



®

END MILLS



MADE IN THE U.S.A.

Besly End Mills are produced from certified materials, heat treated to an exacting process and finished to precise tolerances utilizing multi-axis CNC equipment.

THE WORLD'S FINEST CUTTING TOOLS SINCE 1875

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2-FLUTE END MILLS**LIST 786**Single End – Center Cutting
Regular Length

Designed for production milling of slots, pockets, and other general purpose work. The body construction provides for rigidity and rapid stock removal.



LIST 786									
Size	Shank Diameter	Length of Cut	Overall Length	Part #	Size	Shank Diameter	Length of Cut	Overall Length	Part #
1/8	3/8	3/8	2-5/16	22313	13/16	5/8	1-1/2	4	22339
5/32	3/8	3/8	2-5/16	22316	13/16	3/4	1-7/8	4-1/8	22341
3/16	3/8	7/16	2-3/8	22314	27/32	7/8	1-7/8	4-1/8	22340
7/32	3/8	1/2	2-7/16	22317	7/8	5/8	1-1/2	4	22342
1/4	3/8	1/2	2-7/16	22315	7/8	3/4	1-1/2	4-1/8	22343
9/32	3/8	9/16	2-1/2	22318	7/8	7/8	1-1/2	4-1/8	22345
5/16	3/8	9/16	2-1/2	22320	29/32	7/8	1-7/8	4-1/8	22344
11/32	3/8	9/16	2-1/2	22319	15/16	5/8	1-1/2	4	24326
3/8	3/8	9/16	2-1/2	22321	15/16	3/4	1-1/2	4-1/8	24327
13/32	3/8	13/16	2-11/16	22326	31/32	1	1-5/8	4-1/2	22347
7/16	3/8	13/16	2-11/16	22322	1	5/8	1-1/2	4	22353
15/32	3/8	13/16	2-11/16	22327	1	3/4	1-1/2	4-1/8	24328
1/2	3/8	13/16	2-11/16	22323	1	7/8	1-1/2	4-1/8	22355
1/2	1/2	1	3-1/4	22324	1	1	1-5/8	4-1/2	22360
17/32	1/2	1-1/8	3-3/8	22328	1-1/16	3/4	1-5/8	4-1/4	22361
9/16	1/2	1-1/8	3-3/8	22325	1-1/8	1	1-5/8	4-1/2	22362
19/32	1/2	1-1/8	3-3/8	22329	1-3/16	1	1-5/8	4-1/2	22366
5/8	1/2	1-1/8	3-3/8	22330	1-1/4	7/8	1-5/8	4-1/2	22363
5/8	5/8	1-5/16	3-3/4	22331	1-1/4	1	1-5/8	4-1/2	22364
21/32	5/8	1-5/16	3-3/4	22336	1-1/4	1-1/4	1-5/8	4-1/2	22365
11/16	1/2	1-5/16	3-5/8	22332	1-3/8	1	1-5/8	4-1/2	22370
11/16	5/8	1-5/16	3-3/4	22333	1-1/2	1	1-5/8	4-1/2	22371
23/32	3/4	1-5/8	3-7/8	22337	1-1/2	1-1/4	1-5/8	4-1/2	22372
3/4	1/2	1-5/16	3-5/8	22334	1-5/8	1-1/4	1-5/8	4-1/2	22374
3/4	5/8	1-5/16	3-3/4	22335	1-7/8	1-1/4	1-5/8	4-1/2	24336
3/4	3/4	1-5/16	3-7/8	24318	2	1-1/4	1-5/8	4-1/2	22380
25/32	3/4	1-1/2	4	22338					

High Speed Steel

2-FLUTE END MILLS

Single End – Keyway Cutting
Spiral Flute

LIST 796

Spiral flute keyway cutting to plunge, slot, spot, drill, and profile. Minus tolerance for keyway cutting: +.0000" to -.0015".



LIST 796				
Size	Shank Diameter	Length of Cut	Overall Length	Part #
1/4	3/8	1/2	2-7/16	29593
5/16	3/8	9/16	2-1/2	29594
3/8	3/8	9/16	2-1/2	29595
1/2	1/2	1	3-1/4	29596
5/8	5/8	1-5/16	3-3/4	29597
3/4	3/4	1-5/16	3-7/8	29598
7/8	7/8	1-1/2	4-1/8	29599
1	1	1-5/8	4-1/2	29600

Refer to page 24 for recommended feeds and speeds for High Speed Steel End Mills.

2-FLUTE HIGH HELIX END MILLS

LIST 766

Single End – Center Cutting
Spiral Flute – Regular Length

Designed for maximum chip removal, longer life, and better finishes in aluminum and aluminum alloys.



LIST 766									
Size	Shank Diameter	Length of Cut	Overall Length	Part #	Size	Shank Diameter	Length of Cut	Overall Length	Part #
3/16	3/8	1/2	2-3/8	21880	3/4	3/4	1-5/8	3-7/8	21891
1/4	3/8	5/8	2-7/16	21881	7/8	7/8	1-7/8	4-1/8	21892
5/16	3/8	3/4	2-1/2	21882	1	1	2	4-1/2	21893
3/8	3/8	3/4	2-1/2	21883	1	1	3	5-1/2	21894
7/16	3/8	1	2-11/16	21884	1-1/2	1-1/4	2	4-1/2	21895
1/2	1/2	1-1/4	3-1/4	21885	1-3/4	1-1/4	2	4-1/2	21888
5/8	5/8	1-5/8	3-3/4	21890	2	1-1/4	2	4-1/2	21901

2-FLUTE HIGH HELIX END MILLS

LIST 767

Single End – Center Cutting
Spiral Flute – Long Length

Designed for maximum chip removal, longer life, and better finishes in aluminum and aluminum alloys.



LIST 767									
Size	Shank Diameter	Length of Cut	Overall Length	Part #	Size	Shank Diameter	Length of Cut	Overall Length	Part #
1/4	3/8	1-1/4	3-1/16	21902	7/8	7/8	3-1/2	5-3/4	24337
5/16	3/8	1-3/8	3-1/8	21903	1	1	4	6-1/2	21914
3/8	3/8	1-1/2	3-1/4	21904	1-1/4	1-1/4	4	6-1/2	21915
7/16	1/2	1-3/4	3-3/4	21905	1-1/2	1-1/4	4	6-1/2	21917
1/2	1/2	2	4	21910	1-3/4	1-1/4	4	6-1/2	21919
5/8	5/8	2-1/2	4-5/8	21911	2	1-1/4	4	6-1/2	21920
3/4	3/4	3	5-1/4	21912					

High Speed Steel

2-FLUTE HIGH HELIX END MILLS

Single End – Center Cutting
Spiral Flute – Extra Long Length

LIST 768

Designed for maximum chip removal, longer life, and better finishes in aluminum and aluminum alloys.



LIST 768				
Size	Shank Diameter	Length of Cut	Overall Length	Part #
1/4	3/8	1-3/4	3-9/16	21923
5/16	3/8	2	3-3/4	21924
3/8	3/8	2-1/2	4-1/4	21925
7/16	1/2	2-3/4	4-3/4	21930
1/2	1/2	3	5	21931
5/8	5/8	4	6-1/8	21932
3/4	3/4	4	6-1/4	21933
1	1	6	8-1/2	21935
1-1/4	1-1/4	6	8-1/2	21936
1-1/2	1-1/4	6	8-1/2	21938
2	1-1/4	6	8-1/2	21942

High Speed Steel

2-FLUTE END MILLS

Single End – Center Cutting
Long Shank Length

LIST 790



LIST 790				
Size	Shank Diameter	Length of Cut	Overall Length	Part #
3/16	3/8	1/2	2-11/16	22408
1/4	3/8	5/8	3-1/16	22410
5/16	3/8	3/4	3-5/16	22411
3/8	3/8	3/4	3-5/16	22412
1/2	1/2	1	4	22413
5/8	5/8	1-3/8	4-5/8	22414
3/4	3/4	1-5/8	5-3/8	22415
1	1	2-1/2	7-1/4	22421
1-1/4	1-1/4	3	7-1/4	22422

High Speed Steel

2-FLUTE BALL END MILLS

LIST 791

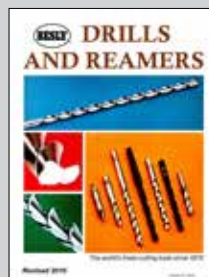
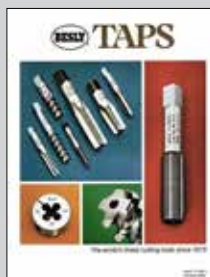
Single End – Ball End
Regular Length

Designed for milling radius bottom slots and fillets, for rounding the bottoms of holes, and for all-around use in die work.



LIST 791				
Size	Shank Diameter	Length of Cut	Overall Length	Part #
1/8	3/8	3/8	2-5/16	22423
3/16	3/8	1/2	2-3/8	22424
1/4	3/8	5/8	2-7/16	22425
5/16	3/8	3/4	2-1/2	22430
3/8	3/8	3/4	2-1/2	22431
7/16	1/2	1	3-1/4	22432
1/2	1/2	1	3-1/4	22433
9/16	1/2	1-1/8	3-3/8	22434
5/8	1/2	1-1/8	3-3/8	22472
5/8	5/8	1-3/8	3-3/4	22435
3/4	3/4	1-5/8	3-7/8	22440
3/4	1/2	1-5/16	3-5/8	22474
13/16	3/4	2	4-1/4	22475
7/8	7/8	2	4-1/4	22441
7/8	3/4	2	4-1/4	22476
15/16	3/4	2-1/4	4-1/2	22477
1	1	2-1/4	4-3/4	22442
1	3/4	2-1/4	4-1/2	22422
1-1/8	1	2-1/4	4-3/4	22478
1-1/4	1-1/4	2-1/2	5	22444
1-1/2	1-1/4	2-1/2	5	22450

Call or visit www.besly.com to receive catalogs for all Besly Cutting Tool products. Available in .pdf on our website.



High Speed Steel

2-FLUTE BALL END MILLS

Double End – Ball End
Regular Length

LIST 798

Designed for milling radius bottom slots and fillets, for rounding the bottoms of holes, and for all-around use in die work.



LIST 798				
Size	Shank Diameter	Length of Cut	Overall Length	Part #
1/8	3/8	3/8	3-1/16	22510
3/16	3/8	7/16	3-1/4	22511
1/4	3/8	1/2	3-3/8	22512
5/16	3/8	9/16	3-1/2	22513
3/8	3/8	9/16	3-1/2	22514
7/16	1/2	13/16	4-1/8	22515
1/2	1/2	13/16	4-1/8	22520
5/8	5/8	1-1/8	5	22521
3/4	3/4	1-5/16	5-5/8	22522
7/8	7/8	1-9/16	6-1/8	24347
1	1	1-5/8	6-3/8	22524

BESLY'S RENOWNED TURBOFLUTE™ DRILLS ARE THE ANSWER TO SOLVING DEEP HOLE DRILLING PROBLEMS!



*Refer to drill catalog D-100C or contact our Customer Service Department.
Information is also available at www.besly.com.*

2-FLUTE END MILLS**LIST 785**Double End – Center Cutting
Regular Length

Designed for production milling of slots, pockets, keyways, and other general purpose work. End teeth are ground to center for plunge cutting. Furnished with right hand cut-right hand spiral.



LIST 785				
Size	Shank Diameter	Length of Cut	Overall Length	Part #
1/8	3/8	3/8	3-1/16	22282
5/32	3/8	7/16	3-1/8	22283
3/16	3/8	7/16	3-1/4	22284
7/32	3/8	1/2	3-1/4	22285
1/4	3/8	1/2	3-3/8	22290
9/32	3/8	9/16	3-3/8	22291
5/16	3/8	9/16	3-1/2	22292
11/32	3/8	9/16	3-1/2	22293
3/8	3/8	9/16	3-1/2	22294
13/32	1/2	13/16	4-1/8	22295
7/16	1/2	13/16	4-1/8	22300
15/32	1/2	13/16	4-1/8	22301
1/2	1/2	13/16	4-1/8	22302
17/32	5/8	1-1/8	5	22487
9/16	5/8	1-1/8	5	22303
19/32	5/8	1-1/8	5	22488
5/8	5/8	1-1/8	5	22304
21/32	3/4	1-5/16	5-5/8	22490
11/16	3/4	1-5/16	5-5/8	22305
23/32	3/4	1-5/16	5-5/8	22306
3/4	3/4	1-5/16	5-5/8	22310
25/32	7/8	1-9/16	6-1/8	22307
13/16	7/8	1-9/16	6-1/8	22220
27/32	7/8	1-9/16	6-1/8	22308
7/8	7/8	1-9/16	6-1/8	22311
29/32	1	1-5/8	6-3/8	22309
15/16	1	1-5/8	6-3/8	22221
31/32	1	1-5/8	6-3/8	22491
1	1	1-5/8	6-3/8	22312

High Speed Steel

4-FLUTE END MILLS

Double End – Non-Center Cutting
Regular Length

LIST 783

Designed for producing smooth finishes after roughing cuts have been made at heavier feeds. Both ends can be resharpened in a single set-up. Furnished with right hand cut-right hand spiral.



LIST 783				
Size	Shank Diameter	Length of Cut	Overall Length	Part #
1/8	3/8	3/8	3-1/16	22115
5/32	3/8	7/16	3-1/8	22120
3/16	3/8	1/2	3-1/4	22121
7/32	3/8	9/16	3-1/4	22122
1/4	3/8	5/8	3-3/8	22123
9/32	3/8	11/16	3-3/8	22124
5/16	3/8	3/4	3-1/2	22125
11/32	3/8	3/4	3-1/2	22130
3/8	3/8	3/4	3-1/2	22131
13/32	1/2	1	4-1/8	22132
7/16	1/2	1	4-1/8	22133
15/32	1/2	1	4-1/8	22134
1/2	1/2	1	4-1/8	22135
9/16	5/8	1-3/8	5	22140
5/8	5/8	1-3/8	5	22141
11/16	3/4	1-5/8	5-5/8	22142
3/4	3/4	1-5/8	5-5/8	22143
13/16	7/8	1-7/8	6-1/8	22144
7/8	7/8	1-7/8	6-1/8	22145
15/16	1	1-7/8	6-3/8	22161
1	1	1-7/8	6-3/8	22150

High Speed Steel

MULTIPLE FLUTE END MILLS

LIST 784 (1 of 2)

Single End – Non-Center Cutting
Regular Length

Designed for producing smooth finishes after roughing cuts have been made. Furnished with right hand cut-right hand spiral.



LIST 784					
Size	Shank Diameter	Length of Cut	Overall Length	Number of Flutes	Part #
1/8	3/8	3/8	2-5/16	4	22183
5/32	3/8	1/2	2-3/8	4	22164
3/16	3/8	1/2	2-3/8	4	22184
7/32	3/8	5/8	2-7/16	4	22165
1/4	3/8	5/8	2-7/16	4	22185
9/32	3/8	5/8	2-7/16	4	22170
5/16	3/8	3/4	2-1/2	4	22190
11/32	3/8	3/4	2-1/2	4	22171
3/8	3/8	3/4	2-1/2	4	22191
13/32	3/8	1	2-11/16	4	22172
7/16	3/8	1	2-11/16	4	22192
15/32	3/8	1	2-11/16	4	22173
1/2	3/8	1	2-11/16	4	22193
1/2	1/2	1-1/4	3-1/4	4	22194
17/32	1/2	1-3/8	3-3/8	4	22174
9/16	1/2	1-3/8	3-3/8	4	22195
19/32	1/2	1-3/8	3-3/8	4	22175
5/8	1/2	1-3/8	3-3/8	4	22200
5/8	5/8	1-5/8	3-3/4	4	22201
21/32	5/8	1-5/8	3-3/4	4	22180
11/16	1/2	1-5/8	3-5/8	4	22202
11/16	5/8	1-5/8	3-3/4	4	22203
23/32	3/4	1-5/8	3-7/8	4	22181
3/4	1/2	1-5/8	3-5/8	4	22204
3/4	5/8	1-5/8	3-3/4	4	22205
3/4	3/4	1-5/8	3-7/8	4	24438
25/32	3/4	1-7/8	4-1/8	4	22182

(continued on next page)

MULTIPLE FLUTE END MILLSSingle End – Non-Center Cutting
Regular Length**LIST 784** (2 of 2)

Designed for producing smooth finishes after roughing cuts have been made. Furnished with right hand cut-right hand spiral.



LIST 784 (continued)					
Size	Shank Diameter	Length of Cut	Overall Length	Number of Flutes	Part #
13/16	5/8	1-7/8	4	6	22211
27/32	7/8	1-7/8	4-1/8	4	22212
7/8	1/2	5/8	3-5/8	4	22214
7/8	5/8	1-7/8	4	6	22213
7/8	3/4	1-7/8	4-1/8	4	24446
7/8	7/8	1-7/8	4-1/8	4	22215
29/32	7/8	1-7/8	4-1/8	4	22222
15/16	5/8	1-7/8	4	6	22224
15/16	3/4	1-7/8	4-1/8	4	24447
15/16	7/8	1-7/8	4-1/8	4	24448
31/32	1	2	4-1/2	4	24449
1	5/8	1-7/8	4	6	22223
1	3/4	1-7/8	4-1/8	4	24456
1	7/8	1-7/8	4-1/8	4	22225
1	1	2	4-1/2	4	22230
1-1/8	7/8	2	4-1/4	6	22231
1-1/8	1	2	4-1/2	6	22232
1-1/4	7/8	2	4-1/4	6	22233
1-1/4	1	2	4-1/2	6	22234
1-1/4	1-1/4	2	4-1/2	6	22235
1-3/8	1	2	4-1/2	6	22240
1-1/2	1	2	4-1/2	6	22241
1-1/2	1-1/4	2	4-1/2	6	22242
1-1/2	1-1/4	2	4-1/2	4	22243
1-5/8	1-1/4	2	4-1/2	6	24457
1-3/4	1-1/4	2	4-1/2	4	22244
2	1-1/4	2	4-1/2	6	22250

MULTIPLE FLUTE END MILLS**LIST 789**Single End – Non-Center Cutting
Long Length

Furnished in right hand cut-right hand spiral.



LIST 789					
Size	Shank Diameter	Length of Cut	Overall Length	Number of Flutes	Part #
1/4	3/8	1-1/4	3-1/16	4	22381
9/32	3/8	1-3/8	3-1/8	4	22388
5/16	3/8	1-3/8	3-1/8	4	22382
11/32	3/8	1-1/2	3-1/4	4	22389
3/8	3/8	1-1/2	3-1/4	4	22383
7/16	3/8	1-3/4	3-3/4	4	22384
1/2	1/2	2	4	4	22385
5/8	5/8	2-1/2	4-5/8	4	22390
3/4	3/4	3	5-1/4	4	22391
7/8	7/8	3-1/2	5-3/4	4	22392
1	1	4	6-1/2	4	22393
1-1/8	1	4	6-1/2	6	22394
1-1/4	1	4	6-1/2	6	22395
1-1/4	1-1/4	4	6-1/2	6	22400
1-1/2	1	4	6-1/2	6	22402
1-1/2	1-1/4	4	6-1/2	6	22403
1-3/4	1-1/4	4	6-1/2	6	22404
2	1-1/4	4	6-1/2	6	22405

High Speed Steel

4-FLUTE END MILLS

Double End – Center Cutting
Regular Length

LIST 683

Furnished in right hand cut-right hand spiral.



LIST 683				
Size	Shank Diameter	Length of Cut	Overall Length	Part #
1/8	3/8	3/8	3-1/16	20941
5/32	3/8	7/16	3-1/8	20931
3/16	3/8	1/2	3-1/4	20942
7/32	3/8	9/16	3-1/4	20933
1/4	3/8	5/8	3-3/8	20943
9/32	3/8	11/16	3-3/8	20934
5/16	3/8	3/4	3-1/2	20944
11/32	3/8	3/4	3-1/2	20935
3/8	3/8	3/4	3-1/2	20945
7/16	1/2	1	4-1/8	20948
1/2	1/2	1	4-1/8	20950
5/8	5/8	1-3/8	5	20951
3/4	3/4	1-5/8	5-5/8	20952
7/8	7/8	1-7/8	6-1/8	20953
1	1	1-7/8	6-3/8	20954

BESLY CUTTING TOOLS SINCE 1875

140 Years of Cutting Tool Design and Manufacturing Experience

4-FLUTE END MILLS**LIST 684**Single End – Center Cutting
Regular Length

Furnished in right hand cut-right hand spiral.



LIST 684				
Size	Shank Diameter	Length of Cut	Overall Length	Part #
1/8	3/8	6/8	2-5/16	20955
3/16	3/8	1/2	2-3/8	20960
7/32	3/8	5/8	2-7/16	20966
1/4	3/8	5/8	2-7/16	20961
9/32	3/8	5/8	2-7/16	20967
5/16	3/8	3/4	2-1/2	20962
11/32	3/8	3/4	2-1/2	20968
3/8	3/8	3/4	2-1/2	20963
13/32	3/8	1	2-11/16	22000
7/16	3/8	1	2-11/16	22004
15/32	3/8	1	2-11/16	22006
1/2	1/2	1-1/4	3-1/4	20964
9/16	1/2	1-3/8	3-3/8	22008
5/8	5/8	1-5/8	3-3/4	20965
3/4	3/4	1-5/8	3-7/8	20971
7/8	7/8	1-7/8	4-1/8	20972
1	3/4	1-7/8	4-1/8	22010
1	1	2	4-1/2	20973
1-1/8	1	2	4-1/2	20974
1-1/4	1-1/4	2	4-1/2	20975
1-1/2	1-1/4	2	4-1/2	20980

High Speed Steel

4-FLUTE END MILLS

Single End – Center Cutting
Long Length

LIST 689

Furnished in right hand cut-right hand spiral.



LIST 689									
Size	Shank Diameter	Length of Cut	Overall Length	Part #	Size	Shank Diameter	Length of Cut	Overall Length	Part #
1/4	3/8	1-1/4	3-1/16	20993	3/4	3/4	3	5-1/4	21002
5/16	3/8	1-3/8	3-1/8	20994	7/8	7/8	3-1/2	5-3/4	21003
3/8	3/8	1-1/2	3-1/4	20995	15/16	7/8	4	6-1/4	22014
7/16	1/2	1/3/4	3-3/4	22012	1	1	4	6-1/2	21004
1/2	1/2	2	4	21000	1-1/4	1-1/4	4	6-1/2	21005
5/8	5/8	2-1/2	4-5/8	21001	1-1/2	1-1/4	4	6-1/2	22016

High Speed Steel

MULTIPLE FLUTE END MILLS

Single End – Center Cutting
Extra Long Length

LIST 792



LIST 792											
Size	Shank Diameter	Length of Cut	Overall Length	Number of Flutes	Part #	Size	Shank Diameter	Length of Cut	Overall Length	Number of Flutes	Part #
1/4	3/8	1-3/4	3-9/16	4	22451	7/8	7/8	5	7-1/4	4	22461
5/16	3/8	2	3-3/4	4	22452	1	1	6	8-1/2	4	22462
3/8	3/8	2-1/2	4-1/4	4	22453	1-1/4	1-1/4	6	8-1/2	6	22463
7/16	3/8	2-5/8	4-5/16	4	22458	1-1/2	1-1/4	8	10-1/2	6	22464
1/2	1/2	3	5	4	22454	2	1-1/4	6	8-1/2	6	22500
5/8	5/8	4	6-1/8	4	22455	2	2	6	9-3/4	6	22504
3/4	3/4	4	6-1/4	4	22460						

High Speed Steel

4-FLUTE BALL END MILLS

LIST 685

Single End – Center Cutting
Regular Length

Designed for milling radius bottom slots and fillets, for rounding the bottoms of holes, and for all-around use in die work.



LIST 685				
Size	Shank Diameter	Length of Cut	Overall Length	Part #
1/4	3/8	5/8	2-7/16	20986
5/16	3/8	3/4	2-1/2	20987
3/8	3/8	3/4	2-1/2	20981
1/2	1/2	1-1/4	3-1/4	20982
5/8	5/8	1-5/8	3-3/4	20983
3/4	3/4	1-5/8	3-7/8	20984
1	1	2	4-1/2	20990

High Speed Steel

4-FLUTE BALL END MILLS

LIST 690

Single End – Center Cutting
Long Length



LIST 690				
Size	Shank Diameter	Length of Cut	Overall Length	Part #
1/4	3/8	1-1/4	3-1/8	21007
5/16	3/8	1-3/8	3-1/8	21008
3/8	3/8	1-1/2	3-1/4	21009
1/2	1/2	2	4	21010
5/8	5/8	2-1/2	4-5/8	21011
3/4	3/4	3	5-1/4	21012
1	1	4	6-1/2	21013

Premium Cobalt High Speed Steel

END MILLS

Designed to machine high tensile steels and high temperature alloys while resisting abrasion and premature wear.



Premium Cobalt High Speed Steel

2-FLUTE END MILLS

Single End – Center Cutting
Regular Length

LIST 656

Designed to machine high tensile steels and high temperature alloys.



LIST 656				
Size	Shank Diameter	Length of Cut	Overall Length	Part #
1/8	3/8	3/8	2-5/16	23068
3/16	3/8	7/16	2-3/8	23069
1/4	3/8	1/2	2-7/16	23076
5/16	3/8	9/16	2-1/2	23077
3/8	3/8	9/16	2-1/2	23078
7/16	3/8	13/16	2-11/16	23080
1/2	1/2	1	3-1/4	23079
5/8	5/8	1-5/16	3-3/4	23086
3/4	3/4	1-5/16	3-7/8	23087
7/8	3/4	1-1/2	3-3/4	23057
1	1	1-5/8	4-1/2	23088
1-1/4	1-1/4	1-5/8	4-1/8	23089
1-1/2	1-1/4	1-5/8	4-1/8	23096

Premium Cobalt High Speed Steel
4-FLUTE END MILLS

Single End – Center Cutting
 Regular Length

LIST 657

Designed to machine high tensile steels and high temperature alloys. Right hand spiral-right hand cut.



LIST 657									
Size	Shank Diameter	Length of Cut	Overall Length	Part #	Size	Shank Diameter	Length of Cut	Overall Length	Part #
1/8	3/8	3/8	2-5/16	23097	1/2	1/2	1-1/4	3-1/4	23108
3/16	3/8	1/2	2-3/8	23098	5/8	5/8	1-5/8	3-3/4	23116
1/4	3/8	5/8	2-7/16	23099	3/4	3/4	1-5/8	3-7/8	23118
5/16	3/8	3/4	2-1/2	23106	1	1	2	4-1/2	23126
3/8	3/8	3/4	2-1/2	23107	1-1/4	1-1/4	2	4-1/2	23976
7/16	3/8	1	2-11/16	23082	1-1/2	1-1/4	2	4-1/2	23977

Premium Cobalt High Speed Steel
4-FLUTE END MILLS

Single End – Center Cutting
 Long Length

LIST 658

Designed to machine high tensile steels and high temperature alloys. Right hand spiral-right hand cut.



LIST 658				
Size	Shank Diameter	Length of Cut	Overall Length	Part #
1/4	3/8	1-1/4	3-1/16	23157
5/16	3/8	1-3/8	3-1/8	23158
3/8	3/8	1-1/2	3-1/4	23139
7/16	1/2	1-1/4	3-1/4	23159
1/2	1/2	2	4	23146
5/8	5/8	2-1/2	4-5/8	23147
3/4	3/4	3	5-1/4	23148
1	1	4	6-1/2	23156
1-1/4	1-1/4	4	6-1/2	23987

Premium Cobalt High Speed Steel

MULTIPLE FLUTE END MILLS

Single End – Center Cutting
Extra Long Length

LIST 659

Designed to machine high tensile steels and high temperature alloys. Right hand spiral-right hand cut.



LIST 659											
Size	Shank Diameter	Length of Cut	Overall Length	Number of Flutes	Part #	Size	Shank Diameter	Length of Cut	Overall Length	Number of Flutes	Part #
1/4	3/8	1-3/4	3-9/16	4	23178	5/8	5/8	4	6-1/8	4	23168
5/16	3/8	2	3-3/4	4	23179	3/4	3/4	4	6-1/4	4	23169
3/8	3/8	2-1/2	4-1/4	4	23166	1	1	6	8-1/2	6	23177
1/2	1/2	3	5	4	23167						

Premium Cobalt High Speed Steel

MULTIPLE FLUTE BALL END MILLS

Single End – Center Cutting
Regular Length

LIST 661

Designed to machine high tensile steels and high temperature alloys. Right hand spiral-right hand cut.



LIST 661											
Size	Shank Diameter	Length of Cut	Overall Length	Number of Flutes	Part #	Size	Shank Diameter	Length of Cut	Overall Length	Number of Flutes	Part #
1/8	3/8	3/8	2-5/16	4	23400	1/2	1/2	1-1/4	3-1/4	4	23227
3/16	3/8	1/2	2-3/8	4	23402	5/8	5/8	1-5/8	3-3/4	4	23228
1/4	3/8	5/8	2-7/16	4	23218	3/4	3/4	1-5/8	3-7/8	4	23229
5/16	3/8	3/4	2-1/2	4	23219	1	1	2	4-1/2	4	23237
3/8	3/8	3/4	2-1/2	4	23226	1-1/4	1-1/4	2	4-1/2	6	23939

MULTIPLE FLUTE ROUGHING END MILLS

LIST 700

Single End – Non-Center Cutting
Coarse Pitch

Designed for fast removal of material. Horsepower requirements are reduced as a result of free cutting action.



LIST 700											
Size	Shank Diameter	Length of Cut	Overall Length	Number of Flutes	Part #	Size	Shank Diameter	Length of Cut	Overall Length	Number of Flutes	Part #
3/8	3/8	3/4	2-1/2	4	38000	1-1/8	1	2	4-1/2	6	38014
7/16	1/2	7/8	3	4	38001	1-1/4	1-1/4	2	4-1/2	6	38015
1/2	1/2	1-1/4	3-1/4	4	38002	1-1/4	1-1/4	3	5-1/2	6	38016
1/2	1/2	2	4	4	38003	1-1/4	1-1/4	4	6-1/2	6	38017
5/8	5/8	1-5/8	3-3/4	4	38004	1-1/4	1-1/4	6	8-1/2	6	38018
5/8	5/8	2-1/2	4-5/8	4	38005	1-1/2	1-1/4	2	4-1/2	6	38019
3/4	3/4	1-5/8	3-7/8	4	38006	1-1/2	1-1/4	4	6-1/2	6	38020
3/4	3/4	3	5-1/4	4	38007	1-1/2	1-1/4	6	8-1/2	6	38021
7/8	3/4	1-3/4	3-7/8	5	38008	1-3/4	1-1/4	4	6-1/2	6	38022
7/8	3/4	3-1/2	5-5/8	5	38009	2	1-1/4	2	4-1/2	8	38023
1	1	2	4-1/2	5	38010	2	1-1/4	4	6-1/2	8	38024
1	1	3	5-1/2	5	38011	2	2	4	7-3/4	8	38025
1	1	4	6-1/2	5	38012	2	2	6	9-3/4	8	38026
1	1	6	8-1/2	5	38013						

3-FLUTE HIGH HELIX ROUGHING END MILLSSingle End – Center Cutting
Coarse Pitch for Aluminum**LIST 710**

Roughing end mills designed for fast removal of material. Horsepower requirements are reduced as a result of free cutting action.



LIST 710									
Size	Shank Diameter	Length of Cut	Overall Length	Part #	Size	Shank Diameter	Length of Cut	Overall Length	Part #
3/8	3/8	3/4	2-1/2	38060	1	3/4	2	4-1/4	38094
3/8	3/8	1-5/8	3-3/16	38062	1	3/4	3	5-1/4	38095
7/16	3/8	1	2-11/16	38064	1	3/4	4	6-1/4	38096
1/2	1/2	1	3	38066	1	1	1-1/8	3-5/8	38097
1/2	1/2	1-1/4	3-1/4	38068	1	1	1-5/8	4-1/8	38098
1/2	1/2	1-5/8	3-5/8	38069	1	1	2	4-1/2	38099
1/2	1/2	2	4	38070	1	1	3	5-1/2	38100
1/2	1/2	2-1/2	4-1/2	38071	1	1	6	8-1/2	38120
1/2	1/2	3	5	38072	1-1/8	3/4	1-1/8	3-3/8	38121
9/16	1/2	1-3/8	3-3/8	38073	1-1/8	3/4	2	4-1/4	38122
5/8	5/8	3/4	2-7/8	38074	1-1/4	3/4	2	4-1/4	38123
5/8	5/8	1-1/4	3-3/8	38075	1-1/4	1-1/4	2	4-1/2	38124
5/8	5/8	1-5/8	3-3/4	38076	1-1/4	1-1/4	3	5-1/2	38125
5/8	5/8	2-1/8	4-1/4	38077	1-1/4	1-1/4	4	6-1/2	38126
5/8	5/8	2-1/2	4-5/8	38078	1-1/4	1-1/4	6	8-1/2	38127
5/8	5/8	3-1/8	5-1/4	38079	1-3/8	3/4	1-1/8	3-3/8	38128
3/4	5/8	1-5/8	3-3/4	38080	1-1/2	3/4	1-1/2	3-3/4	38129
3/4	3/4	3/4	3	38081	1-1/2	3/4	2	4-1/4	38130
3/4	3/4	1-1/4	3-1/2	38082	1-1/2	1-1/4	2	4-1/2	38131
3/4	3/4	1-5/8	3-3/4	38083	1-1/2	1-1/4	3	5-1/2	38132
3/4	3/4	2-1/2	3-1/2	38084	1-1/2	1-1/4	4	6-1/2	38133
3/4	3/4	3	5-1/4	38085	1-3/4	1-1/4	2	4-1/2	38134
3/4	3/4	4-1/8	6-3/8	38086	2	3/4	1-1/8	3-1/2	38135
7/8	3/4	1-1/8	3-3/8	38087	2	3/4	2	4-1/2	38136
7/8	3/4	1-7/8	4-1/8	38088	2	1-1/4	2	4-1/2	38137
7/8	3/4	3-1/2	5-5/8	38089	2	1-1/4	4	6-1/2	38138
7/8	7/8	3-1/2	5-3/4	38090	2	1-1/4	6-1/8	8-5/8	38139
7/8	7/8	1-7/8	4-1/8	38091	2	2	3	6-3/4	38140
1	3/4	1-1/8	3-3/8	38092	2	2	4	7-3/4	38141
1	3/4	1-1/2	3-3/4	38093					

MULTIPLE FLUTE ROUGHING END MILLS

LIST 720

Single End – Non-Center Cutting
Coarse Pitch and Fine Pitch

Designed for fast removal of material. Horsepower requirements are reduced as a result of free cutting action.



LIST 720						
Size	Shank Diameter	Length of Cut	Overall Length	Number of Flutes	Coarse Pitch Part #	Fine Pitch Part #
3/8	3/8	3/4	2-1/2	4	38144	38180
1/2	1/2	1-1/4	3-1/4	4	38145	38181
1/2	1/2	2	4	4	38146	38182
9/16	1/2	1-3/8	3-3/8	4	38147	38183
5/8	5/8	1-5/8	3-3/4	4	38148	38184
5/8	5/8	2-1/2	4-5/8	4	38149	38185
3/4	3/4	1-5/8	3-7/8	4	38150	38186
3/4	3/4	3	5-1/4	4	38151	38187
7/8	3/4	1-3/4	3-7/8	5	38152	38188
7/8	3/4	3-1/2	5-5/8	5	38153	38189
1	1	2	4-1/2	5	38154	38190
1	1	3	5-1/2	5	38155	38191
1	1	4	6-1/2	5	38156	38192
1	1	6	8-1/2	5	38157	38193
1-1/8	1	2	4-1/2	6	38158	38194
1-1/4	1-1/4	2	4-1/2	6	38159	38195
1-1/4	1-1/4	3	5-1/2	6	38160	38196
1-1/4	1-1/4	4	6-1/2	6	38161	38197
1-1/4	1-1/4	6	8-1/2	6	38162	38198
1-1/2	1-1/4	2	4-1/2	6	38163	38199
1-1/2	1-1/4	4	6-1/2	6	38164	38200
1-1/2	1-1/4	6	8-1/2	6	38165	38201
1-3/4	1-1/4	4	6-1/2	6	38166	38202
2	1-1/4	2	4-1/2	8	38167	38203
2	1-1/4	4	6-1/2	8	38168	38204
2	2	4	7-3/4	8	38169	38205
2	2	6	9-3/4	8	38170	38206

MULTIPLE FLUTE ROUGHING END MILLSSingle End – Center Cutting
Coarse Pitch**LIST 740**

Designed for fast removal of material. Horsepower requirements are reduced as a result of free cutting action.



LIST 740											
Size	Shank Diameter	Length of Cut	Overall Length	Number of Flutes	Part #	Size	Shank Diameter	Length of Cut	Overall Length	Number of Flutes	Part #
1/2	1/2	1-1/4	3-1/4	4	38400	1	1	3	5-1/2	5	38432
1/2	1/2	1-5/8	3-5/8	4	38401	1	1	4	6-1/2	5	38433
1/2	1/2	2	4	4	38402	1	1	6	8-1/2	5	38434
1/2	1/2	2-1/2	4-1/2	4	38403	1-1/8	3/4	2	4-1/4	6	38435
1/2	1/2	3	5	4	38405	1-1/8	1	2	4-1/2	6	38436
5/8	5/8	3/4	2-7/8	4	38406	1-1/8	1	3-1/2	6	6	38437
5/8	5/8	1-1/4	3-3/8	4	38407	1-1/4	3/4	1-1/8	3-3/8	6	38438
5/8	5/8	1-5/8	3-3/4	4	38408	1-1/4	3/4	2	4-1/4	6	38439
5/8	5/8	2-1/8	4-1/4	4	38409	1-1/4	1-1/4	3	5-1/2	6	38440
5/8	5/8	2-1/2	4-5/8	4	38410	1-1/4	1-1/4	4	6-1/2	6	38441
5/8	5/8	3-1/8	5-1/4	4	38411	1-1/4	1-1/4	6	8-1/2	6	38442
11/16	5/8	1-5/8	3-3/4	4	38412	1-3/8	3/4	2	4-1/4	6	38443
3/4	5/8	1-5/8	3-3/4	4	38413	1-1/2	3/4	1-1/8	3-3/8	6	38444
3/4	3/4	1-1/4	3-1/2	4	38414	1-1/2	3/4	2	4-1/4	6	38445
3/4	3/4	1-5/8	3-7/8	4	38415	1-1/2	1-1/4	2	4-1/2	6	38446
3/4	3/4	2-1/2	4-5/8	4	38416	1-1/2	1-1/4	3	5-1/2	6	38447
3/4	3/4	3	5-1/4	4	38417	1-1/2	1-1/4	4	6-1/2	6	38448
3/4	3/4	4-1/8	6-3/8	4	38418	1-1/2	1-1/4	6	8-1/2	6	38449
13/16	3/4	1-7/8	4-1/8	5	38419	1-3/4	3/4	1-1/8	3-3/8	6	38450
7/8	3/4	1-1/8	3-3/8	5	38420	1-3/4	3/4	2	4-1/4	6	38451
7/8	3/4	1-7/8	4-1/8	5	38421	1-3/4	1-1/4	4	6-1/2	6	38452
7/8	3/4	3-1/2	5-5/8	5	38422	2	3/4	1-1/8	3-3/8	8	38453
7/8	7/8	1-1/8	3-3/8	5	38423	2	3/4	2	4-1/2	8	38454
1	3/4	1-1/8	3-3/8	5	38424	2	1-1/4	2	4-1/2	8	38455
1	3/4	1-1/2	3-3/8	5	38425	2	1-1/4	4	6-1/2	8	38456
1	3/4	2	4-1/4	5	38426	2	1-1/4	6-1/8	8-5/8	8	38457
1	3/4	3	5-1/4	5	38427	2	2	2	5-3/4	8	38458
1	3/4	4	6-1/4	5	38428	2	2	3	6-3/4	8	38459
1	1	1-1/8	3-5/8	5	38429	2	2	4	7-3/4	8	38460
1	1	1-5/8	4-1/8	5	38430	2	2	6	9-3/4	8	38461
1	1	2	4-1/2	5	38431	2	2	8	11-3/4	8	38462

MAXX-V™ 4-FLUTE END MILLS

LIST 750

Single End – Center Cutting
Regular Length

High performance particle metal for machining harder and more abrasive materials such as titanium, inconel, hastaloy, and waspaloy. Resists fracturing in high shock conditions.



LIST 750											
Size	Shank Diameter	Length of Cut	Overall Length	Number of Flutes	Part #	Size	Shank Diameter	Length of Cut	Overall Length	Number of Flutes	Part #
1/8	3/8	3/8	2-5/16	4	38207	7/16	3/8	1	2-11/16	4	38212
3/16	3/8	1/2	2-3/8	4	38208	1/2	1/2	1-1/4	3-1/4	4	38213
1/4	3/8	5/8	2-7/16	4	38209	5/8	5/8	1-5/8	3-3/4	4	38214
5/16	3/8	3/4	2-1/2	4	38210	3/4	3/4	1-5/8	3-7/8	4	38215
3/8	3/8	3/4	2-1/2	4	38211	1	1	2	4-1/2	4	38216

MAXX-V™ 4-FLUTE END MILLS

LIST 770

Single End – Center Cutting
Long Length

High performance particle metal for machining harder and more abrasive materials such as titanium, inconel, hastaloy, and waspaloy. Resists fracturing in high shock conditions.



LIST 770											
Size	Shank Diameter	Length of Cut	Overall Length	Number of Flutes	Part #	Size	Shank Diameter	Length of Cut	Overall Length	Number of Flutes	Part #
1/4	3/8	1-1/4	3-1/16	4	38220	5/8	5/8	2-1/2	4-5/8	4	38223
3/8	3/8	1-1/2	3-1/4	4	38221	3/4	3/4	3	5-1/4	4	38224
1/2	1/2	2	4	4	38222	1	1	4	6-1/2	4	38225

RECOMMENDED CUTTING FEEDS & SPEEDS

Material	Speed (SFM)	Feed Rate per Tooth (IPT) by Diameter				
		1/8"	1/4"	3/8"	1/2"	3/4"
Cast Iron-Gray	40-70	0.0002	0.0005	0.001	0.001	0.002
Cast Iron-Ductile	50-90	0.0002	0.0005	0.001	0.001	0.002
Cast Iron-Malleable	70-120	0.0002	0.0005	0.001	0.001	0.002
Low Carbon Steels ≤38Rc	80-140	0.0002	0.0005	0.001	0.001	0.002
Medium Carbon Steels ≤38Rc	70-90	0.0002	0.0005	0.001	0.001	0.001
Tool & Die Steels ≤38Rc	40-60	0.0002	0.0002	0.0005	0.001	0.001
Tool Steels 39Rc-48Rc	20-40	0.0002	0.0002	0.0005	0.0005	0.001
Mild Stainless Steel	40-80	0.0002	0.0002	0.0005	0.0005	0.001
Medium Stainless Steel	35-70	0.0002	0.0002	0.0005	0.0005	0.001
Tough Stainless Steel	25-40	0.0002	0.0002	0.0002	0.0005	0.001
Titanium Alloys	20-40	0.0002	0.0002	0.0002	0.0005	0.001
High Temp Alloys-Inconel, Haynes, Hastalloy	5-20	0.0002	0.0002	0.0002	0.0005	0.0005
Hard Brass and Bronze	100-200	0.0002	0.0002	0.001	0.001	0.001
Soft Brass	250-300	0.0002	0.0005	0.0005	0.0005	0.001
Aluminum Wrought	200-400	0.0002	0.0005	0.0005	0.0005	0.001
Aluminum Cast	100-200	0.0002	0.0005	0.0005	0.0005	0.001
Copper	150-250	0.0002	0.0002	0.001	0.001	0.001
Material	Speed (SFM)	1"	1 1/4"	1 1/2"	1 3/4"	2"
Cast Iron-Gray	40-70	0.002	0.002	0.003	0.003	0.003
Cast Iron-Ductile	50-90	0.002	0.002	0.003	0.003	0.003
Cast Iron-Malleable	70-120	0.002	0.002	0.003	0.003	0.003
Low Carbon Steels ≤38Rc	80-140	0.002	0.002	0.003	0.003	0.003
Medium Carbon Steels ≤38Rc	70-90	0.002	0.002	0.003	0.003	0.003
Tool & Die Steels ≤38Rc	40-60	0.002	0.002	0.003	0.003	0.003
Tool Steels 39Rc-48Rc	20-40	0.002	0.002	0.003	0.003	0.003
Mild Stainless Steel	40-80	0.002	0.002	0.003	0.003	0.003
Medium Stainless Steel	35-70	0.002	0.002	0.003	0.003	0.003
Tough Stainless Steel	25-40	0.001	0.0015	0.002	0.002	0.003
Titanium Alloys	20-40	0.001	0.0015	0.002	0.002	0.003
High Temp Alloys-Inconel, Haynes, Hastalloy	5-20	0.001	0.0015	0.002	0.002	0.002
Hard Brass and Bronze	100-200	0.002	0.003	0.003	0.003	0.003
Soft Brass	250-300	0.002	0.002	0.003	0.003	0.003
Aluminum Wrought	200-400	0.002	0.002	0.003	0.003	0.003
Aluminum Cast	100-200	0.002	0.002	0.003	0.003	0.003
Copper	150-250	0.002	0.003	0.003	0.003	0.003

Note: Where only one "IPT" value is shown in the above chart, that value is the minimum starting point. It can be increased until maximum cutting speed is obtained. See following page for criteria.

MACHINING FORMULAS

The data chart shown on the previous page is intended to be a guideline which suggests a starting point. A few considerations for increasing or decreasing speeds shown are material condition, rigidity of fixture/work holding device, machine condition, and amount of material being removed. Coated tools may contribute 25% to 40% increases in SFM.

Symbols

D = Diameter of End Mill

RPM = Revolutions per Minute

SFM = Surface Feet per Minute

IPT = Inches per Tooth

IPM = Inches per Minute

Formula

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

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

IPM = $\text{RPM} \times \# \text{TEETH} \times \text{IPT}$

IPT = $\text{IPM} / (\# \text{TEETH} \times \text{RPM})$

Use Higher Feed Rates For:

Heavy roughing cuts

Easy to machine materials

Low tensile strength materials

Coarse tooth cutters

Rigid set-ups

Abrasive materials

Use Lower Feed Rates For:

Hard to machine materials

Small cutters

High tensile strength materials

Fine tooth cutters

Deep cuts

Less than rigid set-ups



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