
18	18	35	102	102713	102883
20	20	38	102	102714	102885
22	22	38	102	101451	102887
25	25	38	102	102715	102889

2-Flute Stub Length Carbide End Mills

2-Flute Stub has added strength and stability with the same geometry of our standard length series. Stub end mills are specifically designed for shallow milling and slotting in a variety of materials.

MICRO GRAIN CARBIDE | BRIGHT | TiAlN | STUB LENGTH | 30°

Bright: Speeds & Feeds ➤ P. 20
TiAlN: Speeds & Feeds ➤ P. 23

Cutting Dia.	Shank Dia.	Flute Length	Overall Length	Bright Code No.	TiAlN Code No.
Inch					
1/32	1/8	5/64	1-1/2	101220	102202
3/64	1/8	3/32	1-1/2	101221	102221
1/16	1/8	1/8	1-1/2	101222	102222
5/64	1/8	1/8	1-1/2	101223	102223
3/32	1/8	3/16	1-1/2	101224	102224
7/64	1/8	7/32	1-1/2	101225	102225
1/8	1/8	1/4	1-1/2	101226	102226
9/64	3/16	9/32	2	101227	102227
5/32	3/16	5/16	2	101228	102228
3/16	3/16	3/8	2	101229	102229
7/32	1/4	7/16	2	101230	102203
1/4	1/4	1/2	2	101231	102231
5/16	5/16	1/2	2	101232	102204
3/8	3/8	5/8	2	101233	102233
7/16	7/16	5/8	2-1/2	101234	102206
1/2	1/2	5/8	2-1/2	101235	102235
5/8	5/8	3/4	3	101236	102207
3/4	3/4	1	3	101237	102237
Metric					
1	3	2	39	101640	102631
1.5	3	3	39	101641	102641
2	3	4	39	101642	102633
2.5	3	5	39	101643	102643
3	3	6	39	101644	102644
3.5	4	7	51	101645	102645
4	4	8	51	101646	102646
4.5	5	9	51	101647	102647
5	5	10	51	101648	102648
6	6	12	51	101649	102649
7	8	12	51	101650	102635
8	8	12	51	101651	102651
9	10	14	51	101652	102637
10	10	14	51	101653	102653
11	11	16	64	101654	-
12	12	16	64	101655	-

2-Flute 1/8" Shank Miniature Carbide End Mills

Designed for milling small precision components in a variety of materials.

MICRO GRAIN CARBIDE | BRIGHT | TiAlN | REG LENGTH | 30°

Bright: Speeds & Feeds ➤ P. 20
TiAlN: Speeds & Feeds ➤ P. 23

Cutting Dia.	Shank Dia.	Flute Length	Overall Length	Bright Code No.	TiAlN Code No.
Inch					
0.015	1/8	0.047	1-1/2	101210	102208
0.020	1/8	0.063	1-1/2	101211	102211
0.025	1/8	0.078	1-1/2	101212	102212
0.030	1/8	0.094	1-1/2	101213	102213
0.035	1/8	0.109	1-1/2	101214	102214
0.040	1/8	0.125	1-1/2	101215	102209
0.045	1/8	0.140	1-1/2	101216	102216
0.050	1/8	0.156	1-1/2	101217	102217
0.055	1/8	0.171	1-1/2	101218	102218
0.060	1/8	0.188	1-1/2	101219	102219

Tolerances - Inch

Size	Diameter	Shank Diameter
3/32 thru 1"	+0.000"-0.002"	+0.0000"-0.0005"

Tolerances - Metric

Size	Diameter	Shank Diameter
1mm-25mm	+0.000mm-0.051mm	+0.000mm-0.013mm

Steel | Stainless Steel | Cast Iron/Hardened | Aluminum

2-Flute Long Length Carbide End Mills

Long length end mills combine added flute and overall length for greater reach when deep slotting or milling. These end mills have the capability to mill much thicker material in a single pass, thereby eliminating the interrupted cut that may be present with regular length end mills.

MICRO GRAIN CARBIDE | BRIGHT | TiAlN | LONG LENGTH | 30°

Bright: Speeds & Feeds ➤ P. 20
TiAlN: Speeds & Feeds ➤ P. 23

Cutting Dia.	Shank Dia.	Flute Length	Overall Length	Bright Code No.	TiAlN Code No.
Inch					
1/8	1/8	3/4	2-1/4	102961	102902
3/16	3/16	3/4	2-1/4	102962	102904
1/4	1/4	1-1/8	3	102963	102906
5/16	5/16	1-1/8	3	102964	102908
3/8	3/8	1-1/8	3	102965	102910
7/16	7/16	2	4	102966	102912
1/2	1/2	2	4	102967	102914
5/8	5/8	2-1/4	5	102968	102916
3/4	3/4	2-1/4	5	102969	102918
1	1	2-1/4	5	102970	102920
Metric					
3	3	19	57	101560	102921
4	4	19	57	101561	102923
5	5	25	64	101562	102925
6	6	28	76	101563	102927
8	8	29	76	101564	102929
10	10	32	76	101565	102931
12	12	51	102	101566	102933
14	14	57	127	101567	-
16	16	57	127	101568	102937
18	18	57	127	101569	102939
20	20	57	127	101570	-
25	25	57	127	101571	-

2-Flute Extra Long Length Carbide End Mills

Extra long length end mills combine added flute and overall length for greater reach when deep slotting or milling. These end mills have the capability to mill much thicker material in a single pass, thereby eliminating the interrupted cut that may be present with regular length end mills.

MICRO GRAIN CARBIDE | BRIGHT | TiAlN | X-LONG LENGTH | 30°

Bright: Speeds & Feeds ➤ P. 20
TiAlN: Speeds & Feeds ➤ P. 23

Cutting Dia.	Shank Dia.	Flute Length	Overall Length	Bright Code No.	TiAlN Code No.
Inch					
1/8	1/8	1	3	102400	102500
3/16	3/16	1-1/8	3	102402	102502
1/4	1/4	1-1/2	4	102404	102504
5/16	5/16	1-5/8	4	102406	102506
3/8	3/8	1-3/4	4	102408	102508
7/16	7/16	3	6	102410	102510
1/2	1/2	3	6	102412	102512
5/8	5/8	3	6	102414	102514
3/4	3/4	3	6	102416	102516
1	1	3	6	102418	102518

2-Flute Double End Stub Length

Double end end mills offer the same tool geometry as the single end stub end mill, but with two cutters in one tool. Economy is an added feature of this tool.

MICRO GRAIN CARBIDE | BRIGHT | TiAlN | STUB LENGTH | 30°

Bright: Speeds & Feeds ➤ P. 20
TiAlN: Speeds & Feeds ➤ P. 23

Cutting Dia.	Shank Dia.	Flute Length	Overall Length	Bright Code No.	TiAlN Code No.
Inch					
1/32	1/8	5/64	1-1/2	102260	102360
1/16	1/8	1/8	1-1/2	102262	102362
3/32	1/8	3/16	1-1/2	102264	102364
1/8	1/8	1/4	1-1/2	102266	102366
5/32	3/16	5/16	2	102268	102368
3/16	3/16	3/8	2	102270	102370
7/32	1/4	1/2	2-1/2	102272	102372
1/4	1/4	1/2	2-1/2	102274	102374
5/16	5/16	1/2	2-1/2	102276	102376
3/8	3/8	1/2	2-1/2	102278	102378
7/16	7/16	9/16	2-3/4	102280	102380
1/2	1/2	5/8	3	102282	102382

2-Flute Double End Regular Length

With maximum chip clearance, 2-flute end mills are ideal for milling, sinking, profiling or slotting in a variety of materials.

MICRO GRAIN CARBIDE | BRIGHT | TiAlN | REG LENGTH | 30°

Bright: Speeds & Feeds ➤ P. 20
TiAlN: Speeds & Feeds ➤ P. 23

Cutting Dia.	Shank Dia.	Flute Length	Overall Length	Bright Code No.	TiAlN Code No.
Inch					
1/8	3/8	3/8	3-1/16	101300	102001
5/32	3/8	7/16	3-1/8	101301	102003
3/16	3/8	1/2	3-1/4	101302	102005
7/32	3/8	9/16	3-3/8	101303	102007
1/4	3/8	5/8	3-3/8	101304	102009
9/32	3/8	11/16	3-3/8	101305	102011
5/16	3/8	3/4	3-1/2	101306	102013
11/32	3/8	3/4	3-1/2	101307	-
3/8	3/8	3/4	3-1/2	101308	102017
7/16	1/2	7/8	4	101309	102019
1/2	1/2	1	4	101310	102021

End Mill Dispenser Cabinets

- Three drawer
- All steel

Description	Model No.	Code No.
Two flute single and double end for 1/16 to 1	CZD10	113905
Four flute single and double end for 1/16 to 1	CZD11	113906
Two and four flute single and double end for 1/8 to 1 x 8ths	CZD12	113907

End Mill Sheath Rack

- ABS plastic
- 62 sheaths

Model	Size Range (mm)	Dimensions	Code No.
VMS-2	Ø6-Ø42	205x205x80	326545

2-Flute Corner Radius Regular Length

2-flute carbide end mill with corner radius allows more strength and minimizes chipping on corners. Two-flute construction provides more chip space and clearance than three or four flute designs.

MICRO GRAIN CARBIDE | BRIGHT | TiAlN | REG LENGTH | 30°

Bright: Speeds & Feeds ➤ P. 20
TiAlN: Speeds & Feeds ➤ P. 23

Cutting Dia.	Corner Radius	Shank Dia.	Flute Length	Overall Length	Bright Code No.	TiAlN Code No.
Inch						
1/8	0.015	1/8	1/2	1-1/2	101140	102023
3/16	0.020	3/16	5/8	2	101141	102025
3/16	0.030	3/16	5/8	2	101142	102027
1/4	0.020	1/4	3/4	2-1/2	101143	102029
1/4	0.030	1/4	3/4	2-1/2	101144	102031
1/4	0.045	1/4	3/4	2-1/2	101145	102033
5/16	0.020	5/16	13/16	2-1/2	101146	102035
5/16	0.030	5/16	13/16	2-1/2	101147	102037
5/16	0.045	5/16	13/16	2-1/2	101148	102039
3/8	0.020	3/8	1	2-1/2	101149	102041
3/8	0.030	3/8	1	2-1/2	101150	102043
3/8	0.045	3/8	1	2-1/2	101151	102045
1/2	0.020	1/2	1	3	101152	102046
1/2	0.030	1/2	1	3	101153	102047
1/2	0.045	1/2	1	3	101154	102048
1/2	0.060	1/2	1	3	101155	102049
5/8	0.020	5/8	1-1/4	3-1/2	101156	102051
5/8	0.030	5/8	1-1/4	3-1/2	101157	102053
5/8	0.045	5/8	1-1/4	3-1/2	101158	102055
5/8	0.060	5/8	1-1/4	3-1/2	101159	102057
5/8	0.090	5/8	1-1/4	3-1/2	101160	102059
3/4	0.020	3/4	1-1/2	4	101162	102061
3/4	0.030	3/4	1-1/2	4	101163	102063
3/4	0.045	3/4	1-1/2	4	101164	102065
3/4	0.060	3/4	1-1/2	4	101165	102067
3/4	0.090	3/4	1-1/2	4	101166	102069
3/4	0.125	3/4	1-1/2	4	101161	-
1	0.020	1	1-1/2	4	101168	102073
1	0.030	1	1-1/2	4	101169	102075
1	0.045	1	1-1/2	4	101170	102077
1	0.060	1	1-1/2	4	101171	102079
1	0.090	1	1-1/2	4	101172	102081
1	0.125	1	1-1/2	4	101167	102083

Carbide Drill Mills

- Drill/Mills can be used for drilling, slotting, profile milling
- 2-Flute - 60° & 90° included point angle
- Made from submicron grain carbide
- Cutting diameter tolerance: +0.000 / -0.002

Cutting Dia. (in.)	Shank Dia. (in.)	Flute Length (in.)	Overall Length (in.)	Bright 60° Code No.	Bright 90° Code No.
1/16	1/8	3/16	1-1/2	153187	153186
3/32	1/8	3/8	1-1/2	153189	153188
1/8	1/8	1/2	1-1/2	153191	153190
3/16	3/16	5/8	2	153193	153192
1/4	1/4	3/4	2-1/2	153195	153194
5/16	5/16	13/16	2-1/2	153197	153196
3/8	3/8	1	2-1/2	153199	153198
7/16	7/16	1	2-3/4	153201	153200
1/2	1/2	1	3	153203	153202
5/8	5/8	1-1/4	3-1/2	153205	153204
3/4	3/4	1-1/2	4	153207	153206

2-Flute Ball Nose Regular Length

A general purpose carbide end mill with maximum chip clearance added.
For: End Milling, Slotting, Sinking, Contouring
On: Variety of Steels, Cast Iron, Non-Ferrous Metals, Plastics, Abrasive Type Materials

MICRO GRAIN CARBIDE | BRIGHT | TiAlN | REG LENGTH | 30°

Bright: Speeds & Feeds ➤ P. 22
TiAlN: Speeds & Feeds ➤ P. 25

Cutting Dia.	Shank Dia.	Flute Length	Overall Length	Bright Code No.	TiAlN Code No.
Inch					
1/8	1/8	1/2	1-1/2	103872	102862
3/16	3/16	5/8	2	103873	102864
1/4	1/4	3/4	2-1/2	103874	102866
5/16	5/16	13/16	2-1/2	103877	102868
3/8	3/8	1	2-1/2	103875	102870
1/2	1/2	1	3	103876	102872
9/16	9/16	1-1/8	3-1/2	103892	102874
5/8	5/8	1-1/4	3-1/2	103893	102876
11/16	3/4	1-3/8	4	103894	102877
3/4	3/4	1-1/2	4	103895	102878
7/8	7/8	1-1/2	4	103896	102879
1	1	1-1/2	4	103897	102880
Metric					
0.5	3	1.5	39	101460	102107
1	3	3	39	101461	102108
1.5	3	5	39	101462	102109
2	3	7	39	102740	102111
2.5	3	7	39	102741	102113
3	3	9	39	102742	102115
3.5	4	12	51	102743	102117
4	4	14	51	102744	102119
4.5	5	14	51	102745	102121
5	5	16	51	102746	102123
6	6	19	64	102747	102182
7	8	19	64	102748	102183
8	8	21	64	102749	102184
9	10	22	70	102750	102186
10	10	22	70	102751	102187
11	11	25	70	102752	102188
12	12	25	76	102753	102189
14	14	30	89	102755	102191
16	16	32	89	102756	102192
18	18	35	102	102757	102193
20	20	38	102	102758	102194
22	22	38	102	101481	102195
25	25	38	102	102759	102196

2-Flute Ball Nose Extra Long Length

Extra long length end mills combine added flute and overall lengths for greater reach when deep slotting or milling. These end mills have the capability to mill much thicker material in a single pass, thereby eliminating the interrupted cut that may be present with regular length end mills.

MICRO GRAIN CARBIDE | BRIGHT | TiAlN | X-LONG LENGTH | 30°

Bright: Speeds & Feeds ➤ P. 22
TiAlN: Speeds & Feeds ➤ P. 25

Cutting Dia.	Shank Dia.	Flute Length	Overall Length	Bright Code No.	TiAlN Code No.
Inch					
1/8	1/8	1	3	102420	102520
3/16	3/16	1-1/8	3	102422	102522
1/4	1/4	1-1/2	4	102424	102524
5/16	5/16	1-5/8	4	102426	102526
3/8	3/8	1-3/4	4	102428	102528
7/16	7/16	3	6	102430	102530
1/2	1/2	3	6	102432	102532
5/8	5/8	3	6	102434	102534
3/4	3/4	3	6	102436	102536
1	1	3	6	102438	102538

2-Flute Ball Nose Stub Length

This series has added strength and stability with the same geometry of our standard length series. Stub end mills are specifically designed for shallow milling, contour milling and slotting.

MICRO GRAIN CARBIDE | BRIGHT | TiAlN | STUB LENGTH | 30°

Bright: Speeds & Feeds ➤ P. 22
TiAlN: Speeds & Feeds ➤ P. 25

Cutting Dia.	Shank Dia.	Flute Length	Overall Length	Bright Code No.	TiAlN Code No.
Inch					
1/32	1/8	5/64	1-1/2	101240	102197
3/64	1/8	3/32	1-1/2	101241	102198
1/16	1/8	1/8	1-1/2	101242	102199
5/64	1/8	5/32	1-1/2	101243	102201
3/32	1/8	3/16	1-1/2	101244	102239
7/64	1/8	7/32	1-1/2	101245	102241
1/8	1/8	1/4	1-1/2	101246	102243
9/64	3/16	9/32	2	101247	102245
5/32	3/16	5/16	2	101248	102247
3/16	3/16	3/8	2	101249	102249
7/32	1/4	7/16	2	101250	102251
1/4	1/4	1/2	2	101251	102252
5/16	5/16	1/2	2	101252	102253
3/8	3/8	5/8	2	101253	102254
7/16	7/16	5/8	2-1/2	101254	102255
1/2	1/2	5/8	2-1/2	101255	102256
5/8	5/8	3/4	3	101256	102257
3/4	3/4	1	3	101257	102258
Metric					
1	3	2	39	101670	102259
1.5	3	3	39	101671	102261
2	3	4	39	101672	102263
2.5	3	5	39	101673	-
3	3	6	39	101674	102267
3.5	4	7	51	101675	102269
4	4	8	51	101676	102271
4.5	5	9	51	101677	-
5	5	10	51	101678	102275
6	6	12	51	101679	102277
7	8	12	51	101680	102279
8	8	12	51	101681	102281
9	10	14	51	101682	-
10	10	14	51	101683	102285
11	11	16	64	101684	-
12	12	16	64	101685	-

2-Flute Ball Nose Double End Stub Length

These end mills offer the same tool geometry as the single end stub end mill, but with two cutters in one tool.

MICRO GRAIN CARBIDE | BRIGHT | TiAlN | STUB LENGTH | 30°

Bright: Speeds & Feeds ➤ P. 22
TiAlN: Speeds & Feeds ➤ P. 25

Cutting Dia.	Shank Dia.	Flute Length	Overall Length	Bright Code No.	TiAlN Code No.
Inch					
1/32	1/8	5/64	1-1/2	101331	102291
3/64	1/8	3/32	1-1/2	101332	102293
1/16	1/8	1/8	1-1/2	101333	102295
3/32	1/8	3/16	1-1/2	101334	102297
1/8	1/8	1/4	1-1/2	101335	102299
5/32	3/16	5/16	2	101336	102323
3/16	3/16	3/8	2	101337	102324
7/32	1/4	1/2	2-1/2	101338	102325
1/4	1/4	1/2	2-1/2	101339	102326
5/16	5/16	1/2	2-1/2	101351	102327
3/8	3/8	1/2	2-1/2	101352	102328
7/16	7/16	9/16	2-3/4	101353	102329
1/2	1/2	5/8	3	101354	102331

2-Flute Ball Nose Long Length

Long length end mills combine added flute and overall lengths for greater reach when deep slotting or milling. These end mills have the capability to mill much thicker material in a single pass, thereby eliminating the interrupted cut that may be present with regular length end mills.

MICRO GRAIN CARBIDE | BRIGHT | TiAlN | LONG LENGTH | 30°

Bright: Speeds & Feeds ➤ P. 22
TiAlN: Speeds & Feeds ➤ P. 25

Cutting Dia.	Shank Dia.	Flute Length	Overall Length	Bright Code No.	TiAlN Code No.
Inch					
1/8	1/8	3/4	2-1/4	102971	102780
3/16	3/16	3/4	2-1/2	102972	102782
1/4	1/4	1-1/8	3	102973	102784
5/16	5/16	1-1/8	3	102974	102786
3/8	3/8	1-1/8	3	102975	102788
7/16	7/16	2	4	102976	102790
1/2	1/2	2	4	102977	102792
5/8	5/8	2-1/4	5	102978	102794
3/4	3/4	2-1/4	5	102979	102796
1	1	2-1/4	5	102980	102798
Metric					
3	3	19	57	101580	102085
4	4	19	57	101581	102086
5	5	25	64	101582	102087
6	6	28	76	101583	102089
8	8	29	76	101584	-
10	10	32	76	101585	-
12	12	51	102	101586	-
14	14	57	127	101587	-
16	16	57	127	101588	-
18	18	57	127	101589	-
20	20	57	127	101590	-
25	25	57	127	101591	-

2-Flute Ball Nose Double End Regular Length

With maximum chip clearance, 2-flute ball nose end mills are ideal for milling, sinking, profiling or slotting various steels, non-ferrous materials, cast iron or highly abrasive materials.

MICRO GRAIN CARBIDE | BRIGHT | TiAlN | REG LENGTH | 30°

Bright: Speeds & Feeds ➤ P. 22
TiAlN: Speeds & Feeds ➤ P. 25

Cutting Dia.	Shank Dia.	Flute Length	Overall Length	Bright Code No.	TiAlN Code No.
Inch					
1/8	3/8	3/8	3-1/16	101320	102333
5/32	3/8	7/16	3-1/8	101321	102335
3/16	3/8	1/2	3-1/4	101322	102337
7/32	3/8	9/16	3-3/8	101323	102339
1/4	3/8	5/8	3-3/8	101324	102341
9/32	3/8	11/16	3-3/8	101325	102343
5/16	3/8	3/4	3-1/2	101326	102345
11/32	3/8	3/4	3-1/2	101327	102347
3/8	3/8	3/4	3-1/2	101328	102349
7/16	1/2	7/8	4	101329	-
1/2	1/2	1	4	101330	102352

Tolerances - Inch

Size	Diameter	Shank Diameter
3/32 thru 1"	+0.000"-0.002"	+0.0000"-0.0005"

Tolerances - Metric

Size	Diameter	Shank Diameter
1mm-25mm	+0.000mm-0.051mm	+0.000mm-0.013mm

Steel | Stainless Steel | Cast Iron/Hardened | Aluminum

3-Flute Regular Length Carbide End Mills

3-flute carbide end mills offer maximum chip clearance therefore reducing chip packing.
For: End milling, Slotting, Sinking
On: Steels, Cast Iron, Aluminum, Copper, Brass, Plastics, and Abrasive Type Materials

MICRO GRAIN CARBIDE | BRIGHT | TiAlN | REG LENGTH | 30°

Bright: Speeds & Feeds ➤ P. 20

Cutting Dia.	Shank Dia.	Flute Length	Overall Length	Bright Code No.	TiAlN Code No.
Inch					
1/16	1/8	3/16	1-1/2	101080	102353
5/64	1/8	3/16	1-1/2	101081	102354
3/32	1/8	5/16	1-1/2	101082	102355
7/64	1/8	7/16	1-1/2	101083	102356
1/8	1/8	1/2	1-1/2	101084	102357
9/64	3/16	1/2	2	101085	102358
5/32	3/16	9/16	2	101086	102359
11/64	3/16	5/8	2	101087	102361
3/16	3/16	5/8	2	101088	102363
13/64	1/4	5/8	2-1/2	101089	102365
7/32	1/4	5/8	2-1/2	101090	102367
15/64	1/4	3/4	2-1/2	101091	102369
1/4	1/4	3/4	2-1/2	101092	102371
17/64	5/16	3/4	2-1/2	101093	102373
9/32	5/16	3/4	2-1/2	101094	102375
19/64	5/16	13/16	2-1/2	101095	102377
5/16	5/16	13/16	2-1/2	101096	102379
3/8	3/8	1	2-1/2	101097	102381
7/16	7/16	1	2-3/4	101098	102383
1/2	1/2	1	3	101099	102384
9/16	9/16	1-1/8	3-1/2	101100	102385
5/8	5/8	1-1/4	3-1/2	101101	102386
11/16	3/4	1-3/8	4	101102	-
3/4	3/4	1-1/2	4	101103	102388
7/8	7/8	1-1/2	4	101104	102389
1	1	1-1/2	4	101105	102390
Metric					
1	3	3	39	101490	102391
1.5	3	5	39	101491	102392
2	3	7	39	101492	102393
3	3	10	39	101494	-
3.5	4	12	51	101495	102396
4	4	14	51	101496	-
4.5	5	14	51	101497	102398
5	5	16	51	101498	102399
6	6	19	64	101499	102401
7	8	19	64	101500	102403
8	8	21	64	101501	102405
9	10	22	70	101502	102407
10	10	25	70	101503	102409
11	11	25	70	101504	-
12	12	25	76	101505	102413
14	14	30	89	101506	102415
16	16	32	89	101507	102417
18	18	35	102	101508	102419
20	20	38	102	101509	102421
22	22	38	102	101510	102423
25	25	38	102	101511	102425

3-Flute Ball Nose Regular Length

3-flute carbide end mills offer maximum chip clearance therefore reducing chip packing.
For: End Milling, Slotting, Sinking
On: Steels, Cast Iron, Aluminum, Copper, Brass, Plastics, and Abrasive Type Materials

MICRO GRAIN CARBIDE | BRIGHT | TiAlN | REG LENGTH | 30°

Bright: Speeds & Feeds ➤ P. 22

Cutting Dia.	Shank Dia.	Flute Length	Overall Length	Bright Code No.	TiAlN Code No.
Inch					
1/16	1/8	3/16	1-1/2	101110	102455
5/64	1/8	3/16	1-1/2	101111	102457
3/32	1/8	5/16	1-1/2	101112	102459
7/64	1/8	7/16	1-1/2	101113	102461
1/8	1/8	1/2	1-1/2	101114	102463
9/64	3/16	1/2	2	101115	102465
5/32	3/16	9/16	2	101116	102467
11/64	3/16	5/8	2	101117	102469
3/16	3/16	5/8	2	101118	102470
13/64	1/4	5/8	2-1/2	101119	102471
7/32	1/4	5/8	2-1/2	101120	102472
15/64	1/4	3/4	2-1/2	101121	102473
1/4	1/4	3/4	2-1/2	101122	102474
17/64	5/16	3/4	2-1/2	101123	102475
9/32	5/16	3/4	2-1/2	101124	102476
19/64	5/16	13/16	2-1/2	101125	102477
5/16	5/16	13/16	2-1/2	101126	102478
3/8	3/8	1	2-1/2	101127	102479
7/16	7/16	1	2-3/4	101128	102481
1/2	1/2	1	3	101129	102483
9/16	9/16	1-1/8	3-1/2	101130	-
5/8	5/8	1-1/4	3-1/2	101131	102487
11/16	3/4	1-3/8	4	101132	-
3/4	3/4	1-1/2	4	101133	102491
7/8	7/8	1-1/2	4	101134	-
1	1	1-1/2	4	101135	102495
Metric					
1	3	3	39	101520	102497
1.5	3	5	39	101521	102499
2	3	7	39	101522	102501
2.5	3	8	39	101523	102503
3	3	10	39	101524	102505
3.5	4	12	51	101525	102507
4	4	14	51	101526	102509
4.5	5	14	51	101527	102511
5	5	16	51	101528	102513
6	6	19	64	101529	102515
7	8	19	64	101530	-
8	8	21	64	101531	102519
9	10	22	70	101532	102521
10	10	25	70	101533	102523
11	11	25	70	101534	-
12	12	25	76	101535	102527
14	14	30	89	101536	102529
16	16	32	89	101537	102531
18	18	35	102	101538	102533
20	20	38	102	101539	102535
22	22	38	102	101540	102537
25	25	38	102	101541	102539

Tolerances - Inch

Size	Diameter	Shank Diameter
3/32 thru 1"	+0.000"-0.002"	+0.0000"-0.0005"

Tolerances - Metric

Size	Diameter	Shank Diameter
1mm-25mm	+0.000mm-0.051mm	+0.000mm-0.013mm

Steel | Stainless Steel | Cast Iron/Hardened | Aluminum

3-Flute 60° High-Helix

These end mills are designed for milling stainless steel, titanium, inconel and other similar metals where high cutting forces are generated. The high helix angle increases length of cutting edge engaged in the cut, reducing cutting load variations and prolonging tool life. Excellent surface finish with high speed and feed capabilities are features of these tools.

MICRO GRAIN CARBIDE | BRIGHT | TiAlN | REG LENGTH | 60°

Bright: Speeds & Feeds ➤ P. 21
TiAlN: Speeds & Feeds ➤ P. 24

Cutting Dia.	Shank Dia.	Flute Length	Overall Length	Bright Code No.	TiAlN Code No.
Inch					
1/8	1/8	1/2	1-1/2	101000	102427
3/16	3/16	5/8	2	101002	102429
1/4	1/4	3/4	2-1/2	101004	102431
5/16	5/16	13/16	2-1/2	101006	102433
3/8	3/8	1	2-1/2	101008	102435
7/16	7/16	1	2-3/4	101010	102437
1/2	1/2	1	3	101012	102439
5/8	5/8	1-1/4	3-1/2	101014	102440
3/4	3/4	1-1/2	4	101016	102441
1	1	1-1/2	4	101018	102442
Metric					
6	6	19	64	101730	-
8	8	21	64	101731	-
10	10	25	70	101732	-
12	12	25	76	101733	-
14	14	29	89	101734	-
16	16	32	89	101735	-
18	18	38	102	101736	-
20	20	38	102	101737	-
25	25	38	102	101738	-

See Page 4

4-Flute Regular Length Carbide End Mills

The industry standard. Wear resistance and minimal deflection for excellent size control.

For: Slotting, Production Milling, Profiling
On: Variety of Steels

MICRO GRAIN CARBIDE | BRIGHT | TiAlN | REG LENGTH | 30°

Bright: Speeds & Feeds ➤ P. 21
TiAlN: Speeds & Feeds ➤ P. 24

Cutting Dia.	Shank Dia.	Flute Length	Overall Length	Bright Code No.	TiAlN Code No.
Inch					
1/32	1/8	1/8	1-1/2	103781	102899
3/64	1/8	9/64	1-1/2	103782	102831
1/16	1/8	3/16	1-1/2	103870	102832
5/64	1/8	1/4	1-1/2	103783	102833
3/32	1/8	5/16	1-1/2	103871	102834
7/64	1/8	3/8	1-1/2	103784	102835
1/8	1/8	1/2	1-1/2	103860	102836
9/64	3/16	1/2	2	103785	102837
5/32	3/16	9/16	2	103861	102839
11/64	3/16	9/16	2	103786	102841
3/16	3/16	5/8	2	103862	102838
13/64	1/4	5/8	2-1/2	103787	102843
7/32	1/4	5/8	2-1/2	103863	102845
1/4	1/4	3/4	2-1/2	103864	102840
9/32	5/16	3/4	2-1/2	103865	102847
5/16	5/16	13/16	2-1/2	103866	102842
11/32	3/8	7/8	2-1/2	103789	102849
3/8	3/8	1	2-1/2	103867	102844
13/32	7/16	1	2-3/4	103790	102851
7/16	7/16	1	2-3/4	103868	102846
1/2	1/2	1	3	103869	102848
9/16	9/16	1-1/8	3-1/2	103933	102850
5/8	5/8	1-1/4	3-1/2	103934	102852
11/16	3/4	1-3/8	4	103935	102854
3/4	3/4	1-1/2	4	103936	102856
7/8	7/8	1-1/2	4	103937	102858
1	1	1-1/2	4	103938	102860
Metric					
1	3	3	39	101550	102601
1.5	3	5	39	101551	102603
2	3	7	39	102716	102605
2.5	3	8	39	102717	102607
3	3	10	39	102718	102609
3.5	4	12	51	102719	102611
4	4	14	51	102720	102613
4.5	5	14	51	102721	102615
5	5	16	51	102722	102617
6	6	19	64	102723	102619
7	8	19	64	102724	102621
8	8	21	64	102725	102623
9	10	22	70	102726	102625
10	10	25	70	102727	102627
11	11	25	70	102728	102629
12	12	25	76	102729	102657
14	14	30	89	102731	102659
16	16	32	89	102732	102661
18	18	35	102	102733	102663
20	20	38	102	102734	102665
22	22	38	102	102736	102667
25	25	38	102	102735	102669

4-Flute Stub Length Carbide End Mills

Strength, rigidity and improved tool life can be obtained with this stub length end mill. The premium micrograin carbide makes these mills tough enough to machine the very hard metals.

MICRO GRAIN CARBIDE | BRIGHT | TiAlN | STUB LENGTH | 30°

Bright: Speeds & Feeds ➤ P. 21
TiAlN: Speeds & Feeds ➤ P. 24

Cutting Dia.	Shank Dia.	Flute Length	Overall Length	Bright Code No.	TiAlN Code No.
Inch					
1/32	1/8	5/64	1-1/2	101260	102540
3/64	1/8	3/32	1-1/2	101261	102541
1/16	1/8	1/8	1-1/2	101262	102542
5/64	1/8	5/32	1-1/2	101263	102543
3/32	1/8	3/16	1-1/2	101264	102544
7/64	1/8	7/32	1-1/2	101265	102545
1/8	1/8	1/4	1-1/2	101266	102546
9/64	3/16	9/32	2	101267	102547
5/32	3/16	5/16	2	101268	-
3/16	3/16	3/8	2	101269	102549
7/32	1/4	7/16	2	101270	102551
1/4	1/4	1/2	2	101271	102553
5/16	5/16	1/2	2	101272	102555
3/8	3/8	5/8	2	101273	102557
7/16	7/16	5/8	2-1/2	101274	102559
1/2	1/2	5/8	2-1/2	101275	102561
5/8	5/8	3/4	3	101276	102563
3/4	3/4	1	3	101277	102565
Metric					
1	3	2	39	101690	102567
1.5	3	3	39	101691	102569
2	3	4	39	101692	102570
2.5	3	5	39	101693	102571
3	3	6	39	101694	102572
3.5	4	7	51	101695	102573
4	4	8	51	101696	102574
4.5	5	9	51	101697	-
5	5	10	51	101698	-
6	6	12	51	101699	102577
7	8	12	51	101700	102578
8	8	12	51	101701	102579
10	10	14	51	101703	102583
11	11	16	64	101704	-
12	12	16	64	101705	-

4-Flute Long Length Carbide End Mills

Long length end mills combine added flute and overall length for greater reach when deep slotting or milling. These end mills have the capability to mill thicker material in one pass, eliminating the interrupted cut that may be present with regular length end mills.

MICRO GRAIN CARBIDE | BRIGHT | TiAlN | LONG LENGTH | 30°

Bright: Speeds & Feeds ➤ P. 21
TiAlN: Speeds & Feeds ➤ P. 24

Cutting Dia.	Shank Dia.	Flute Length	Overall Length	Bright Code No.	TiAlN Code No.
Inch					
1/8	1/8	3/4	2-1/4	102981	102922
3/16	3/16	3/4	2-1/4	102982	102924
1/4	1/4	1-1/8	3	102983	102926
5/16	5/16	1-1/8	3	102984	102928
3/8	3/8	1-1/8	3	102985	102930
7/16	7/16	2	4	102986	102932
1/2	1/2	2	4	102987	102934
5/8	5/8	2-1/4	5	102988	102936
3/4	3/4	2-1/4	5	102989	102938
1	1	2-1/4	5	102990	102940
Metric					
3	3	19	57	101600	102901
4	4	19	57	101601	102903
5	5	25	64	101602	102905
6	6	28	76	101603	102907
8	8	29	76	101604	102909
10	10	32	76	101605	102911
12	12	51	102	101606	102913
14	14	57	127	101607	102915
18	18	57	127	101609	102919
20	20	57	127	101610	102917
25	25	57	127	101611	-

4-Flute Extra Long Length Carbide End Mills

Extra long length end mills combine added flute and overall length for greater reach when deep slotting or milling. These end mills have the capability to mill much thicker material in a single pass, thereby eliminating the interrupted cut that may be present with regular length end mills.

MICRO GRAIN CARBIDE | BRIGHT | TiAlN | X-LONG LENGTH | 30°

Bright: Speeds & Feeds ➤ P. 21
TiAlN: Speeds & Feeds ➤ P. 24

Cutting Dia.	Shank Dia.	Flute Length	Overall Length	Bright Code No.	TiAlN Code No.
Inch					
1/8	1/8	1	3	102450	102550
3/16	3/16	1-1/8	3	102452	102552
1/4	1/4	1-1/2	4	102454	102554
5/16	5/16	1-5/8	4	102456	102556
3/8	3/8	1-3/4	4	102458	102558
7/16	7/16	3	6	102460	102560
1/2	1/2	3	6	102462	102562
5/8	5/8	3	6	102464	102564
3/4	3/4	3	6	102466	102566
1	1	3	6	102468	102568

Tolerances - Inch

Size	Diameter	Shank Diameter
3/32 thru 1"	+0.000"-0.002"	+0.0000"-0.0005"

Tolerances - Metric

Size	Diameter	Shank Diameter
1mm-25mm	+0.000mm-0.051mm	+0.000mm-0.013mm

Steel | Stainless Steel | Cast Iron/Hardened | Aluminum

4-Flute Double End Regular Length

Four-flute configuration with centre cutting permits plunging and milling on many ferrous and non-ferrous materials. It also offers lower chip-load for size control and finish.

MICRO GRAIN CARBIDE | BRIGHT | TiAlN | REG LENGTH | 30°

Bright: Speeds & Feeds ➤ P. 21
TiAlN: Speeds & Feeds ➤ P. 24

Cutting Dia.	Shank Dia.	Flute Length	Overall Length	Bright Code No.	TiAlN Code No.
Inch					
1/8	3/8	3/8	3-1/16	101340	102589
5/32	3/8	7/16	3-1/8	101341	-
3/16	3/8	1/2	3-1/4	101342	102593
7/32	3/8	9/16	3-3/8	101343	102595
1/4	3/8	5/8	3-3/8	101344	102597
9/32	3/8	11/16	3-3/8	101345	102599
5/16	3/8	3/4	3-1/2	101346	102671
11/32	3/8	3/4	3-1/2	101347	-
3/8	3/8	3/4	3-1/2	101348	102675
7/16	1/2	7/8	4	101349	-
1/2	1/2	1	4	101350	102679

4-Flute Double End Stub Length

These end mills have a shorter flute length which provides greater rigidity with less deflection for shallow milling or slotting. This series is ideal for use on high tensile alloys and heat treated steels.

MICRO GRAIN CARBIDE | BRIGHT | TiAlN | STUB LENGTH | 30°

Bright: Speeds & Feeds ➤ P. 21
TiAlN: Speeds & Feeds ➤ P. 24

Cutting Dia.	Shank Dia.	Flute Length	Overall Length	Bright Code No.	TiAlN Code No.
Inch					
1/16	1/8	1/8	1-1/2	102230	102330
3/32	1/8	3/16	1-1/2	102232	102332
1/8	1/8	1/4	1-1/2	102234	102334
5/32	3/16	5/16	2	102236	102336
3/16	3/16	3/8	2	102238	102338
7/32	1/4	1/2	2-1/2	102240	102340
1/4	1/4	1/2	2-1/2	102242	102342
5/16	5/16	1/2	2-1/2	102244	102344
3/8	3/8	1/2	2-1/2	102246	102346
7/16	7/16	9/16	2-3/4	102248	102348
1/2	1/2	5/8	3	102250	102350

4-Flute Corner Radius Regular Length

Four-flute carbide end mills with corner radius allows more strength and minimizes chipping on corners. Four-flute construction provides more strength than two or three-flute and will also result in excellent surface finishes.

MICRO GRAIN CARBIDE | BRIGHT | TiAlN | REG LENGTH | 30°

Bright: Speeds & Feeds ➤ P. 21
TiAlN: Speeds & Feeds ➤ P. 24

Cutting Dia.	Corner Radius (in.)	Shank Dia.	Flute Length	Overall Length	Bright Code No.	TiAlN Code No.
Inch						
1/8	0.015	1/8	1/2	1-1/2	101175	101833
3/16	0.020	3/16	5/8	2	101176	101834
3/16	0.030	3/16	5/8	2	101177	101835
1/4	0.020	1/4	3/4	2-1/2	101178	101836
1/4	0.030	1/4	3/4	2-1/2	101179	101837
1/4	0.045	1/4	3/4	2-1/2	101180	101838
5/16	0.020	5/16	13/16	2-1/2	101181	101839
5/16	0.030	5/16	13/16	2-1/2	101182	101862
5/16	0.045	5/16	13/16	2-1/2	101183	101863
3/8	0.020	3/8	1	2-1/2	101184	101864
3/8	0.030	3/8	1	2-1/2	101185	101865
3/8	0.045	3/8	1	2-1/2	101186	101866
1/2	0.020	1/2	1	3	101187	101867
1/2	0.030	1/2	1	3	101188	101868
1/2	0.045	1/2	1	3	101189	101869
1/2	0.060	1/2	1	3	101190	101892
5/8	0.020	5/8	1-1/4	3-1/2	101191	101893
5/8	0.030	5/8	1-1/4	3-1/2	101192	101894
5/8	0.045	5/8	1-1/4	3-1/2	101193	101895
5/8	0.060	5/8	1-1/4	3-1/2	101194	101896
5/8	0.090	5/8	1-1/4	3-1/2	101195	101897
3/4	0.020	3/4	1-1/2	4	101197	101898
3/4	0.030	3/4	1-1/2	4	101198	101899
3/4	0.045	3/4	1-1/2	4	101199	101990
3/4	0.060	3/4	1-1/2	4	101200	101991
3/4	0.090	3/4	1-1/2	4	101201	101992
3/4	0.125	3/4	1-1/2	4	101196	101993
1	0.020	1	1-1/2	4	101203	101994
1	0.030	1	1-1/2	4	101204	101995
1	0.045	1	1-1/2	4	101205	101996
1	0.060	1	1-1/2	4	101206	101997
1	0.090	1	1-1/2	4	101207	101998
1	0.125	1	1-1/2	4	101202	101999

4-Flute Ball Nose Stub Length

Strength, rigidity and improved tool life can be obtained with this stub length end mill.

MICRO GRAIN CARBIDE | BRIGHT | TiAlN | STUB LENGTH | 30°

Bright: Speeds & Feeds ➤ P. 22
TiAlN: Speeds & Feeds ➤ P. 25

Cutting Dia.	Shank Dia.	Flute Length	Overall Length	Bright Code No.	TiAlN Code No.
Inch					
1/32	1/8	5/64	1-1/2	101280	102681
3/64	1/8	3/32	1-1/2	101281	102683
1/16	1/8	1/8	1-1/2	101282	102685
5/64	1/8	5/32	1-1/2	101283	102687
3/32	1/8	3/16	1-1/2	101284	102689
7/64	1/8	7/32	1-1/2	101285	102691
1/8	1/8	1/4	1-1/2	101286	102693
9/64	3/16	9/32	2	101287	102694
5/32	3/16	5/16	2	101288	102695
3/16	3/16	3/8	2	101289	102781
7/32	1/4	7/16	2	101290	102783
1/4	1/4	1/2	2	101291	102785
5/16	5/16	1/2	2	101292	102787
3/8	3/8	5/8	2	101293	102789
7/16	7/16	5/8	2-1/2	101294	102791
1/2	1/2	5/8	2-1/2	101295	102793
5/8	5/8	3/4	3	101296	102795
3/4	3/4	1	3	101297	102797
Metric					
1	3	2	39	101710	102891
1.5	3	3	39	101711	102893
2	3	4	39	101712	-
2.5	3	5	39	101713	-
3	3	6	39	101714	102941
3.5	4	7	51	101715	-
4	4	8	51	101716	-
4.5	5	9	51	101717	-
5	5	10	51	101718	102935
6	6	12	51	101719	102945
7	8	12	51	101720	-
8	8	12	51	101721	-
9	10	14	51	101722	102943
10	10	14	51	101723	-
11	11	16	64	101724	-
12	12	16	64	101725	-

4-Flute Ball Nose Regular Length

The industry standard. Wear resistance and minimal deflection for excellent size control.
For: General Purpose Milling, Production Milling, Contouring
On: Steels, Stainless Steels

MICRO GRAIN CARBIDE | BRIGHT | TiAlN | REG LENGTH | 30°

Bright: Speeds & Feeds ➤ P. 22
TiAlN: Speeds & Feeds ➤ P. 25

Cutting Dia.	Shank Dia.	Flute Length	Overall Length	Bright Code No.	TiAlN Code No.
Inch					
1/8	1/8	1/2	1-1/2	103880	102882
3/16	3/16	5/8	2	103881	102884
1/4	1/4	3/4	2-1/2	103882	102886
5/16	5/16	13/16	2-1/2	103883	102888
3/8	3/8	1	2-1/2	103884	102890
1/2	1/2	1	3	103885	102892
9/16	9/16	1-1/8	3-1/2	103939	102894
5/8	5/8	1-1/4	3-1/2	103940	102896
11/16	3/4	1-3/8	4	103941	102895
3/4	3/4	1-1/2	4	103942	102898
7/8	7/8	1-1/2	4	103943	102897
1	1	1-1/2	4	103944	102900
Metric					
1	3	3	39	102737	101635
1.5	3	5	39	102738	101636
2	3	7	39	102760	101637
2.5	3	8	39	102761	101638
3	3	10	39	102762	101639
3.5	4	12	51	102763	101656
4	4	14	51	102764	101657
4.5	5	14	51	102765	101658
5	5	16	51	102766	101659
6	6	19	64	102767	101660
7	8	19	64	102768	101661
8	8	21	64	102769	101662
9	10	22	70	102770	101663
10	10	25	70	102771	101664
11	11	25	70	102772	101665
12	12	25	76	102773	101666
14	14	30	89	102775	101667
16	16	32	89	102776	101668
18	18	35	102	102777	101669
20	20	38	102	102778	101686
25	25	38	102	102779	101687

Multi-Flute Rougher Regular Length — TiAlN Coated

These fine pitch roughing end mills have an excellent flute design for roughing applications in a variety of materials. TiAlN coating enhances speeds-feeds and tool life.
• 4 flutes

MICRO GRAIN CARBIDE | BRIGHT | TiAlN | REG LENGTH

TiAlN: Speeds & Feeds ➤ P. 24

Cutting Dia.	Shank Dia.	Flute Length	Overall Length	Bright Code No.	TiAlN Code No.
Inch					
1/4	1/4	3/4	2-1/2	102150	102185
5/16	5/16	3/4	2-1/2	102155	102190
3/8	3/8	1	2-1/2	102160	102200
1/2	1/2	1-1/4	3	102165	102205
5/8	5/8	1-1/4	3-1/2	102170	102210
3/4	3/4	1-5/8	4	102175	102215
1	1	1-3/4	4	102180	102220

4-Flute Ball Nose Long Length

Added flute and overall length combine for greater reach when deep slotting or milling. These end mills have the capability to mill thicker material in one pass, eliminating the interrupted cut that may be present with regular length end mills.

MICRO GRAIN CARBIDE | BRIGHT | TiAlN | LONG LENGTH | 30°

Bright: Speeds & Feeds ➤ P. 22
TiAlN: Speeds & Feeds ➤ P. 25

Cutting Dia.	Shank Dia.	Flute Length	Overall Length	Bright Code No.	TiAlN Code No.
Inch					
1/8	1/8	3/4	2-1/4	102991	102942
3/16	3/16	3/4	2-1/2	102992	102944
1/4	1/4	1-1/8	3	102993	102946
5/16	5/16	1-1/8	3	102994	102948
3/8	3/8	1-1/8	3	102995	102950
7/16	7/16	2	4	102996	102952
1/2	1/2	2	4	102997	102954
5/8	5/8	2-1/4	5	102998	102956
3/4	3/4	2-1/4	5	102999	102958
1	1	2-1/4	5	103000	102960
Metric					
3	3	19	57	101620	101764
4	4	19	57	101621	101765
5	5	25	64	101622	101766
6	6	28	76	101623	101767
8	8	29	76	101624	101768
10	10	32	76	101625	101769
12	12	51	102	101626	101770
14	14	57	127	101627	-
16	16	57	127	101628	101772
18	18	57	127	101629	-
20	20	57	127	101630	101774
25	25	57	127	101631	-

4-Flute Ball Nose Extra Long Length

Extra Long Length End mills combine added flute and overall length for greater reach when deep slotting or milling. These end mills have the capability to mill much thicker material in a single pass, thereby eliminating the interrupted cut that may be present with regular length end mills.

MICRO GRAIN CARBIDE | BRIGHT | TiAlN | X-LONG LENGTH | 30°

Bright: Speeds & Feeds ➤ P. 22
TiAlN: Speeds & Feeds ➤ P. 25

Cutting Dia.	Shank Dia.	Flute Length	Overall Length	Bright Code No.	TiAlN Code No.
Inch					
1/8	1/8	1	3	102480	102580
3/16	3/16	1-1/8	3	102482	102582
1/4	1/4	1-1/2	4	102484	102584
5/16	5/16	1-5/8	4	102486	102586
3/8	3/8	1-3/4	4	102488	102588
7/16	7/16	3	6	102490	102590
1/2	1/2	3	6	102492	102592
5/8	5/8	3	6	102494	102594
3/4	3/4	3	6	102496	102596
1	1	3	6	102498	102598

4-Flute Ball Nose Double End Regular Length

The ball nose 4-flute centre cut design allows for excellent finish while contour milling.

MICRO GRAIN CARBIDE | BRIGHT | TiAlN | REG LENGTH | 30°

Bright: Speeds & Feeds ➤ P. 22
TiAlN: Speeds & Feeds ➤ P. 25

Cutting Dia.	Shank Dia.	Flute Length	Overall Length	Bright Code No.	TiAlN Code No.
Inch					
1/8	3/8	3/8	3-1/16	101360	101708
5/32	3/8	7/16	3-1/8	101361	-
3/16	3/8	1/2	3-1/4	101362	101726
7/32	3/8	9/16	3-3/8	101363	-
1/4	3/8	5/8	3-3/8	101364	101728
9/32	3/8	11/16	3-3/8	101365	-
5/16	3/8	3/4	3-1/2	101366	101739
11/32	3/8	3/4	3-1/2	101367	-
3/8	3/8	3/4	3-1/2	101368	101748
7/16	1/2	7/8	4	101369	-
1/2	1/2	1	4	101370	101763

4-Flute Ball Nose Double End Stub Length

These end mills have a shorter flute length which provides greater rigidity with less deflection for shallow milling or slotting. This series is ideal for use on high tensile alloys and heat treated steels.

MICRO GRAIN CARBIDE | BRIGHT | TiAlN | STUB LENGTH | 30°

Bright: Speeds & Feeds ➤ P. 22
TiAlN: Speeds & Feeds ➤ P. 25

Cutting Dia.	Shank Dia.	Flute Length	Overall Length	Bright Code No.	TiAlN Code No.
Inch					
1/32	1/8	5/64	1-1/2	101355	101776
3/64	1/8	3/32	1-1/2	101356	101777
1/16	1/8	1/8	1-1/2	101357	101778
3/32	1/8	3/16	1-1/2	101358	101779
1/8	1/8	1/4	1-1/2	101359	101802
5/32	3/16	5/16	2	101371	101803
3/16	3/16	3/8	2	101372	101804
7/32	1/4	1/2	2-1/2	101373	101805
1/4	1/4	1/2	2-1/2	101374	101806
5/16	5/16	1/2	2-1/2	101375	101807
3/8	3/8	1/2	2-1/2	101376	101808
7/16	7/16	9/16	2-3/4	101377	101809
1/2	1/2	5/8	3	101378	101832

Tolerances - Inch

Size	Diameter	Shank Diameter
3/32 thru 1"	+0.000"-0.002"	+0.0000"-0.0005"

Tolerances - Metric

Size	Diameter	Shank Diameter
1mm-25mm	+0.000mm-0.051mm	+0.000mm-0.013mm

Steel | Stainless Steel | Cast Iron/Hardened | Aluminum

2-Flute Regular Length — Typhoon

These end mills are manufactured with Premium Sub-Micron carbide and are designed to cut hardened materials. The unique geometry of the Typhoon end mill combined with its modified AlTiN coating make it an excellent choice for demanding applications.

SUB MICRON MICRO GRAIN CARBIDE | TYPHOON | REG LENGTH

Speeds & Feeds ➤ P. 26

Cutting Dia. (in.)	Shank Dia. (in.)	Flute Length (in.)	Overall Length (in.)	Code No.
Inch				
1/16	1/8	3/16	1-1/2	104602
3/32	1/8	5/16	1-1/2	104601
1/8	1/8	1/2	1-1/2	104600
5/32	3/16	9/16	2	104603
3/16	3/16	5/8	2	104604
7/32	1/4	5/8	2-1/2	104605
1/4	1/4	3/4	2-1/2	104608
9/32	5/16	3/4	2-1/2	104607
5/16	5/16	13/16	2-1/2	104612
3/8	3/8	1	2-1/2	104616
7/16	7/16	1	2-3/4	104618
1/2	1/2	1	3	104620
9/16	9/16	1-1/8	3-1/2	104622
5/8	5/8	1-1/4	3-1/2	104624
11/16	3/4	1-3/8	4	104630
3/4	3/4	1-1/2	4	104628
7/8	7/8	1-1/2	4	104631
1	1	1-1/2	4	104632
Metric				
1	3	3	39	101780
1.5	3	5	39	101781
2	3	7	39	101782
2.5	3	8	39	101783
3	3	10	39	101784
3.5	4	12	51	101785
4	4	14	51	101786
4.5	5	14	51	101787
5	5	16	51	101788
6	6	19	64	101789
7	8	19	64	101790
8	8	21	64	101791
9	10	22	70	101792
10	10	25	70	101793
11	12	25	70	101794
12	12	25	76	101795
14	14	30	89	101796
16	16	32	89	101797
18	18	35	102	101798
20	20	38	102	101799
22	22	38	102	101800
25	25	38	102	101801

2-Flute Long Length — Typhoon

These Typhoon end mills have the added reach and depth of cut required for longer reach applications in hardened materials.

SUB MICRON MICRO GRAIN CARBIDE | TYPHOON | LONG LENGTH

Speeds & Feeds ➤ P. 26

Cutting Dia. (in.)	Shank Dia. (in.)	Flute Length (in.)	Overall Length (in.)	Code No.
Inch				
1/8	1/8	3/4	2-1/4	104815
3/16	3/16	3/4	2-1/4	104816
1/4	1/4	1-1/8	3	104818
5/16	5/16	1-1/8	3	104820
3/8	3/8	1-1/8	3	104822
1/2	1/2	2	4	104824
5/8	5/8	2-1/4	5	104826
3/4	3/4	2-1/4	5	104830
1	1	2-1/4	5	104831

2-Flute Corner Radius — Typhoon

Typhoon end mills with corner radius allow more strength and minimize chipping on the corners in demanding applications.

SUB MICRON MICRO GRAIN CARBIDE | TYPHOON | REG LENGTH

Speeds & Feeds ➤ P. 26

Cutting Dia. (in.)	Corner Radius (in.)	Shank Dia. (in.)	Flute Length (in.)	Overall Length (in.)	Code No.
Inch					
1/8	0.015	1/8	1/2	1-1/2	102602
3/16	0.020	3/16	5/8	2	102610
1/4	0.020	1/4	3/4	2-1/2	102616
1/4	0.030	1/4	3/4	2-1/2	102618
5/16	0.020	5/16	13/16	2-1/2	102620
3/8	0.020	3/8	1	2-1/2	102628
3/8	0.030	3/8	1	2-1/2	102630
1/2	0.020	1/2	1	3	102636
1/2	0.030	1/2	1	3	102638
1/2	0.060	1/2	1	3	102640

2-Flute Ball Nose Regular Length — Typhoon

Typhoon ball nose end mills are designed for contour milling applications in hardened materials.

SUB MICRON MICRO GRAIN CARBIDE | TYPHOON | REG LENGTH

Speeds & Feeds ➤ P. 27

Cutting Dia. (in.)	Shank Dia. (in.)	Flute Length (in.)	Overall Length (in.)	Code No.
Inch				
1/16	1/8	3/16	1-1/2	104649
3/32	1/8	5/16	1-1/2	104651
1/8	1/8	1/2	1-1/2	104650
5/32	3/16	9/16	2	104653
3/16	3/16	5/8	2	104654
7/32	1/4	5/8	2-1/2	104655
1/4	1/4	3/4	2-1/2	104658
9/32	5/16	3/4	2-1/2	104657
5/16	5/16	13/16	2-1/2	104662
3/8	3/8	1	2-1/2	104666
7/16	7/16	1	2-3/4	104668
1/2	1/2	1	3	104670
9/16	9/16	1-1/8	3-1/2	104672
5/8	5/8	1-1/4	3-1/2	104674
3/4	3/4	1-1/2	4	104678
7/8	7/8	1-1/2	4	104681
1	1	1-1/2	4	104682
Metric				
1	3	3	39	101810
1.5	3	5	39	101811
2	3	7	39	101812
2.5	3	8	39	101813
3	3	10	39	101814
3.5	4	12	51	101815
4	4	14	51	101816
4.5	5	14	51	101817
5	5	16	51	101818
6	6	19	64	101819
7	8	19	64	101820
8	8	21	64	101821
9	10	22	70	101822
10	10	25	70	101823
11	12	25	70	101824
12	12	25	76	101825
14	14	30	89	101826
16	16	32	89	101827
18	18	35	102	101828
20	20	38	102	101829
22	22	38	102	101830
25	25	38	102	101831

2-Flute Ball Nose Long Length — Typhoon

Typhoon ball nose end mills are designed for contour milling in hardened materials. The long length allows for milling tougher materials in longer reach applications.

SUB MICRON MICRO GRAIN CARBIDE | TYPHOON | LONG LENGTH

Speeds & Feeds ➤ P. 27

Cutting Dia. (in.)	Shank Dia. (in.)	Flute Length (in.)	Overall Length (in.)	Code No.
Inch				
1/8	1/8	3/4	2-1/4	104652
3/16	3/16	3/4	2-1/4	104656
1/4	1/4	1-1/8	3	104660
5/16	5/16	1-1/8	3	104663
3/8	3/8	1-1/8	3	104667
1/2	1/2	2	4	104671
3/4	3/4	2-1/4	5	104679
1	1	2-1/4	5	104683

2-Flute Mold Mill — Typhoon

The Typhoon Mold Mill offers excellent performance and tool life in mold milling applications on tougher materials.

SUB MICRON MICRO GRAIN CARBIDE | TYPHOON | REG LENGTH

Speeds & Feeds ➤ P. 28

Cutting Dia. (in.)	Shank Dia. (in.)	Flute Length (in.)	Overall Length (in.)	Code No.
Inch				
1/8	1/8	5/16	2-3/8	104034
3/16	3/16	3/8	3-1/8	104036
1/4	1/4	1/2	3-1/2	104038
5/16	5/16	15/32	4	104040
3/8	3/8	3/4	4	104042
1/2	1/2	7/8	4-1/4	104044
5/8	5/8	15/16	6	104046
3/4	3/4	1-1/8	6	104048
1	1	1-1/2	6	104050

2-Flute Spherical Ball End — Typhoon

- High performance ball nose plus end mills are used in the mold industry and have a full 220 degree arc cutting capability
- Modified AlTiN coated for improved tool life and increased production output
- Made from premium sub-micron grain carbide

SUB MICRON MICRO GRAIN CARBIDE | TYPHOON | REG LENGTH

Speeds & Feeds ➤ P. 27

Cutting Dia. (in.)	Shank Dia. (in.)	Flute Length (in.)	Overall Length (in.)	Code No.
Regular Length				
1/8	1/8	3/32	1-1/2	153110
3/16	3/16	9/64	2	153112
1/4	1/4	3/16	2-1/2	153114
3/8	3/8	9/32	2-1/2	153116
1/2	1/2	3/8	3	153118
Long Length				
1/8	1/8	3/32	3	153120
3/16	3/16	9/64	3	153122
1/4	1/4	3/16	4	153124
3/8	3/8	9/32	4	153126
1/2	1/2	3/8	6	153128

Tolerances - Inch		
Size	Diameter	Shank Diameter
3/32 thru 1"	+0.000"-0.002"	+0.0000"-0.0005"

Tolerances - Metric		
Size	Diameter	Shank Diameter
1mm-25mm	+0.000mm-0.051mm	+0.000mm-0.013mm

Steel | Stainless Steel | Cast Iron/Hardened | Aluminum

4-Flute Regular Length — Typhoon

These end mills are manufactured with premium sub-micron carbide and are designed to cut hardened materials. The unique geometry of the Typhoon end mill combined with its modified AlTiN coating make it an excellent choice for demanding applications.

SUB MICRON MICRO GRAIN CARBIDE | TYPHOON | REG LENGTH

Speeds & Feeds ➤ P. 26

Cutting Dia. (in.)	Shank Dia. (in.)	Flute Length (in.)	Overall Length (in.)	Code No.
Inch				
1/16	1/8	3/16	1-1/2	104702
3/32	1/8	5/16	1-1/2	104701
1/8	1/8	1/2	1-1/2	104700
5/32	3/16	9/16	2	104703
3/16	3/16	5/8	2	104704
7/32	1/4	5/8	2-1/2	104705
1/4	1/4	3/4	2-1/2	104708
9/32	5/16	3/4	2-1/2	104707
5/16	5/16	13/16	2-1/2	104712
3/8	3/8	1	2-1/2	104716
7/16	7/16	1	2-3/4	104718
1/2	1/2	1	3	104720
9/16	9/16	1-1/8	3-1/2	104722
5/8	5/8	1-1/4	3-1/2	104724
11/16	3/4	1-3/8	4	104730
3/4	3/4	1-1/2	4	104728
7/8	7/8	1-1/2	4	104731
1	1	1-1/2	4	104732
Metric				
1	3	3	39	101840
1.5	3	5	39	101841
2	3	7	39	101842
2.5	3	8	39	101843
3	3	10	39	101844
3.5	4	12	51	101845
4	4	14	51	101846
4.5	5	14	51	101847
5	5	16	51	101848
6	6	19	64	101849
7	8	19	64	101850
8	8	21	64	101851
9	10	22	70	101852
10	10	25	70	101853
11	12	25	70	101854
12	12	25	76	101855
14	14	30	89	101856
16	16	32	89	101857
18	18	35	102	101858
20	20	38	102	101859
22	22	38	102	101860
25	25	38	102	101861

4-Flute Long Length — Typhoon

These end mills are manufactured with premium sub-micron carbide and are designed to cut hardened materials. The unique geometry of the Typhoon end mill combined with its modified AlTiN coating make it an excellent choice for demanding and longer reach applications.

SUB MICRON MICRO GRAIN CARBIDE | TYPHOON | LONG LENGTH

Speeds & Feeds ➤ P. 26

Cutting Dia. (in.)	Shank Dia. (in.)	Flute Length (in.)	Overall Length (in.)	Code No.
Inch				
1/8	1/8	3/4	2-1/4	104832
3/16	3/16	3/4	2-1/4	104834
1/4	1/4	1-1/8	3	104836
5/16	5/16	1-1/8	3	104838
3/8	3/8	1-1/8	3	104840
1/2	1/2	2	4	104842
5/8	5/8	2-1/4	5	104844
3/4	3/4	2-1/4	5	104846
1	1	2-1/4	5	104848

4-Flute Corner Radius — Typhoon

Typhoon end mills with corner radius provides greater strength and minimizes chipping on the corners in demanding applications.

SUB MICRON MICRO GRAIN CARBIDE | TYPHOON | REG LENGTH

Speeds & Feeds ➤ P. 26

Cutting Dia. (in.)	Corner Radius (in.)	Shank Dia. (in.)	Flute Length (in.)	Overall Length (in.)	Code No.
Inch					
1/8	0.015	1/8	1/2	1-1/2	102652
1/8	0.030	1/8	1/2	1-1/2	102656
3/16	0.020	3/16	5/8	2	102660
1/4	0.020	1/4	3/4	2-1/2	102666
1/4	0.030	1/4	3/4	2-1/2	102668
5/16	0.020	5/16	13/16	2-1/2	102670
5/16	0.030	5/16	13/16	2-1/2	102672
3/8	0.020	3/8	1	2-1/2	102678
3/8	0.030	3/8	1	2-1/2	102680
1/2	0.020	1/2	1	3	102686
1/2	0.030	1/2	1	3	102688
1/2	0.060	1/2	1	3	102690

4-Flute Spherical Ball End — Typhoon

- High performance ball nose plus end mills are used in the mold industry and have a full 220 degree arc cutting capability
- Modified AlTiN coated for improved tool life and increased production output
- Made from premium sub-micron grain carbide

SUB MICRON MICRO GRAIN CARBIDE | TYPHOON | REG LENGTH

Speeds & Feeds ➤ P. 27

Cutting Dia. (in.)	Shank Dia. (in.)	Flute Length (in.)	Overall Length (in.)	Code No.
Regular Length				
1/8	1/8	3/32	1-1/2	153130
3/16	3/16	9/64	2	153132
1/4	1/4	3/16	2-1/2	153134
3/8	3/8	9/32	2-1/2	153136
1/2	1/2	3/8	3	153138
Long Length				
1/8	1/8	3/32	3	153140
3/16	3/16	9/64	3	153142
1/4	1/4	3/16	4	153144
3/8	3/8	9/32	4	153146
1/2	1/2	3/8	6	153148

4-Flute Ball Nose Long Length — Typhoon

Typhoon ball nose end mills are designed for long reach contour milling applications in hardened materials.

SUB MICRON MICRO GRAIN CARBIDE | TYPHOON | LONG LENGTH

Speeds & Feeds ➤ P. 27

Cutting Dia. (in.)	Shank Dia. (in.)	Flute Length (in.)	Overall Length (in.)	Code No.
Inch				
1/8	1/8	3/4	2-1/4	104833
3/16	3/16	3/4	2-1/4	104835
1/4	1/4	1-1/8	3	104837
5/16	5/16	1-1/8	3	104839
3/8	3/8	1-1/8	3	104841
1/2	1/2	2	4	104843
5/8	5/8	2-1/4	5	104845
3/4	3/4	2-1/4	5	104847
1	1	2-1/4	5	104849

4-Flute Ball Nose Regular Length — Typhoon

Typhoon ball nose end mills are designed for contour milling applications in hardened materials.

SUB MICRON MICRO GRAIN CARBIDE | TYPHOON | REG LENGTH

Speeds & Feeds ➤ P. 27

Cutting Dia. (in.)	Shank Dia. (in.)	Flute Length (in.)	Overall Length (in.)	Code No.
Inch				
1/16	1/8	3/16	1-1/2	104752
3/32	1/8	5/16	1-1/2	104751
1/8	1/8	1/2	1-1/2	104750
5/32	3/16	9/16	2	104753
3/16	3/16	5/8	2	104754
7/32	1/4	5/8	2-1/2	104755
1/4	1/4	3/4	2-1/2	104758
9/32	5/16	3/4	2-1/2	104757
5/16	5/16	13/16	2-1/2	104762
3/8	3/8	1	2-1/2	104766
7/16	7/16	1	2-3/4	104768
1/2	1/2	1	3	104770
9/16	9/16	1-1/8	3-1/2	104772
5/8	5/8	1-1/4	3-1/2	104774
11/16	3/4	1-3/8	4	104780
3/4	3/4	1-1/2	4	104778
7/8	7/8	1-1/2	4	104781
1	1	1-1/2	4	104782
Metric				
1	3	3	39	101870
1.5	3	5	39	101871
2	3	7	39	101872
2.5	3	8	39	101873
3	3	10	39	101874
3.5	4	12	51	101875
4	4	14	51	101876
4.5	5	14	51	101877
5	5	16	51	101878
6	6	19	64	101879
7	8	19	64	101880
8	8	21	64	101881
9	10	22	70	101882
10	10	25	70	101883
11	12	25	70	101884
12	12	25	76	101885
14	14	30	89	101886
16	16	32	89	101887
18	18	35	102	101888
20	20	38	102	101889
22	22	38	102	101890
25	25	38	102	101891

Multi-Flute Regular Length — Typhoon

Multi-Flute Typhoon end mill design allow them to be run at higher rpm than conventional end mills as well as increase tool life without chipping.

SUB MICRON MICRO GRAIN CARBIDE | TYPHOON | REG LENGTH | 50°

Speeds & Feeds ➤ P. 28

Cutting Dia. (in.)	Shank Dia. (in.)	Flute Length (in.)	Overall Length (in.)	No. of Flutes	Code No.
Inch					
1/8	1/8	1/2	1-1/2	4	101050
3/16	3/16	5/8	2	4	101052
1/4	1/4	3/4	2-1/2	6	101054
5/16	5/16	13/16	2-1/2	6	101056
3/8	3/8	1	2-1/2	6	101058
7/16	7/16	1	2-3/4	6	101060
1/2	1/2	1	3	6	101062
9/16	9/16	1-1/8	3-1/2	6	101064
5/8	5/8	1-1/4	3-1/2	6	101066
3/4	3/4	1-1/2	4	6	101068
7/8	7/8	1-1/2	4	6	101070
1	1	1-1/2	4	8	101072

Roughers Regular Length — Typhoon

TOOLING

This fine pitch rougher is designed for milling harder metals and has updated geometry in the design of this tool for higher feed rates with no vibration or chatter and chipbreakers to eliminate birdnesting.

SUB MICRON MICRO GRAIN CARBIDE | TYPHOON | REG LENGTH

Speeds & Feeds ➤ P. 29

Cutting Dia. (in.)	Shank Dia. (in.)	Flute Length (in.)	Overall Length (in.)	No. of Flutes	Code No.
Inch					
1/4	1/4	3/4	2-1/2	3	104800
5/16	5/16	3/4	2-1/2	3	104802
3/8	3/8	7/8	2-1/2	3	104804
1/2	1/2	1	3	4	104806
5/8	5/8	1-1/4	3-1/2	4	104810
3/4	3/4	1-5/8	4	4	104812
1	1	1-3/4	4	5	104814

5-Flute Variable Helix Carbide End Mill — Typhoon

TOOLING

- 25% increase in feed rates over 4-flute version
- Helix changes along flutes
- Increased stability during cutting action
- Substantial increase in speed
- Small corner radius for added strength and smoother cutting action
- Modified AlTiN coated for improved tool life and increase production output

SUB MICRON MICRO GRAIN CARBIDE | TYPHOON | REG LENGTH

Speeds & Feeds ➤ P. 29

Cutting Dia. (in.)	Shank Dia. (in.)	Flute Length (in.)	Overall Length (in.)	Corner Radius	Code No.
1/4	1/4	3/4	2-1/2	0.015-0.020	153100
3/8	3/8	1	2-1/2	0.015-0.020	153102
1/2	1/2	1	3	0.025-0.030	153104
5/8	5/8	1-1/4	3-1/2	0.030-0.035	153106
3/4	3/4	1-1/2	4	0.030-0.035	153108
1	1	1-1/2	4	0.030-0.035	153109

4-Flute Variable Helix Carbide End Mill — Typhoon

- Helix changes along flutes
- Increased stability during cutting action
- Substantial increase in speed
- Small corner radius for added strength and smoother cutting action
- AlTiN coated for improved tool life and increased production output
- Made from premium sub-micron grain carbide

TOOLING

SUB MICRON MICRO GRAIN CARBIDE | TYPHOON | REG LENGTH

Speeds & Feeds ➤ P. 29

Cutting Dia. (in.)	Shank Dia. (in.)	Flute Length (in.)	Overall Length (in.)	Corner Radius	With Radius Code No.	Without Radius Code No.	Weldon Flat Without Radius Code No.
1/8	1/8	1/2	1-1/2	0.010-0.015	153000	153250	-
3/16	3/16	3/8	1-1/2	0.010-0.015	153001	-	-
3/16	3/16	5/8	2	0.015-0.020	153002	153252	-
1/4	1/4	1/2	2	0.015-0.020	153004	153254	-
1/4	1/4	3/4	2-1/2	0.015-0.020	153006	153256	-
1/4	1/4	1-1/8	3	0.015-0.020	153008	153258	-
5/16	5/16	1/2	2	0.015-0.020	153010	153260	-
5/16	5/16	13/16	2-1/2	0.015-0.020	153012	153262	-
5/16	5/16	1-1/8	3	0.015-0.020	153014	153264	-
3/8	3/8	5/8	2	0.015-0.020	153016	153266	153500
3/8	3/8	1	2-1/2	0.015-0.020	153018	153268	153502
3/8	3/8	1-1/8	3	0.015-0.020	153020	153270	153504
7/16	7/16	1	2-3/4	0.015-0.020	153022	153272	153506
1/2	1/2	5/8	2-1/2	0.025-0.030	153024	153274	153508
1/2	1/2	1	3	0.025-0.030	153026	153276	153510
1/2	1/2	1-1/4	3	0.025-0.030	153027	153277	153512
1/2	1/2	2	4	0.025-0.030	153028	153278	153514
5/8	5/8	3/4	3	0.030-0.035	153030	153280	153516
5/8	5/8	1-1/4	3-1/2	0.030-0.035	153032	153282	-
5/8	5/8	2-1/4	5	0.030-0.035	153034	153284	153518
3/4	3/4	1	3	0.030-0.035	153036	153286	153520
3/4	3/4	1-1/2	4	0.030-0.035	153038	153288	-
3/4	3/4	2-1/4	5	0.030-0.035	153040	153290	153522
1	1	1-1/2	4	0.030-0.035	153042	153292	153526
1	1	2-1/4	5	0.030-0.035	153041	153293	153524
1-1/4	1-1/4	2-1/4	5	0.030-0.035	153043	153294	-

Tolerances - Inch

Size	Diameter	Shank Diameter
3/32 thru 1"	+0.000"-0.002"	+0.0000"-0.0005"

Tolerances - Metric

Size	Diameter	Shank Diameter
1mm-25mm	+0.000mm-0.051mm	+0.000mm-0.013mm

Steel | Stainless Steel | Cast Iron/Hardened | Aluminum

2-Flute For Aluminum

This carbide aluminum end mill has been designed specially for milling aluminum and all non-ferrous materials. The unique geometry permits much higher speed and feed rates without loading. Spindle and feed rates can be increased by fifty percent for greater productivity with excellent piece/part finishes.

SUB MICRON MICRO GRAIN CARBIDE | BRIGHT | REG LENGTH | 40°

Speeds & Feeds ➤ P. 30

Cutting Dia. (in.)	Shank Dia. (in.)	Flute Length (in.)	Overall Length (in.)	Code No.
Inch				
1/4	1/4	3/4	2-1/2	101020
1/4	1/4	1-1/2	4	101022
5/16	5/16	13/16	2-1/2	101024
5/16	5/16	1-5/8	4	101026
3/8	3/8	1	2-1/2	101028
3/8	3/8	1-3/4	4	101030
1/2	1/2	1	3	101032
1/2	1/2	2	4	101034
5/8	5/8	1-1/4	3-1/2	101036
5/8	5/8	2-1/4	5	101038
3/4	3/4	1-1/2	4	101040
3/4	3/4	2-1/4	5	101042
1	1	2-1/4	5	101044
1	1	3	6	101046
Metric				
6	6	19	63	101390
6	6	38	102	101391
8	8	21	63	101392
8	8	41	102	101393
10	10	25	70	101394
10	10	51	102	101395
12	12	26	76	101396
12	12	51	102	101397
16	16	32	89	101398
16	16	57	127	101399
20	20	38	102	101400
20	20	57	127	101401
25	25	57	127	101402
25	25	76	152	101403

2-Flute Corner Radius For Aluminum

- Special geometry allows for high chip loads and feed rates
- Excellent for slotting and profiling at high speeds
- Made from premium sub-micron grain carbide
- Cutting diameter tolerance +0.000 / -0.002

SUB MICRON MICRO GRAIN CARBIDE | BRIGHT | TiCN | 35°

Speeds & Feeds ➤ P. 30

Cutting Dia. (in.)	Shank Dia. (in.)	Flute Length (in.)	Overall Length (in.)	Corner Radius	Bright Finish Code No.	TiCN Coated Code No.
Regular Length						
1/8	1/8	3/8	1-1/2	0.010	153208	153400
3/16	3/16	5/8	2	0.010	153210	153402
1/4	1/4	3/4	2-1/2	0.010	153212	153404
5/16	5/16	13/16	2-1/2	0.010	153214	153406
3/8	3/8	1	2-1/2	0.015	153216	153408
7/16	7/16	1	2-3/4	0.015	153218	153410
1/2	1/2	1	3	0.020	153220	153412
5/8	5/8	1-1/4	3-1/2	0.020	153222	153414
3/4	3/4	1-1/2	4	0.030	153224	153416
1	1	1-1/2	4	0.030	153226	153418
Long Length						
1/4	1/4	1-1/8	3	0.010	153228	153420
5/16	5/16	1-1/8	3	0.010	153230	153422
3/8	3/8	1-1/8	3	0.015	153232	153424
1/2	1/2	2	4	0.020	153234	153426
5/8	5/8	2-1/4	5	0.020	153236	153428
3/4	3/4	2-1/4	5	0.030	153238	153430
1	1	2-1/4	5	0.030	153240	153432

Tolerances - Inch

Size	Diameter	Shank Diameter
3/32 thru 1"	+0.000"-0.002"	+0.0000"-0.0005"

Tolerances - Metric

Size	Diameter	Shank Diameter
1mm-25mm	+0.000mm-0.051mm	+0.000mm-0.013mm

Steel | Stainless Steel | Cast Iron/Hardened | Aluminum

3-Flute Square End 40° Helix Carbide End Mills

- Special geometry allows for high chip loads and feed rates
- 3-flute design excellent for slotting and profiling at high speeds
- Made from premium sub-micron grain carbide
- Cutting diameter tolerance +0.000 / -0.002

SUB MICRON MICRO GRAIN CARBIDE | BRIGHT | TiCN | 40°

Speeds & Feeds ➤ P. 30

Cutting Dia. (in.)	Shank Dia. (in.)	Flute Length (in.)	Overall Length (in.)	Bright Finish Code No.	TiCN Coated Code No.
Inch					
1/32	1/8	3/32	1-1/2	153300	153350
3/64	1/8	1/8	1-1/2	153302	153352
1/16	1/8	3/16	1-1/2	153304	153354
3/32	1/8	3/8	1-1/2	153306	153356
1/8	1/8	1/2	1-1/2	153308	153358
9/64	3/16	9/16	2	153310	153360
5/32	3/16	9/16	2	153312	153362
11/64	3/16	9/16	2	153314	153364
3/16	3/16	5/8	2	153316	153366
13/64	1/4	5/8	2-1/2	153318	153368
7/32	1/4	5/8	2-1/2	153320	153370
15/64	1/4	3/4	2-1/2	153322	153372
1/4	1/4	3/4	2-1/2	153324	153374
17/64	5/16	3/4	2-1/2	153326	153376
5/16	5/16	13/16	2-1/2	153328	153378
5/16	5/16	1-5/8	4	153330	153380
3/8	3/8	1	2-1/2	153332	153382
3/8	3/8	1-1/8	3	153334	153384
1/2	1/2	1	3	153336	153386
1/2	1/2	2	4	153338	153388
5/8	5/8	1-1/4	3-1/2	153340	153390
5/8	5/8	2-1/4	5	153342	153392
3/4	3/4	1-1/2	4	153344	153394

3-Flute Corner Radius For Aluminum

- Special geometry allows for high chip loads and feed rates
- 3-flute design excellent for slotting and profiling at high speeds
- Made from premium sub-micron grain carbide
- Cutting diameter tolerance +0.000 / -0.002

SUB MICRON MICRO GRAIN CARBIDE | BRIGHT | TiCN | 35°

Speeds & Feeds ➤ P. 30

Cutting Dia. (in.)	Shank Dia. (in.)	Flute Length (in.)	Overall Length (in.)	Corner Radius	Bright Finish Code No.	TiCN Coated Code No.
Regular Length						
1/8	1/8	3/8	1-1/2	0.005	153150	153044
3/16	3/16	5/8	2	0.005	153152	153046
1/4	1/4	3/4	2-1/2	0.005	153154	153048
5/16	5/16	13/16	2-1/2	0.005	153156	153050
3/8	3/8	1	2-1/2	0.005	153158	153052
7/16	7/16	1	2-3/4	0.005	153160	153054
1/2	1/2	1-1/4	3	0.005	153162	153056
5/8	5/8	1-5/8	3-1/2	0.005	153164	153058
3/4	3/4	1-5/8	4	0.005	153166	153060
1	1	1-1/2	4	0.005	153168	153062
Long Length						
1/4	1/4	1-1/8	3	0.005	153170	153434
5/16	5/16	1-1/8	3	0.005	153172	153436
3/8	3/8	1-1/8	3	0.005	153174	153438
1/2	1/2	1-1/2	4	0.005	153176	153440
1/2	1/2	2	4	0.005	153178	153442
5/8	5/8	2-1/4	5	0.005	153180	153444
3/4	3/4	2-1/4	5	0.005	153182	153446
1	1	2-1/4	5	0.005	153184	153448

Sowa carbide end mills have moved to the GS Tooling line.

The only change is the logo.

2 & 3-Flute Square End, 2-Flute Corner Radius, & 2-Flute Miniature Bright Carbide End Mills

Slot Milling — 2-Flute Regular Length, 2-Flute Stub Length, 2-Flute Double End Reg & Stub Length, 2-Flute Corner Radius

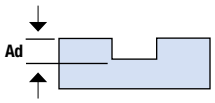
- For side milling, increase Feeds 25% or more

2-Flute Long & Extra Long Length

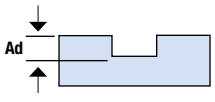
- Reduce Speeds and Feeds 25% for 2-fl. Long Length
- Reduce Speeds and Feeds 50% for 2-fl. Extra Long Length

3-Flute Regular Length

- Increase Speeds and Feeds 20% for 3-fl. Reg. Length

Hardness		Tensile Strength: Up to 750N/mm²		Up to 30HRC		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	Ad 0.3D								
				1/8 ≤ D	0.5D								
Dia. (in)	(mm)	170 SFM		155 SFM		130 SFM		110 SFM		90 SFM		390 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
	0.5	32,000	6.6	30,000	4.5	25,230	1.9	21,350	1.4	16,890	1.2	50,000	9.4
1/32	0.8	20,790	6.6	18,950	4.5	15,900	1.9	13,450	1.4	10,640	1.2	47,700	9.4
	1	16,800	6.6	15,000	4.5	12,600	1.9	10,680	1.4	8,400	1.2	37,800	9.4
3/64		15,225	6.6	13,590	4.5	11,430	1.9	9,660	1.4	7,595	1.2	34,140	9.4
1/16	1.5	11,970	6.6	10,660	4.6	9,000	2.0	7,540	1.4	5,925	1.2	26,520	9.4
5/64	2	8,705	6.6	7,730	4.7	6,570	2.1	5,415	1.4	4,260	1.2	18,900	9.4
3/32		7,480	6.8	6,635	4.7	5,650	2.4	4,650	1.4	3,645	1.2	16,305	9.4
7/64		6,335	6.9	5,610	4.7	4,790	2.6	3,935	1.4	3,075	1.2	13,925	9.4
1/8	3	5,445	7.1	4,815	4.7	4,125	3.0	3,375	1.4	2,640	1.2	12,060	10.3
9/64		4,870	7.3	4,310	4.7	3,700	3.4	3,020	1.4	2,380	1.2	10,845	12.1
5/32	4	4,300	7.5	3,815	4.7	3,270	3.7	2,660	1.4	2,115	1.2	9,630	14.0
11/64		3,945	7.6	3,490	4.7	2,990	3.8	2,440	1.4	1,940	1.2	8,835	14.2
3/16		3,615	7.7	3,180	4.7	2,735	3.8	2,225	1.4	1,775	1.2	8,075	14.2
13/64	5	3,320	8.0	2,920	4.7	2,505	3.8	2,040	1.4	1,630	1.2	7,415	14.2
7/32		3,080	8.6	2,730	4.7	2,345	3.8	1,895	1.4	1,510	1.2	6,915	14.2
1/4	6	2,690	9.5	2,400	4.7	2,060	3.8	1,660	1.4	1,320	1.2	6,070	14.2
9/32		2,405	10.2	2,140	4.7	1,845	3.8	1,490	1.4	1,185	1.2	5,430	14.2
5/16	8	2,115	10.8	1,875	4.7	1,630	3.8	1,330	1.4	1,055	1.2	4,785	14.2
11/32		1,940	10.9	1,725	4.7	1,485	3.8	1,220	1.4	970	1.2	4,385	14.2
3/8		1,775	10.9	1,580	4.7	1,340	3.8	1,120	1.4	885	1.2	4,005	14.2
13/32	10	1,630	10.9	1,455	4.7	1,230	3.8	1,035	1.4	815	1.2	3,680	14.2
7/16		1,510	10.9	1,360	4.7	1,155	3.8	965	1.4	755	1.2	3,440	14.2
1/2	12	1,310	10.9	1,190	4.7	1,020	3.8	840	1.4	660	1.2	3,010	14.2
9/16		1,175	10.9	1,060	4.7	905	3.8	740	1.4	585	1.2	2,645	14.2
5/8	16	1,080	11.1	960	4.7	815	3.8	670	1.6	520	1.2	2,355	14.2
11/16		980	11.1	870	4.7	740	3.8	610	1.7	470	1.2	2,160	14.2
3/4	20	880	11.1	780	4.7	665	3.8	545	1.7	425	1.2	1,920	14.2
7/8	22	765	11.1	675	4.7	580	3.8	480	1.7	370	1.2	1,660	14.2
1	25	670	10.9	590	4.7	500	3.8	420	1.7	330	1.2	1,475	14.2

Slot Milling — 2-Flute Miniature End Mills

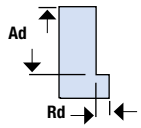
Hardness		Tensile Strength: Up to 750N/mm²		Up to 30HRC		30 to 38 HRC		38 to 45 HRC					
Work Material		Cast Iron		Mild Steels, Carbon Steels		Alloy Steels, Tool Steels, Ti Alloys (Annealed)		Hardened Steels, Prehardened Steels, Ti Alloys (Solution Treated and Aged)		Hardened Steels, Prehardened Steels, Stainless Steels, Inconel, Ni Based Alloys		Aluminum Alloys		Copper Alloys	
Depth of Cut				D < 0.04	Ad 0.1D										
				0.04 ≤ D	0.3D										
Dia. (in)		145 SFM		130 SFM		110 SFM		90 SFM		70 SFM		330 SFM		130 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
0.015		31,500	2.2	31,500	2.2	27,425	1.5	22,900	0.9	18,210	0.7	32,000	3.0	31,500	2.2
0.020		27,180	2.7	25,830	2.4	22,140	1.6	17,950	1.0	14,260	0.8	32,000	4.0	25,830	2.4
0.025		22,450	3.0	20,035	2.6	17,210	1.6	13,885	1.0	11,015	0.8	32,000	5.0	20,035	2.6
0.030		18,640	3.1	16,545	2.7	14,355	1.6	11,665	1.0	9,270	0.8	32,000	6.0	16,545	2.7
0.035		15,940	3.4	14,165	3.0	12,165	1.6	10,065	1.1	7,970	0.9	32,000	7.1	14,165	3.0
0.040		13,800	3.7	12,340	3.3	10,380	1.6	8,780	1.2	6,900	1.0	31,560	8.0	12,340	3.3
0.045		12,210	3.7	11,070	3.3	9,425	1.6	7,825	1.2	6,140	1.0	28,065	7.9	11,070	3.3
0.050		11,325	3.7	9,990	3.3	8,545	1.6	7,030	1.2	5,520	1.0	25,100	7.9	9,990	3.3
0.055		11,005	3.7	9,070	3.3	7,715	1.7	6,365	1.2	5,010	1.0	22,560	7.9	9,070	3.3
0.060		9,725	3.9	8,365	3.5	7,110	1.8	5,850	1.2	4,595	1.0	20,640	7.9	8,365	3.3

4-Flute Square End, 4-Flute Corner Radius & 3-Flute 60° Bright Carbide End Mills

Side Milling — 4-Flute Regular Length, 4-Flute Stub Length, 4-Flute Double End Regular & Stub Length, 4-Flute Corner Radius

4-Flute Long & Extra Long Length

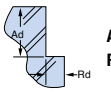
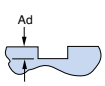
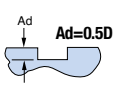
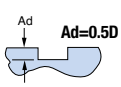
- Reduce Speeds and Feeds 25% for 4-fl. Long Length
- Reduce Speeds and Feeds 50% for 4-fl. Extra Long Length
- For slot milling, reduce Feeds 20% to 50%

Hardness			Tensile Strength: Up to 750N/mm²		Up to 30HRC		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)	160 SFM		175 SFM		130 SFM		120 SFM		95 SFM		470 SFM	
		Speed	Feed	Speed	Feed	Speed	Feed	Speed	Feed	Speed	Feed	Speed	Feed
		RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min
	0.5	32,000	23.9	32,000	11.8	25,240	10.9	23,300	4.5	19,400	3.5	50,000	39.4
1/32	0.8	21,150	23.9	23,240	11.8	15,900	10.9	14,600	4.5	12,200	3.5	50,000	39.4
	1	15,600	23.9	17,400	11.8	12,600	10.9	11,400	4.5	9,000	3.5	44,400	39.4
3/64		14,140	23.9	15,680	11.8	11,390	10.9	10,305	4.5	8,145	3.5	40,275	39.4
1/16	1.5	11,115	23.9	12,105	11.8	8,895	10.9	8,045	4.5	6,390	3.5	31,710	39.4
5/64	2	8,090	23.9	8,535	11.8	6,395	10.9	5,780	4.5	4,625	3.5	23,135	39.4
3/32		6,970	23.9	7,320	12.6	5,495	10.9	4,965	4.4	3,960	3.4	19,820	40.6
7/64		5,920	23.9	6,200	13.5	4,660	10.9	4,205	4.3	3,340	3.4	16,725	41.8
1/8	3	5,090	24.6	5,330	14.4	4,005	10.9	3,610	4.3	2,870	3.3	14,370	42.9
9/64		4,545	26.3	4,785	15.4	3,580	10.9	3,225	4.3	2,585	3.3	12,935	43.8
5/32	4	4,000	28.0	4,240	16.4	3,150	10.9	2,850	4.3	2,295	3.3	11,505	44.8
11/64		3,670	28.1	3,885	16.9	2,895	11.2	2,620	4.3	2,100	3.3	10,565	45.2
3/16		3,360	28.1	3,555	17.2	2,655	11.6	2,405	4.3	1,910	3.3	9,660	45.6
13/64	5	3,090	28.1	3,260	17.6	2,445	11.8	2,205	4.3	1,750	3.3	8,880	46.0
7/32		2,870	28.1	3,020	17.9	2,285	11.8	2,045	4.3	1,630	3.3	8,280	46.3
1/4	6	2,520	28.1	2,640	18.2	2,000	11.8	1,775	4.3	1,430	3.3	7,280	46.8
9/32		2,260	28.1	2,380	18.3	1,785	11.8	1,580	4.3	1,295	3.3	6,520	47.0
5/16	8	1,995	28.1	2,115	18.4	1,570	11.8	1,390	4.3	1,150	3.3	5,760	47.2
11/32		1,820	28.3	1,940	19.4	1,445	11.8	1,290	4.3	1,055	3.3	5,280	47.2
3/8		1,655	28.6	1,775	20.4	1,325	11.8	1,200	4.3	965	3.3	4,830	47.2
13/32	10	1,515	28.9	1,630	21.0	1,220	11.8	1,110	4.3	885	3.3	4,430	48.0
7/16		1,420	29.1	1,510	21.1	1,140	11.8	1,035	4.3	825	3.3	4,120	49.8
1/2	12	1,250	30.9	1,310	22.5	995	12.2	900	4.3	720	3.3	3,585	52.0
9/16		1,120	34.3	1,175	24.9	880	13.1	795	4.3	635	3.3	3,170	52.0
5/8	16	1,005	35.5	1,055	25.7	790	13.8	720	4.3	570	3.3	2,840	52.0
11/16		915	38.4	960	25.9	720	13.9	650	4.3	515	3.3	2,595	52.0
3/4	20	820	39.4	860	26.3	640	13.9	580	4.1	465	3.3	2,340	52.0
7/8	22	710	35.5	750	23.6	560	12.6	510	3.7	405	3.0	2,015	49.1
1	25	630	31.2	660	20.7	490	10.9	440	3.3	360	2.6	1,775	43.5

3-Flute 60° High Helix

Side Milling

Slotting

Work Material		Aluminum		Medium Carbon Steels Mild Steels		Pre-hardened Steels Stainless Steels Die & Alloy Steels		Pre-hardened Steels Stainless Steels Die & Alloy Steels		Hardened Steels		Medium Carbon Steels Mild Steels		Pre-hardened Steels Stainless Steels Die & Alloy Steels		Pre-hardened Steels Stainless Steels Die & Alloy Steels		Hardened Steels	
Hardness						< 35HRC		35-45 HRC		45-55 HRC				< 35HRC		35-45 HRC		45-55 HRC	
Depth of Cut				Ad = 1.5D Rd = 0.1D						Ad = 1.5D Rd = 0.1D				up to 1/2" Ad = 1.0D over 1/2" Ad = 0.5D					
Mill Dia. (inch)	mm	390-460 SFM		130-164 SFM		Up to 100 SFM		Up to 66 SFM		Up to 50 SFM		110-140 SFM		Up to 85 SFM		Up to 56 SFM		Up to 43 SFM	
		Speed	Feed	Speed	Feed	Speed	Feed	Speed	Feed	Speed	Feed	Speed	Feed	Speed	Feed	Speed	Feed	Speed	Feed
		RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min
1/4	6	6900	21.7	2400	10.6	1600	6.7	1060	3.0	800	1.2	2040	7.9	1360	4.7	900	2.0	680	0.8
5/16	8	5200	21.7	1800	10.6	1200	6.7	800	3.0	600	1.2	1530	7.9	1020	4.7	680	2.0	510	0.8
3/8	10	4200	23.6	1400	13.4	950	6.7	640	3.0	480	1.2	1190	9.1	810	4.7	540	2.0	410	0.8
1/2	12	3500	23.6	1200	14.2	800	7.1	530	3.0	400	1.2	1020	9.8	680	5.1	450	2.0	340	0.8
5/8	16	2600	23.6	900	15.7	600	7.1	400	3.0	300	1.2	760	10.6	510	5.1	340	2.0	260	0.8
3/4	20	2100	23.6	720	16.1	480	7.9	320	3.0	240	1.2	620	11.0	410	5.5	270	2.0	200	0.8
1	25	1700	23.6	580	13.8	380	7.1	250	3.0	190	1.2	500	9.4	320	5.1	210	2.0	160	0.8

2, 3 & 4-Flute Ball Nose Bright Carbide End Mills

Profiling — 2-Flute Regular Length, 2-Flute Stub Length, 2-Flute Double End Regular & Stub Length Ball Nose End Mills

2-Flute Ball Nose Long & Extra Long Length

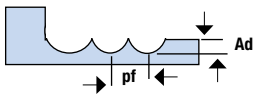
- Reduce Speeds and Feeds 25% for 2-fl. Ball Nose Long Length
- Reduce Speeds and Feeds 50% for 2-fl. Ball nose Extra Long Length

3-Flute Regular Length

- Increase Speeds and Feeds 20% for 3-fl. Reg. Length

4-Flute Ball Nose

- Increase Speeds and Feeds 40% for 4-fl. Ball Nose Reg. & Stub Length, also 4-fl Double End Reg. & Stub 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

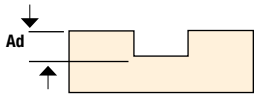
Hardness			Tensile Strength: Up to 750N/mm²		Up to 30HRC		30 to 38 HRC		38 to 45 HRC			
Work Material		Cast Iron		Mild Steels, Carbon Steels		Alloy Steels, Tool Steels, Ti Alloys (Annealed)		Hardened Steels, Prehardened Steels, Ti Alloys (Solution Treated and Aged)		Hardened Steels, Prehardened Steels, Stainless Steels, Inconel, Ni Based Alloys		Aluminum Alloys	
Depth of Cut													
		D < 1/8		Ad = 0.1D		pf = 0.2D							
		1/8 ≤ D		Ad = 0.3D		pf = 0.7D							
Dia. (in)	(mm)	160 SFM		160 SFM		120 SFM		100 SFM		80 SFM		490 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
	0.5	31,000	4.8	31,000	4.5	23,300	2.5	19,400	1.2	15,500	0.9	50,000	6.8
1/32	0.8	19,600	4.8	19,600	4.5	14,680	2.5	12,200	1.2	9,780	0.9	50,000	6.8
	1	15,600	5.0	15,600	4.7	11,400	2.8	9,540	1.4	7,620	0.9	38,400	7.1
3/64		14,140	5.2	14,140	4.8	10,305	3.0	8,620	1.5	6,885	1.0	35,535	8.0
1/16	1.5	11,115	5.8	11,115	5.1	8,045	3.4	6,720	1.7	5,360	1.2	29,585	9.8
5/64	2	8,090	6.3	8,090	5.4	5,780	3.7	4,810	1.8	3,840	1.4	23,630	11.7
3/32		6,970	6.5	6,970	5.7	4,965	3.9	4,140	1.9	3,290	1.4	20,420	11.8
7/64		5,920	6.7	5,920	6.0	4,205	4.1	3,520	1.9	2,795	1.4	17,325	11.8
1/8	3	5,090	7.2	5,090	6.1	3,610	4.3	3,030	1.9	2,400	1.4	14,945	11.8
9/64		4,545	7.9	4,545	6.2	3,225	4.3	2,690	1.9	2,140	1.4	13,470	11.8
5/32	4	4,000	8.6	4,000	6.3	2,850	4.3	2,360	1.9	1,875	1.4	11,990	11.8
11/64		3,670	9.2	3,670	6.6	2,620	4.3	2,160	1.9	1,725	1.4	11,020	12.7
3/16		3,360	9.6	3,360	6.9	2,405	4.4	1,970	1.9	1,580	1.4	10,090	13.6
13/64	5	3,090	10.1	3,090	7.1	2,205	4.4	1,810	1.9	1,455	1.4	9,275	14.2
7/32		2,870	10.4	2,870	7.1	2,045	4.3	1,690	1.9	1,360	1.4	8,630	14.2
1/4	6	2,520	11.3	2,520	6.9	1,775	4.2	1,490	1.9	1,205	1.4	7,570	14.6
9/32		2,260	12.5	2,260	6.4	1,580	4.1	1,350	1.9	1,080	1.4	6,785	15.5
5/16	8	1,995	13.6	1,995	5.9	1,390	4.0	1,200	1.9	960	1.4	6,000	16.4
11/32		1,820	13.7	1,820	5.8	1,290	4.0	1,100	1.9	880	1.4	5,495	16.5
3/8		1,655	13.7	1,655	5.7	1,200	4.0	1,005	1.9	800	1.4	5,020	16.5
13/32	10	1,515	13.7	1,515	5.6	1,110	3.9	920	1.9	735	1.4	4,610	16.9
7/16		1,420	13.7	1,420	5.4	1,035	3.7	855	1.9	690	1.4	4,300	17.8
1/2	12	1,250	13.7	1,250	5.2	900	3.5	750	1.9	600	1.4	3,750	18.9
9/16		1,120	13.9	1,120	5.2	795	3.5	660	1.9	530	1.4	3,290	18.5
5/8	16	1,005	13.9	1,005	5.2	720	3.5	590	1.9	470	1.4	2,960	16.7
11/16		915	13.9	915	5.2	650	3.5	540	1.9	430	1.4	2,715	16.5
3/4	20	820	12.9	820	5.2	580	3.5	485	1.9	380	1.4	2,415	16.5
7/8	22	710	11.2	710	5.2	510	3.5	425	1.8	335	1.4	2,100	16.5
1	25	630	9.8	630	5.1	440	3.5	370	1.6	300	1.4	1,830	16.3

2-Flute Square End, TiAlN Coated Carbide End Mills

Slot Milling — 2-Flute Regular Length, 2-Flute Stub Length, 2-Flute Double End Regular & Stub Length

2-Flute Long & Extra Long Length

- Reduce Speeds and Feeds 25% for 2-fl. Long Length
- Reduce Speeds and Feeds 50% for 2-fl. Extra Long Length
- For side milling, increase Feeds 25% or more.

Hardness			Tensile Strength: Up to 750N/mm²		Up to 30HRC		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												
Dia. (in)	(mm)	220 SFM		200 SFM		170 SFM		140 SFM		110 SFM		500 SFM	
		Speed	Feed	Speed	Feed	Speed	Feed	Speed	Feed	Speed	Feed	Speed	Feed
		RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min
	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
1/32	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

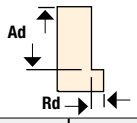
	Ad
D < 1/8	0.3D
1/8 ≤ D	0.5D

4-Flute Square End, TiAlN Coated Carbide End Mills

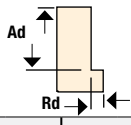
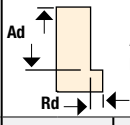
Side Milling — 4-Flute Regular Length, 4-Flute Double End Stub Length

4-Flute Long & Extra Long Length

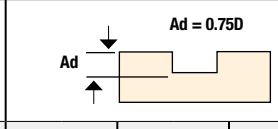
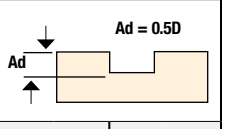
- Reduce Speeds and Feeds 25% for 4-fl. Long Length
- Reduce Speeds and Feeds 50% for 4-fl. Extra Long Length
- For slot milling, reduce Feeds 20% to 50%.

Hardness			Tensile Strength: Up to 750N/mm²	Up to 30HRC		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
	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	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		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		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		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		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		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		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		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		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		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		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		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		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		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

TiAlN Coated Carbide Roughing End Mills — Side Milling

Hardness			Tensile Strength: Up to 750N/mm²	Up to 30HRC		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

TiAlN Coated Carbide Roughing End Mills — Slotting

Hardness			Tensile Strength: Up to 750N/mm²	Up to 30HRC	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						
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

2 & 4-Flute Ball Nose TiAlN Coated Carbide End Mills

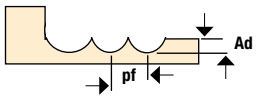
Profiling — 2-Flute Regular Length Ball Nose End Mills

2-Flute Long & Extra Long Length

- 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-Flute Ball Nose

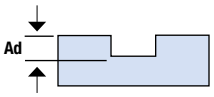
- Increase Speeds and Feeds 40% for 4-fl. Ball Nose Reg. Length
- Reduce Speeds 25% and Increase Feeds 10% for 4-fl. Ball Nose Long Length
- Reduce Speeds 50% and Increase Feeds 10% for 4-fl. Ball Nose Extra Long Length

Hardness			Tensile Strength: Up to 750N/mm²		Up to 30HRC		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											
Dia. (in)	(mm)	200 SFM		205 SFM		150 SFM		125 SFM		100 SFM		600 SFM	
		Speed	Feed	Speed	Feed	Speed	Feed	Speed	Feed	Speed	Feed	Speed	Feed
		RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min
	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
1/32	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

	Ad	pf
D < 1/8	0.1D	0.2D
1/8 ≤ D	0.3D	0.7D

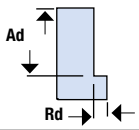
Typhoon Modified AlTiN Carbide End Mills

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

Hardness		Tensile Strength: Up to 750N/mm²		Up to 30HRC		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				D <1/16 | Ad 0.1D 1/16 ≤ D<1/8 | 0.3D 1/16 ≤ D | 0.5D						D <1/16 | Ad 0.02D 1/16 ≤ D | 0.05D		D <1/16 | Ad 0.01D 1/16 ≤ D<1/8 | 0.02D 1/8 ≤ D | 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

Typhoon Modified AlTiN Carbide End Mills

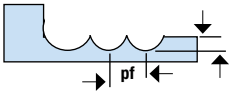
Side Milling — 4-Flute Square End & 4-Flute Corner Radius

Hardness		Tensile Strength: Up to 750N/mm²		Up to 30HRC		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				D <1/8 | Ad 1.5D | Rd 0.05D 1/8 ≤ D | 1.5D | 0.1D								Ad 1D | Rd 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

2 & 4-Flute Ball Nose Typhoon Modified AlTiN Carbide End Mills

Profiling — 2-Flute Ball Nose

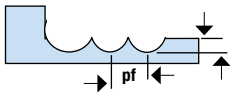
4-Flute Ball Nose: Increase Feeds 40% to 50%

Hardness		Tensile Strength: Up to 750N/mm²	Up to 30HRC	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			Ad: 0.1D, pf: 0.2D			Ad: 0.05D, 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		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		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		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		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		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		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		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		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		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

High-Speed Light Milling — 2-Flute Ball Nose

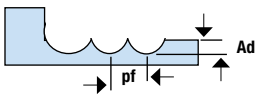
4-Flute Ball Nose: Increase Feeds 40% to 50%

Hardness	Tensile Strength: Up to 750N/mm²	Up to 30HRC	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		Ad: 0.02D, pf: 0.05D			D <5/8: Ad 0.02D, pf 0.05D 5/8 ≤ D: Ad 0.012", 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	88.6	59.4	17,650	39.4
3/32		27,490	137.8	21,750	110.2	21,250	98.4	20,450	88.6	88.6	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	90.0	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	96.2	74.4	7,960	43.1
3/16		16,085	154.6	15,110	153.3	14,230	112.8	11,585	91.9	91.9	80.8	7,675	46.3
7/32		15,215	175.0	14,160	164.9	12,600	110.9	10,160	89.4	89.4	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	84.8	84.8	6,305	43.5
9/32		12,990	163.1	11,490	144.5	10,035	93.6	8,150	76.2	76.2	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	67.6	67.6	5,000	35.4
11/32		10,760	134.3	9,355	117.3	8,285	76.9	6,610	61.9	61.9	61.9	4,575	32.4
3/8		9,975	124.2	8,660	108.0	7,575	70.7	6,035	56.4	56.4	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	51.6	51.6	3,840	27.2
7/16		8,630	107.1	7,465	92.5	6,475	60.4	5,165	47.6	47.6	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	41.5	41.5	3,125	22.0
9/16		6,675	83.2	5,785	71.4	5,000	46.4	3,975	37.5	37.5	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	33.7	33.7	2,465	17.4
11/16		5,465	67.6	4,705	58.7	4,075	38.3	3,250	30.7	30.7	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	27.6	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	24.0	24.1	1,755	12.3
1	25	3,740	46.6	3,250	40.8	2,805	26.4	2,215	21.0	21.0	21.0	1,525	10.7

Typhoon Modified AlTiN Mold Mills

Mold Mills for Profile Milling

Hardness		Tensile Strength: Up to 750N/mm²	Up to 30HRC	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							

	Ad
D < 5/8	0.05D
5/8≤ D	0.03"

Dia. (in)	(mm)	550 SFM		550 SFM		450 SFM		360 SFM		270 SFM		230 SFM		200 SFM	
		Speed	Feed	Speed	Feed	Speed	Feed	Speed	Feed	Speed	Feed	Speed	Feed	Speed	Feed
		RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min	RPM	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 50° High Spiral Typhoon Modified AlTiN Carbide End Mills

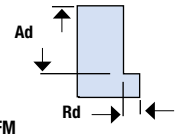
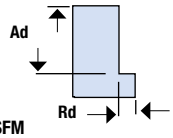
Side Milling

Work Material	Mild Steel Carbon Steel Cast Iron	Alloy Steels Tool Steels	Hardened Steels Tool Steels	Hardened Steels Tool Steels	Titanium Alloy	Nickel Base High-Temp Alloy
Hardness	Up to 25HRC	25-45 HRC	45-55 HRC	55-60 HRC	30-40 HRC	25-45 HRC
Depth of Cut	 Ad= 1.5D Rd= 0.1D		 Ad= 1.5D Rd= 0.05D		 Ad= 1.5D Rd= 0.05D	

Dia. (in)	(mm)	312-540 SFM		156-312 SFM		96-156 SFM		60-96 SFM		156-276 SFM		48-80 SFM	
		Speed	Feed	Speed	Feed	Speed	Feed	Speed	Feed	Speed	Feed	Speed	Feed
		RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min	RPM	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
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

Typhoon Modified AlTiN Carbide Roughing End Mills

Roughing Side Cutting

Hardness		Up to 30HRC		30 to 38 HRC		38 to 45 HRC		45 to 55 HRC		55 to 65 HRC	
Work Material		Non-Alloyed Steels Alloy Steels Cast Iron		Alloys Steels Heat Resistant Steels		Alloys Steels Heat Resistant Steels		Hardened Steels		Hardened Steels	
Depth of Cut		 Ad = 1.5D Rd = 0.3D 1000 SFM		800 SFM		550 SFM		 Ad = 1.0D Rd = 0.05D 225 SFM		160 SFM	
Dia. (in)	Strength (mm)	Up to 1000N/mm²		1000 to 1200N/mm²		1200 to 1400N/mm²		1400 to 2000N/mm²		2000N/mm²~	
		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	15,600	91.35	12,400	33.10	8,400	22.45	3,400	10.25	2,400	7.50
5/16	8	11,600	91.35	9,200	33.10	6,300	22.45	2,400	9.50	1,800	7.10
3/8	10	9,200	91.35	7,600	33.10	5,100	22.45	2,000	11.40	1,300	7.50
1/2	12	8000	94.50	6,000	31.50	4,200	22.45	1,680	10.25	1,200	7.50
5/8	16	6000	94.50	4,800	29.90	3,300	20.05	1,200	6.30	800	4.35
3/4	20	5200	91.35	4,400	28.35	2,700	16.55	1,100	5.90	700	3.95
1	25	4800	85.05	3,600	22.05	2,400	14.15	1,000	5.90	660	3.95

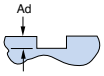
4 & 5-Flute Variable Helix End Mills

Material	SFM	1/8"	1/4"	1/2"	1"
Aluminum Alloys	1120	0.0010	0.0020	0.0040	0.0080
Carbon Steel	300-600	0.0010	0.0015	0.0030	0.0060
Cast Iron	350-550	0.0010	0.0015	0.0030	0.0060
Copper Alloys	500-900	0.0010	0.0020	0.0030	0.0060
Steel - Annealed	350-500	0.0010	0.0020	0.0030	0.0050
Steel - 18-24 HRC	150-500	0.0004	0.0008	0.0015	0.0045
Steel - 25-37 HRC	125-200	0.0003	0.0005	0.0010	0.0030
Stainless Steel - Free Machining	250-400	0.0005	0.0010	0.0020	0.0030
Stainless Steel - Other	150-300	0.0005	0.0010	0.0020	0.0030
Inconel/Monel	60-100	0.0005	0.0010	0.0015	0.0030
Titanium	175-300	0.0005	0.0008	0.0015	0.0030

* All speeds and feeds are suggested starting points. They may be increased or decreased depending on machine condition, depth of cut, finish required, coolant, etc.

2-Flute Aluminum

Side Milling **Slotting**

Work Material		Aluminum		Aluminum	
Hardness					
Depth of Cut		 Ad= 1.5D Rd= 0.1D		 Ad= 0.5D	
Mill Dia. (inch)	mm	V=660 SFM		V=660 SFM	
		Speed	Feed	Speed	Feed
		RPM	in/min	RPM	in/min
1/4	6	10000	60	10000	30
5/16	8	8000	64	8000	32
3/8	10	8000	80	8000	40
1/2	12	8000	96	8000	48
5/8	16	6000	84	6000	42
3/4	20	4000	64	4000	32
1	25	4000	64	4000	32

2-Flute Corner Radius Aluminum

Chip load per tooth					
Material	SFM	1/8"	1/4"	1/2"	1"
Aluminum Alloys	600/1200	0.0010	0.0020	0.0040	0.0080

RPM = 3.82 x sfm ÷ dia SFM = rpm x 0.262 ÷ dia IPM = chip load x No. of teeth x rpm

3-Flute Aluminum

Chip Load Per Tooth					
Material	SFM	1/8"	1/4"	1/2"	1"
Aluminum Alloys	600/1200	0.0010	0.0020	0.0040	0.0080

RPM = 3.82 x sfm ÷ dia SFM = rpm x 0.262 ÷ dia
IPM = chip load x No. of teeth x rpm

3-Flute Corner Radius Aluminum

Chip load per tooth					
Material	SFM	1/8"	1/4"	1/2"	1"
Aluminum Alloys	600/1200	0.0010	0.0020	0.0040	0.0080

RPM = 3.82 x sfm ÷ dia SFM = rpm x 0.262 ÷ dia IPM = chip load x No. of teeth x rpm

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