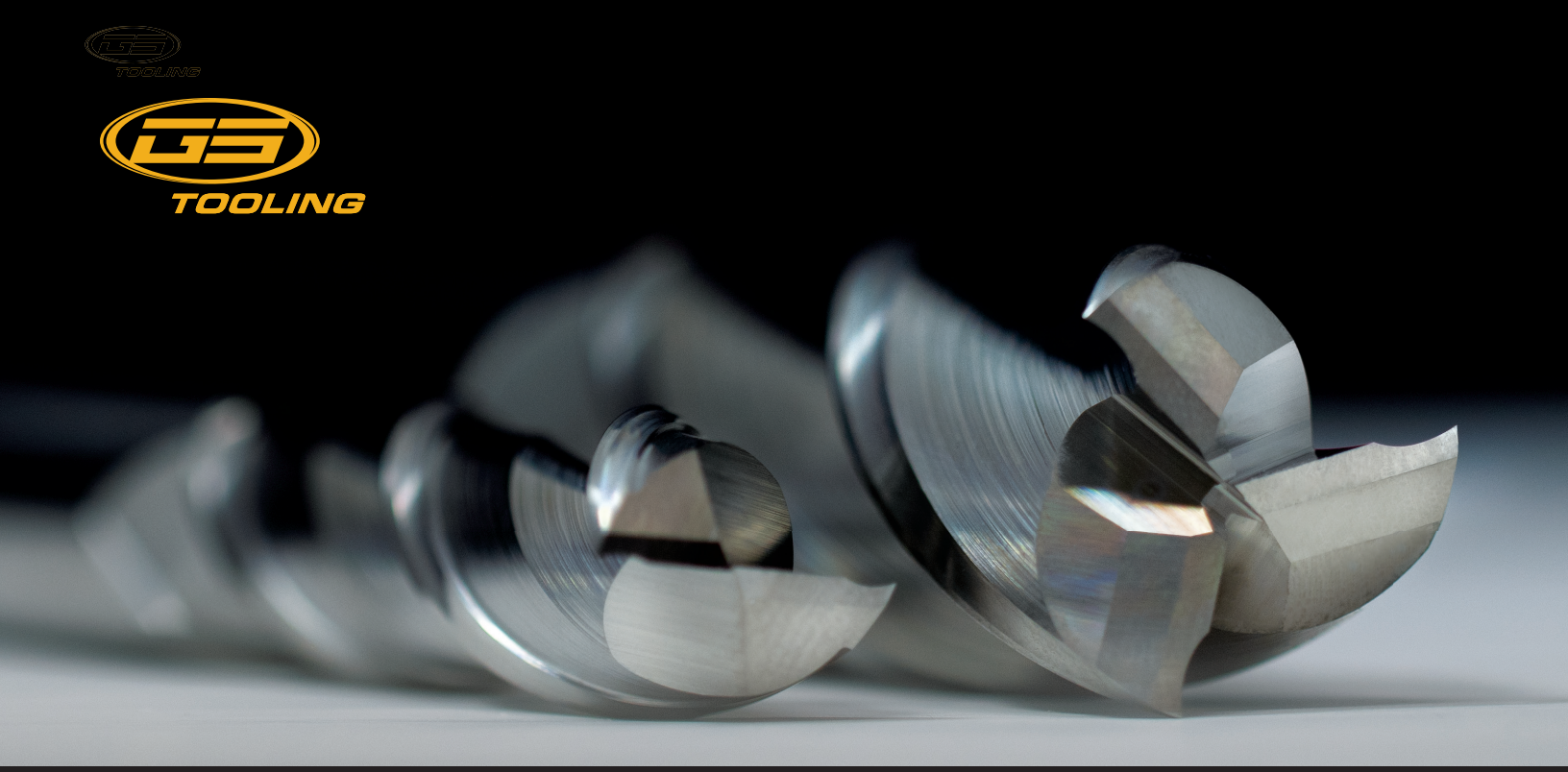
Solid Carbide End Mills

G3 TOOLING

Uncoated & TiCN for Aluminum 6

Uncoated, TiAlN Coated, AlTiN Coated . . 7-15



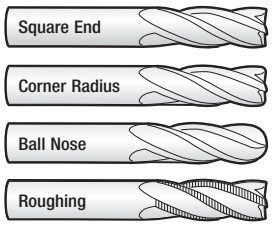
Solid Carbide End Mills

Compare our End Mills with other brands... the biggest difference you'll find is unrivaled value for your money!

At Sowa Tool, we strive to make our customers' experience easy and enjoyable and take great pride in our reputation as a trusted and reliable brand. By combining our 6-plus decades of industry expertise with our agility and size to provide tailored and one-stop-shop solutions, we help our customers reach their goals. Our long-term customers have come to know us for our dedication to quality and customer satisfaction.

Our GS Tooling branded products are guaranteed to meet the most stringent industry benchmarks. The performance of GS Tooling end mills, at such a reasonable cost, is without a doubt one of the best deals available on the marketplace today.

TYPES:



LENGTHS:

FINISHES:

FLUTES:

	GS TOOLING	OTHER BRANDS
Quality Material:		
Solid Sub-Micron Micrograin Carbide	✔	✔
Superior Tolerance:		
Ground to a Tolerance of h6	✔	✔
Variety of Finishes:		
Uncoated for Aluminum	✔	✔
Titanium Carbonitride (TiCN) for Aluminum	✔	✔
Uncoated	✔	✔
Titanium Aluminum Nitride (TiAlN)	✔	✔
Aluminum Titanium Nitride (AlTiN)	✔	✔
2 to 8-Flutes:		
Available in 2, 3, 4, 5, 6 & 8-Flutes	✔	✔
Most Common Types:		
Available in Square End, Ball Nose, Corner Radius & Roughing	✔	✔
Other:		
Stock available in USA & Canada	✔	✔
Decades of performance	✔	✔
UNRIVALED VALUE FOR YOUR MONEY	✔	✘

Depend on us to tool your world and deliver
the competitive edge your business needs to stay ahead!

GS TOOLING

Superior performance tooling solutions when speed and accuracy matter most.

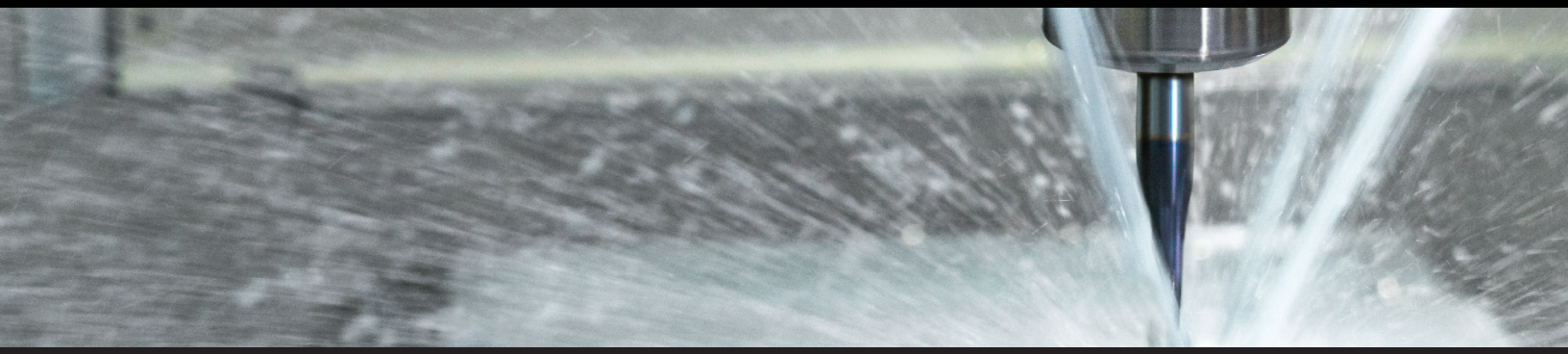
GS Tooling is an industry leader in precision tooling where high-performance and stringent quality standards are essential. Tool your World with GS Tooling End Mill Holders, Collet Chucks & Collets, Retention Knobs, Vises & Workholding, Live Centers, Angle Heads, Carbide End Mills and more!

Tool Holding

Angle Heads & Driven Tooling

Cutting Tools

Vises & Workholding



End Mill Coatings

Sub-Micron Micrograin Carbide for Aluminum — Uncoated & TiCN

FOR ALUMINUM AND DIE CAST ALUMINUM

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

Designed specially for milling aluminum and all non-ferrous materials, the unique geometry of these end mills permits much higher speed and feed rates without loading. Spindle and feed rates can be increased by fifty percent for greater productivity with excellent surface finishes. Two and three flutes available in Uncoated and TiCN coated options.

TiCN Applications: Excellent for milling aluminum, cast irons, high silicon aluminum alloys, copper, and all abrasive materials. Because of the relatively low oxidation temperature of TiCN, coolant must be applied correctly to control the temperature at the cutting edge. Failure to do so can lead to premature wear of the coated surface.

Titanium Carbonitride (TiCN) coating offers high surface lubricity, reduces friction, and increases chip flow. The resistance in heat and hardness allows the tool to run at 20-30% higher machining speeds than uncoated end mills. Titanium Carbonitride (TiCN) is harder than Titanium Nitride (TiN) at low cutting temperatures.

Hardness (Vickers):	3,000 (87 Rc)
Oxidation Temperature:	400ºC (750ºF)
Friction Coefficient:	0.45
Thickness:	2-4 microns
Surface Roughness (R_aµm):	0.17

Sub-Micron Micrograin Carbide Uncoated

FOR GENERAL DUCTILE MATERIALS

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

Made of premium, highly optimized and structurally tough micrograin carbide, GS Tooling uncoated end mills can be run at higher speeds than high speed steel (HSS) or cobalt, making them a perfect general purpose cutter for general ductile materials.

CUTTING SPEED (SFM)

	90	100	150	200	250	300	350	400	500	600
Low Carbon										
Medium Carbon										
Aluminum										
Brass/Bronze										
Copper										
Cast Iron										

HARDNESS (HRC)

	0	5	10	15	20	25	30	35	40
Low Carbon					up to 25				
Medium Carbon					up to 25				
Aluminum									
Brass/Bronze									
Copper									
Cast Iron			up to 15						

Sub-Micron Micrograin Carbide TiAlN Coated

FOR TOUGH MATERIALS

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

Applications: Excellent in milling of high strength steels, hard die steels, and high temperature alloys, including nickel base and titanium (chip classes 120 & 140) where high heat is generated and chipping is a problem.

Titanium Aluminum Nitride (TiAlN) forms a hard aluminum oxide layer in high heat (> 800ºC), and dry machining applications. This further reflects the heat back into the chip and away from the tool and workpiece. Greater ductility makes it a good choice for interrupted cuts. Increased production levels at higher feeds and speeds and longer tool life in high heat applications are the primary benefits.

Hardness (Vickers): 2,800 (85 Rc)
Oxidation Temperature: 800ºC (1,450ºF)
Friction Coefficient: 0.70
Thickness: 2-4 microns
Surface Roughness (R_aµm): 0.40

CUTTING SPEED (SFM)

	100	150	200	250	300	350	400	450	500
Stainless Steel									
Tool Steels									
Medium Carbon									
Alloyed High Carbon									
High Strength									
Titanium									

HARDNESS (HRC)

	0	5	10	15	20	25	30	35	40
Stainless Steel						up to 29			
Tool Steels							up to 35		
Medium Carbon						up to 28			
Alloyed High Carbon							up to 32		
High Strength							up to 32		
Titanium							up to 32		

Sub-Micron Micrograin Carbide Modified AlTiN

FOR HIGH TENSILE MATERIALS

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/Hardened	<45	150-225
Titanium	6 AL 4	Annealed/Hardened	<42	175-275

Applications: Excellent in dry milling of chip classes 20, 40, and 60. Because of the high hardness of the coating however, very hard steels may cause chipping of the cutting edge (first consider TiAlN). Can be used for wet milling of titanium alloys, high temperature alloys, and other abrasive and difficult to machine materials when chipping is not a problem.

Aluminum Titanium Nitride (AlTiN) is a harder, smoother variation of TiAlN. Created for abrasive and high temperature applications (> 800ºC), AlTiN creates an aluminum oxide layer during the cutting process.

Hardness (Vickers): 4,500 (90 Rc)
Oxidation Temperature: 800ºC (1,450ºF)
Friction Coefficient: 0.45
Thickness: 2-4 microns
Surface Roughness (Raµm): 0.15

CUTTING SPEED (SFM)

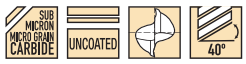
	25	50	75	100	125	150	175	200	225	250	275	300
Stainless Steel												
Tool Steels												
High Strength												
Nickel Alloys												
Titanium												

HARDNESS (HRC)

	0	5	10	15	20	25	30	35	40	45	50	55	60	65
Stainless Steel									up to 45					
Tool Steels												up to 60		
High Strength												up to 60		
Nickel Alloys									up to 45					
Titanium								up to 42						

2-Flute Square End, 40° Helix End Mills For Aluminum

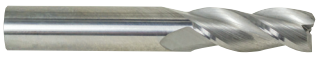
Designed specifically for milling aluminum and all non-ferrous materials, the 40º helix permits much higher speed and feed rates without chip loading. Spindle and feed rates can be increased by fifty percent for greater productivity while maintaining excellent part surface finish.



Speeds & Feeds: Page 2. *Link in header.*

Cutting Dia. (in.)	Shank Dia. (in.)	Flute Length (in.)	Overall Length (in.)	Uncoated Code No.	Price $
1/4	1/4	3/4	2-1/2	101020	**20.39**
1/4	1/4	1-1/2	4	101022	**36.82**
5/16	5/16	13/16	2-1/2	101024	**43.04**
5/16	5/16	1-5/8	4	101026	**48.02**
3/8	3/8	1	2-1/2	101028	**35.60**
3/8	3/8	1-3/4	4	101030	**53.20**
1/2	1/2	1	3	101032	**57.03**
1/2	1/2	2	4	101034	**77.84**
5/8	5/8	1-1/4	3-1/2	101036	**109.99**
5/8	5/8	2-1/4	5	101038	**160.45**
3/4	3/4	1-1/2	4	101040	**161.27**
3/4	3/4	2-1/4	5	101042	**255.60**
1	1	2-1/4	5	101044	**241.21**
1	1	3	6	101046	**434.55**
Metric					
6	6	19	63	101390	**21.39**
6	6	38	102	101391	**38.77**
8	8	21	63	101392	**30.02**
10	10	25	70	101394	**43.35**
10	10	51	102	101395	**67.79**
12	12	51	102	101397	**82.51**
16	16	32	89	101398	**115.48**
16	16	57	127	101399	**160.45**
20	20	38	102	101400	**215.29**
20	20	57	127	101401	**269.26**
25	25	57	127	101402	**250.11**
25	25	76	152	101403	**414.92**

3-Flute Square End, 40° Helix End Mills For Aluminum



Designed specifically for milling aluminum and all non-ferrous materials, the 40º helix permits much higher speed and feed rates without chip loading. Their 3-flute design is excellent for slotting and profiling applications where faster chip evacuation is required when machining at higher speeds. Titanium Carbonitride (TiCN) coating offers high surface lubricity, reduces friction, and increases chip flow. The resistance in heat and hardness allows the tool to run at 20-30% higher machining speeds than uncoated end mills. Titanium Carbonitride (TiCN) is harder than Titanium Nitride (TiN) at low cutting temperatures.

Speeds & Feeds: Page 2. *Link in header.*

Cutting Dia. (in.)	Shank Dia. (in.)	Flute Length (in.)	Overall Length (in.)	Uncoated Code No.	Price $	TiCN Coated Code No.	Price $
1/32	1/8	3/32	1-1/2	153300	**14.34**	153350	**17.64**
3/64	1/8	1/8	1-1/2	153302	**14.34**	153352	**17.64**
1/16	1/8	3/16	1-1/2	153304	**14.34**	153354	**17.64**
3/32	1/8	3/8	1-1/2	153306	**14.34**	153356	**17.64**
1/8	1/8	1/2	1-1/2	153308	**14.34**	153358	**17.64**
9/64	3/16	9/16	2	153310	**16.90**	153360	**20.79**
5/32	3/16	9/16	2	153312	**16.90**	153362	**20.79**
11/64	3/16	9/16	2	153314	**16.90**	153364	**20.79**
3/16	3/16	5/8	2	153316	**16.90**	153366	**20.79**
13/64	1/4	5/8	2-1/2	153318	**20.39**	153368	**25.08**
7/32	1/4	5/8	2-1/2	153320	**20.39**	153370	**25.08**
15/64	1/4	3/4	2-1/2	153322	**20.39**	153372	**25.08**
1/4	1/4	3/4	2-1/2	153324	**20.39**	153374	**25.08**
17/64	5/16	3/4	2-1/2	153326	**28.60**	153376	**35.17**
5/16	5/16	13/16	2-1/2	153328	**28.60**	153378	**35.17**
5/16	5/16	1-5/8	4	153330	**48.02**	153380	**59.07**
3/8	3/8	1	2-1/2	153332	**35.60**	153382	**43.79**
3/8	3/8	1-1/8	3	153334	**53.20**	153384	**65.43**
1/2	1/2	1	3	153336	**57.03**	153386	**70.15**
1/2	1/2	2	4	153338	**77.84**	153388	**95.75**
5/8	5/8	1-1/4	3-1/2	153340	**109.99**	153390	**135.28**
5/8	5/8	2-1/4	5	153342	**160.45**	153392	**197.36**
3/4	3/4	1-1/2	4	153344	**161.27**	153394	**198.36**

2-Flute Corner Radius, 35º End Mills For Aluminum

Designed specifically for milling aluminum and all non-ferrous materials, these end mills have a slightly less aggressive helix geometry at 35º but are supplied with the corner radius of your choice. This tool will break up a sharp corner with its radius formation, and the rounding helps distribute cutting forces more evenly across the corner, helping to prevent wear or chipping while prolonging functional tool life. Titanium Carbonitride (TiCN) coating offers high surface lubricity, reduces friction, and increases chip flow. The resistance in heat and hardness allows the tool to run at 20-30% higher machining speeds than uncoated end mills. Titanium Carbonitride (TiCN) is harder than Titanium Nitride (TiN) at low cutting temperatures.

Speeds & Feeds: Page 2. *Link in header.*

Cutting Dia. (in.)	Shank Dia. (in.)	Flute Length (in.)	Overall Length (in.)	Corner Radius	Uncoated Code No.	Price $	TiCN Coated Code No.	Price $
1/8	1/8	3/8	1-1/2	0.010	153208	**14.34**	153400	**17.64**
3/16	3/16	5/8	2	0.010	153210	**17.90**	153402	**22.02**
1/4	1/4	3/4	2-1/2	0.010	153212	**20.39**	153404	**25.08**
1/4	1/4	1-1/8	3	0.010	153228	**36.82**	153420	**45.29**
5/16	5/16	13/16	2-1/2	0.010	153214	**43.04**	153406	**52.94**
5/16	5/16	1-1/8	3	0.010	153230	**43.04**	153422	**52.94**
3/8	3/8	1	2-1/2	0.015	153216	**35.60**	153408	**43.79**
3/8	3/8	1-1/8	3	0.015	153232	**53.20**	153424	**65.43**
7/16	7/16	1	2-3/4	0.015	153218	**55.39**	153410	**68.13**
1/2	1/2	1	3	0.020	153220	**57.03**	153412	**70.15**
1/2	1/2	2	4	0.020	153234	**77.84**	153426	**95.75**
5/8	5/8	1-1/4	3-1/2	0.020	153222	**109.99**	153414	**135.28**
5/8	5/8	2-1/4	5	0.020	153236	**160.45**	153428	**197.36**
3/4	3/4	1-1/2	4	0.030	153224	**161.27**	153416	**198.36**
3/4	3/4	2-1/4	5	0.030	153238	**255.60**	153430	**314.39**
1	1	1-1/2	4	0.030	153226	**241.21**	153418	**296.69**
1	1	2-1/4	5	0.030	153240	**434.55**	153432	**534.50**

3-Flute Corner Radius, 35º End Mills For Aluminum

Designed specifically for milling aluminum and all non-ferrous materials, these end mills have a slightly less aggressive helix geometry at 35º but are supplied with the corner radius of your choice. This tool will break up a sharp corner with its radius formation, and the rounding helps distribute cutting forces more evenly across the corner, helping to prevent wear or chipping while prolonging functional tool life. Their 3-flute design is excellent for slotting and profiling applications where faster chip evacuation is required when machining at higher speeds. Titanium Carbonitride (TiCN) coating offers high surface lubricity, reduces friction, and increases chip flow. The resistance in heat and hardness allows the tool to run at 20-30% higher machining speeds than uncoated end mills. Titanium Carbonitride (TiCN) is harder than Titanium Nitride (TiN) at low cutting temperatures.

Speeds & Feeds: Page 2. *Link in header.*

Cutting Dia. (in.)	Shank Dia. (in.)	Flute Length (in.)	Overall Length (in.)	Corner Radius	Uncoated Code No.	Price $	TiCN Coated Code No.	Price $
1/8	1/8	3/8	1-1/2	0.005	153150	**14.34**	153044	**17.64**
3/16	3/16	5/8	2	0.005	153152	**16.90**	153046	**20.79**
1/4	1/4	3/4	2-1/2	0.005	153154	**20.39**	153048	**25.08**
1/4	1/4	1-1/8	3	0.005	153170	**34.90**	153434	**42.93**
5/16	5/16	13/16	2-1/2	0.005	153156	**28.60**	153050	**35.17**
5/16	5/16	1-1/8	3	0.005	153172	**48.02**	153436	**59.07**
3/8	3/8	1	2-1/2	0.005	153158	**35.60**	153052	**43.79**
3/8	3/8	1-1/8	3	0.005	153174	**53.20**	153438	**65.43**
7/16	7/16	1	2-3/4	0.005	153160	**43.46**	153054	**53.46**
1/2	1/2	1-1/4	3	0.005	153162	**57.03**	153056	**70.15**
1/2	1/2	1-1/2	4	0.005	153176	**77.84**	153440	**95.75**
1/2	1/2	2	4	0.005	153178	**77.84**	153442	**95.75**
5/8	5/8	1-5/8	3-1/2	0.005	153164	**109.99**	153058	**135.28**
5/8	5/8	2-1/4	5	0.005	153180	**160.45**	153444	**197.36**
3/4	3/4	1-5/8	4	0.005	153166	**161.27**	153060	**198.36**
3/4	3/4	2-1/4	5	0.005	153182	**255.60**	153446	**314.39**
1	1	1-1/2	4	0.005	153168	**241.21**	153062	**296.69**
1	1	2-1/4	5	0.005	153184	**434.55**	153448	**534.50**

2-Flute Square End Carbide End Mills

A general-purpose end mill where maximum chip clearance is required. All end mills are center cutting and can be used for plunging applications. Both TiAlN and AlTiN coatings are designed for difficult to machine materials. TiAlN coating reduces heat in cases where interrupted cuts may be encountered. AlTiN coating is better for dry machining applications, continuous cutting and for abrasive applications.

Speeds & Feeds: Uncoated - Page 2, TiAlN - Page 3, AlTiN - Page 4. *Link in header.*

Cutting Dia. (in.)	Shank Dia. (in.)	Flute Length (in.)	Overall Length (in.)	Uncoated Code No.	Price $	TiAlN Code No.	Price $	AlTiN Code No.	Price $
1/32	1/8	5/64	1-1/2	101220	**14.14**	102202	**17.54**	-	**-**
1/32	1/8	1/8	1-1/2	103770	**14.14**	102677	**17.54**	-	**-**
3/64	1/8	3/32	1-1/2	101221	**14.14**	102221	**17.54**	-	**-**
3/64	1/8	9/64	1-1/2	103772	**14.14**	102799	**17.54**	-	**-**
1/16	1/8	1/8	1-1/2	101222	**13.12**	102222	**16.54**	-	**-**
1/16	1/8	3/16	1-1/2	103848	**13.12**	102800	**16.54**	104602	**17.96**
5/64	1/8	1/8	1-1/2	101223	**13.12**	102223	**16.54**	-	**-**
5/64	1/8	1/4	1-1/2	103773	**13.12**	102801	**16.54**	-	**-**
3/32	1/8	3/16	1-1/2	101224	**12.41**	102224	**15.81**	-	**-**
3/32	1/8	5/16	1-1/2	103849	**12.41**	102802	**15.81**	104601	**17.15**
7/64	1/8	7/32	1-1/2	101225	**12.41**	102225	**15.81**	-	**-**
7/64	1/8	3/8	1-1/2	103775	**12.41**	102803	**15.81**	-	**-**
1/8	1/8	1/4	1-1/2	101226	**11.45**	102226	**14.85**	-	**-**
1/8	1/8	1/2	1-1/2	103850	**11.45**	102804	**14.85**	104600	**16.11**
1/8	1/8	3/4	2-1/4	102961	**16.80**	102902	**17.64**	104815	**18.52**
1/8	1/8	1	3	102400	**25.94**	102500	**30.09**	-	**-**
9/64	3/16	9/32	2	101227	**16.93**	102227	**20.33**	-	**-**
9/64	3/16	1/2	2	103776	**16.93**	102805	**20.33**	-	**-**
5/32	3/16	5/16	2	101228	**16.93**	102228	**20.33**	-	**-**
5/32	3/16	9/16	2	103851	**16.93**	102806	**20.33**	104603	**21.23**
11/64	3/16	9/16	2	103777	**16.93**	102807	**20.33**	-	**-**
3/16	3/16	3/8	2	101229	**16.07**	102229	**19.44**	-	**-**
3/16	3/16	5/8	2	103852	**16.07**	102808	**19.44**	104604	**20.31**
3/16	3/16	3/4	2-1/4	102962	**18.33**	102904	**19.30**	104816	**20.31**
3/16	3/16	1-1/8	3	102402	**28.61**	102502	**33.92**	-	**-**
13/64	1/4	5/8	2-1/2	103778	**21.27**	102809	**28.32**	-	**-**
7/32	1/4	7/16	2	101230	**18.19**	102203	**23.51**	-	**-**
7/32	1/4	5/8	2-1/2	103853	**21.27**	102811	**28.32**	104605	**29.74**
1/4	1/4	1/2	2	101231	**17.93**	102231	**23.25**	-	**-**
1/4	1/4	3/4	2-1/2	103854	**19.36**	102810	**26.39**	104608	**27.41**
1/4	1/4	1-1/8	3	102963	**33.13**	102906	**40.16**	104818	**45.99**
1/4	1/4	1-1/2	4	102404	**34.99**	102504	**43.20**	-	**-**
9/32	5/16	3/4	2-1/2	103855	**33.96**	102813	**44.48**	104607	**46.70**
5/16	5/16	1/2	2	101232	**24.54**	102204	**32.11**	-	**-**
5/16	5/16	13/16	2-1/2	103856	**27.16**	102812	**37.68**	104612	**39.07**
5/16	5/16	1-1/8	3	102964	**40.89**	102908	**51.41**	104820	**58.65**
5/16	5/16	1-5/8	4	102406	**45.66**	102506	**58.98**	-	**-**
11/32	3/8	7/8	2-1/2	103779	**40.22**	102815	**50.73**	-	**-**
3/8	3/8	5/8	2	101233	**30.31**	102233	**37.87**	-	**-**
3/8	3/8	1	2-1/2	103857	**33.84**	102814	**44.32**	104616	**46.11**
3/8	3/8	1-1/8	3	102965	**46.01**	102910	**56.54**	104822	**64.65**
3/8	3/8	1-3/4	4	102408	**50.51**	102508	**63.88**	-	**-**
13/32	7/16	1	2-3/4	103780	**48.10**	102817	**60.06**	-	**-**
7/16	7/16	5/8	2-1/2	101234	**37.48**	102206	**49.42**	-	**-**
7/16	7/16	1	2-3/4	103858	**41.27**	102816	**53.24**	104618	**55.44**
7/16	7/16	2	4	102966	**69.53**	102912	**84.99**	-	**-**
7/16	7/16	3	6	102410	**92.43**	102510	**114.18**	-	**-**
1/2	1/2	5/8	2-1/2	101235	**49.99**	102235	**61.93**	-	**-**
1/2	1/2	1	3	103859	**54.17**	102818	**66.13**	104620	**68.96**
1/2	1/2	2	4	102967	**73.96**	102914	**89.42**	104824	**93.32**
1/2	1/2	3	6	102412	**106.93**	102512	**128.67**	-	**-**
9/16	9/16	1-1/8	3-1/2	103886	**92.55**	102820	**109.81**	104622	**114.68**
5/8	5/8	3/4	3	101236	**95.54**	102207	**109.40**	-	**-**
5/8	5/8	1-1/4	3-1/2	103887	**104.48**	102822	**121.77**	104624	**127.25**
5/8	5/8	2-1/4	5	102968	**152.42**	102916	**178.08**	104826	**199.63**
5/8	5/8	3	6	102414	**152.42**	102514	**178.08**	-	**-**
11/16	3/4	1-3/8	4	103888	**173.99**	102824	**194.40**	104630	**204.12**
3/4	3/4	1	3	101237	**137.42**	102237	**154.00**	-	**-**
3/4	3/4	1-1/2	4	103889	**153.17**	102826	**173.57**	104628	**181.64**
3/4	3/4	2-1/4	5	102969	**220.02**	102918	**231.60**	104830	**243.79**
3/4	3/4	3	6	102416	**242.81**	102516	**272.51**	-	**-**
7/8	7/8	1-1/2	4	103890	**220.44**	102828	**250.56**	104631	**271.35**
1	1	1-1/2	4	103891	**229.17**	102830	**259.26**	104632	**271.35**
1	1	2-1/4	5	102970	**412.80**	102920	**345.07**	104831	**363.23**
1	1	3	6	102418	**412.80**	102518	**451.35**	-	**-**
6pc set: 1/4", 5/16", 3/8", 1/2", 5/8", 3/4"				103846	**372.57**	-	**-**	-	**-**
5pc set: 3/16", 1/4", 5/16", 3/8", 1/2"				-	**-**	102957	**184.26**	-	**-**

2-Flute Square End Carbide End Mills – Metric

A general-purpose end mill where maximum chip clearance is required. All end mills are center cutting and can be used for plunging applications. Both TiAlN and AlTiN coatings are designed for difficult to machine materials. TiAlN coating reduces heat in cases where interrupted cuts may be encountered. AlTiN coating is better for dry machining applications, continuous cutting and for abrasive applications.

Speeds & Feeds: Uncoated - Page 2, TiAlN - Page 3, AlTiN - Page 4. *Link in header.*

Cutting Dia. (in.)	Shank Dia. (in.)	Flute Length (in.)	Overall Length (in.)	Uncoated Code No.	Price $	TiAlN Code No.	Price $	AlTiN Code No.	Price $
Metric									
0.5	3	1.5	39	101552	**14.85**	102819	**18.28**	-	**-**
1	3	3	39	101553	**14.85**	102821	**18.25**	101780	**19.05**
1.5	3	5	39	101432	**14.85**	102823	**18.25**	101781	**19.05**
2	3	7	39	102696	**13.76**	102825	**17.16**	101782	**17.96**
2.5	3	7	39	102697	**13.02**	102827	**16.45**	-	**-**
2.5	3	8	39	-	**-**	-	**-**	101783	**16.11**
3	3	9	39	102698	**12.03**	102829	**15.45**	-	**-**
3	3	10	39	-	**-**	-	**-**	101784	**16.11**
3	3	19	57	101560	**16.07**	102921	**18.76**	-	**-**
3.5	4	12	51	102699	**17.80**	102853	**21.20**	101785	**30.24**
4	4	14	51	102700	**16.89**	102855	**20.29**	101786	**30.24**
4	4	19	57	101561	**16.89**	102923	**20.29**	-	**-**
4.5	5	14	51	102701	**20.66**	102857	**25.97**	101787	**29.61**
5	5	16	51	102702	**19.70**	102859	**26.72**	101788	**29.61**
5	5	25	64	101562	**30.12**	102925	**37.11**	-	**-**
6	6	19	64	102703	**20.33**	102861	**27.35**	101789	**28.38**
6	6	28	76	101563	**34.90**	102927	**41.88**	-	**-**
7	8	19	64	102704	**27.93**	102863	**38.42**	101790	**49.94**
8	8	21	64	102705	**28.51**	102865	**39.03**	101791	**40.50**
8	8	29	76	101564	**43.07**	102929	**53.55**	-	**-**
9	10	22	70	102706	**35.51**	102867	**46.02**	101792	**62.54**
10	10	22	70	102707	**41.17**	102869	**53.11**	-	**-**
10	10	25	70	-	**-**	-	**-**	101793	**55.29**
10	10	32	76	101565	**49.94**	102931	**61.89**	-	**-**
11	11	25	70	102708	**43.35**	102871	**55.29**	-	**-**
11	12	25	70	-	**-**	-	**-**	101794	**71.81**
12	12	25	76	102709	**56.90**	102873	**68.83**	101795	**71.81**
12	12	51	102	101566	**78.42**	102933	**93.87**	-	**-**
14	14	30	89	102711	**97.15**	102875	**114.43**	101796	**127.07**
14	14	57	127	101567	**140.37**	-	**-**	-	**-**
16	16	32	89	102712	**109.71**	102881	**127.00**	101797	**132.74**
16	16	57	127	101568	**152.42**	102937	**178.08**	-	**-**
18	18	35	102	102713	**160.86**	102883	**181.25**	101798	**199.86**
18	18	57	127	101569	**229.17**	102939	**229.17**	-	**-**
20	20	38	102	102714	**204.51**	102885	**234.65**	101799	**245.40**
20	20	57	127	101570	**255.79**	-	**-**	-	**-**
22	22	38	102	101451	**227.26**	102887	**257.37**	101800	**297.44**
25	25	38	102	102715	**237.61**	102889	**267.73**	101801	**280.24**
25	25	57	127	101571	**394.15**	-	**-**	-	**-**

2-Flute High Performance Mold Carbide End Mill

The Mold Mill offers excellent performance and tool life in mold milling applications on tougher materials. The AlTiN coating is designed for difficult to machine materials, and is better for dry machining applications, continuous cutting and for abrasive applications.

Speeds & Feeds: AlTiN - Page 4. *Link in header.*

Cutting Dia. (in.)	Shank Dia. (in.)	Flute Length (in.)	Overall Length (in.)	AlTiN Code No.	Price $
1/8	1/8	5/16	2-3/8	104034	**38.94**
3/16	3/16	3/8	3-1/8	104036	**38.94**
1/4	1/4	1/2	3-1/2	104038	**60.14**
5/16	5/16	15/32	4	104040	**81.11**
3/8	3/8	3/4	4	104042	**86.82**
1/2	1/2	7/8	4-1/4	104044	**113.04**
5/8	5/8	15/16	6	104046	**213.66**
3/4	3/4	1-1/8	6	104048	**329.36**
1	1	1-1/2	6	104050	**473.13**

2-Flute High Performance Spherical Ball End Carbide End Mill

High performance ball nose end mills are used in the mold industry and have a full 220° arc cutting capability. AlTiN coating is designed for difficult to machine materials, and is better for dry machining applications, continuous cutting and for abrasive applications.

Speeds & Feeds: AlTiN - Page 7. *Link in header.*

Cutting Dia. (in.)	Shank Dia. (in.)	Flute Length (in.)	Overall Length (in.)	AlTiN Code No.	Price $
1/8	1/8	3/32	1-1/2	153110	**36.90**
1/8	1/8	3/32	3	153120	**41.78**
3/16	3/16	9/64	2	153112	**37.29**
3/16	3/16	9/64	3	153122	**42.44**
1/4	1/4	3/16	2-1/2	153114	**54.27**
1/4	1/4	3/16	4	153124	**73.67**
3/8	3/8	9/32	2-1/2	153116	**76.37**
3/8	3/8	9/32	4	153126	**86.02**
1/2	1/2	3/8	3	153118	**113.02**
1/2	1/2	3/8	6	153128	**161.11**

2-Flute Ball Nose Carbide End Mills

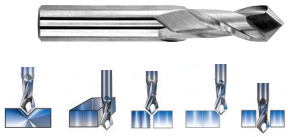
A general-purpose end mill where maximum chip clearance is required. All end mills are center cutting and can be used for plunging applications. Ball end mills have a helical gash on ball end for reduced cutting force and better chip evacuation. Both TiAlN and AlTiN coatings are designed for difficult to machine materials. TiAlN coating reduces heat in cases where interrupted cuts may be encountered. AlTiN coating is better for dry machining applications, continuous cutting and for abrasive applications.

Speeds & Feeds: Uncoated - Page 5, TiAlN - Page 6, AlTiN - Page 7. *Link in header.*

Cutting Dia. (in.)	Shank Dia. (in.)	Flute Length (in.)	Overall Length (in.)	Uncoated Code No.	Price $	TiAlN Code No.	Price $	AlTiN Code No.	Price $
1/32	1/8	5/64	1-1/2	101240	**17.93**	102197	**21.36**	-	**-**
3/64	1/8	3/32	1-1/2	101241	**17.93**	102198	**21.36**	-	**-**
1/16	1/8	1/8	1-1/2	101242	**13.22**	102199	**16.61**	-	**-**
1/16	1/8	3/16	1-1/2	-	**-**	-	**-**	104649	**20.36**
5/64	1/8	5/32	1-1/2	101243	**13.91**	102201	**17.31**	-	**-**
3/32	1/8	3/16	1-1/2	101244	**12.48**	102239	**15.88**	-	**-**
3/32	1/8	5/16	1-1/2	-	**-**	-	**-**	104651	**19.62**
7/64	1/8	7/32	1-1/2	101245	**13.12**	102241	**16.54**	-	**-**
1/8	1/8	1/4	1-1/2	101246	**12.16**	102243	**15.56**	-	**-**
1/8	1/8	1/2	1-1/2	103872	**14.69**	102862	**18.09**	104650	**19.00**
1/8	1/8	3/4	2-1/4	102971	**19.78**	102780	**20.77**	104652	**21.80**
1/8	1/8	1	3	102420	**30.52**	102520	**34.67**	-	**-**
9/64	3/16	9/32	2	101247	**17.90**	102245	**21.32**	-	**-**
5/32	3/16	5/16	2	101248	**17.03**	102247	**20.42**	-	**-**
5/32	3/16	9/16	2	-	**-**	-	**-**	104653	**24.98**
3/16	3/16	3/8	2	101249	**16.16**	102249	**19.56**	-	**-**
3/16	3/16	5/8	2	103873	**19.36**	102864	**21.62**	104654	**22.76**
3/16	3/16	3/4	2-1/2	102972	**19.36**	102782	**21.62**	104656	**22.76**
3/16	3/16	1-1/8	3	102422	**33.65**	102522	**38.94**	-	**-**
7/32	1/4	7/16	2	101250	**21.43**	102251	**26.74**	-	**-**
7/32	1/4	5/8	2-1/2	-	**-**	-	**-**	104655	**32.10**
1/4	1/4	1/2	2	101251	**21.08**	102252	**26.42**	-	**-**
1/4	1/4	3/4	2-1/2	103874	**24.05**	102866	**31.04**	104658	**32.59**
1/4	1/4	1-1/8	3	102973	**38.96**	102784	**45.99**	104660	**48.29**
1/4	1/4	1-1/2	4	102424	**40.98**	102524	**49.23**	-	**-**
9/32	5/16	3/4	2-1/2	-	**-**	-	**-**	104657	**42.07**
5/16	5/16	1/2	2	101252	**28.84**	102253	**36.41**	-	**-**
5/16	5/16	13/16	2-1/2	103877	**31.52**	102868	**42.07**	104662	**44.17**
5/16	5/16	1-1/8	3	102974	**48.13**	102786	**58.65**	104663	**61.58**
5/16	5/16	1-5/8	4	102426	**53.69**	102526	**67.05**	-	**-**
3/8	3/8	5/8	2	101253	**35.63**	102254	**43.20**	-	**-**
3/8	3/8	1	2-1/2	103875	**38.58**	102870	**49.13**	104666	**51.59**
3/8	3/8	1-1/8	3	102975	**54.14**	102788	**64.65**	104667	**67.88**
3/8	3/8	1-3/4	4	102428	**59.40**	102528	**72.76**	-	**-**
7/16	7/16	5/8	2-1/2	101254	**44.09**	102255	**56.03**	-	**-**
7/16	7/16	1	2-3/4	-	**-**	-	**-**	104668	**59.40**
7/16	7/16	2	4	102976	**81.78**	102790	**97.30**	-	**-**
7/16	7/16	3	6	102430	**106.31**	102530	**128.06**	-	**-**
1/2	1/2	5/8	2-1/2	101255	**58.78**	102256	**70.71**	-	**-**
1/2	1/2	1	3	103876	**71.81**	102872	**83.80**	104670	**87.99**
1/2	1/2	2	4	102977	**83.54**	102792	**99.03**	104671	**103.98**
1/2	1/2	3	6	102432	**118.33**	102532	**140.05**	-	**-**
9/16	9/16	1-1/8	3-1/2	103892	**104.59**	102874	**121.86**	104672	**127.95**
5/8	5/8	3/4	3	101256	**116.15**	102257	**109.40**	-	**-**
5/8	5/8	1-1/4	3-1/2	103893	**116.15**	102876	**133.41**	104674	**140.08**
5/8	5/8	2-1/4	5	102978	**173.99**	102794	**199.63**	-	**-**
5/8	5/8	3	6	102434	**173.99**	102534	**199.63**	-	**-**
11/16	3/4	1-3/8	4	103894	**193.35**	102877	**213.72**	-	**-**
3/4	3/4	1	3	101257	**161.70**	102258	**178.30**	-	**-**
3/4	3/4	1-1/2	4	103895	**170.93**	102878	**191.32**	104678	**200.88**
3/4	3/4	2-1/4	5	102979	**285.53**	102796	**315.22**	104679	**330.98**
3/4	3/4	3	6	102436	**285.53**	102536	**315.22**	-	**-**
7/8	7/8	1-1/2	4	103896	**273.84**	102879	**303.97**	104681	**326.63**
1	1	1-1/2	4	103897	**296.49**	102880	**326.63**	104682	**342.96**
1	1	2-1/4	5	102980	**362.68**	102798	**381.78**	104683	**401.87**
1	1	3	6	102438	**485.54**	102538	**524.13**	-	**-**

Carbide Drill Mills

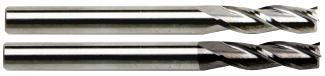
This versatile tool can be used for drilling, slotting, profile milling, spotting, and chamfering. 60° and 90° included point angles available. Made from sub-micron micrograin carbide with a cutting diameter tolerance of +0.000 / -0.002.



Cutting Dia. (in.)	Shank Dia. (in.)	Flute Length (in.)	Overall Length (in.)	Uncoated 60° Code No.	Price $	Uncoated 90° Code No.	Price $
1/16	1/8	3/16	1-1/2	153187	**14.69**	153186	**14.69**
3/32	1/8	3/8	1-1/2	153189	**14.69**	153188	**14.69**
1/8	1/8	1/2	1-1/2	153191	**14.69**	153190	**14.69**
3/16	3/16	5/8	2	153193	**19.36**	153192	**19.36**
1/4	1/4	3/4	2-1/2	153195	**24.05**	153194	**24.05**
5/16	5/16	13/16	2-1/2	153197	**31.52**	153196	**31.52**
3/8	3/8	1	2-1/2	153199	**38.58**	153198	**38.58**
7/16	7/16	1	2-3/4	153201	**47.49**	153200	**47.49**
1/2	1/2	1	3	153203	**71.81**	153202	**71.81**
5/8	5/8	1-1/4	3-1/2	153205	**116.15**	153204	**116.15**
3/4	3/4	1-1/2	4	153207	**170.93**	153206	**170.93**

3-Flute Square End Carbide End Mills

3-flute end mills offer maximum chip clearance therefore reducing chip packing. All end mills are center cutting and can be used for plunging applications. The TiAlN coating is designed for difficult to machine materials and reduces heat in cases where interrupted cuts may be encountered.



Speeds & Feeds: Uncoated - Page 2, TiAlN - Page 3. *Link in header.*

Cutting Dia. (in.)	Shank Dia. (in.)	Flute Length (in.)	Overall Length (in.)	Uncoated Code No.	Price $	TiAlN Code No.	Price $
1/16	1/8	3/16	1-1/2	101080	**13.12**	102353	**16.54**
5/64	1/8	3/16	1-1/2	101081	**13.12**	102354	**16.54**
3/32	1/8	5/16	1-1/2	101082	**12.41**	102355	**15.81**
7/64	1/8	7/16	1-1/2	101083	**12.41**	102356	**15.81**
1/8	1/8	1/2	1-1/2	101084	**11.45**	102357	**14.85**
9/64	3/16	1/2	2	101085	**16.93**	102358	**20.33**
5/32	3/16	9/16	2	101086	**16.93**	102359	**20.33**
11/64	3/16	5/8	2	101087	**16.93**	102361	**20.33**
3/16	3/16	5/8	2	101088	**16.07**	102363	**19.44**
13/64	1/4	5/8	2-1/2	101089	**21.27**	102365	**28.32**
7/32	1/4	5/8	2-1/2	101090	**21.27**	102367	**28.32**
15/64	1/4	3/4	2-1/2	101091	**21.27**	102369	**28.32**
1/4	1/4	3/4	2-1/2	101092	**19.36**	102371	**26.39**
17/64	5/16	3/4	2-1/2	101093	**33.96**	102373	**44.48**
9/32	5/16	3/4	2-1/2	101094	**33.96**	102375	**44.48**
19/64	5/16	13/16	2-1/2	101095	**33.96**	102377	**44.48**
5/16	5/16	13/16	2-1/2	101096	**27.16**	102379	**37.68**
3/8	3/8	1	2-1/2	101097	**33.84**	102381	**44.32**
7/16	7/16	1	2-3/4	101098	**41.27**	102383	**53.24**
1/2	1/2	1	3	101099	**54.17**	102384	**66.13**
9/16	9/16	1-1/8	3-1/2	101100	**92.55**	102385	**109.81**
5/8	5/8	1-1/4	3-1/2	101101	**104.48**	102386	**121.77**
11/16	3/4	1-3/8	4	101102	**173.99**	-	-
3/4	3/4	1-1/2	4	101103	**153.17**	102388	**173.57**
7/8	7/8	1-1/2	4	101104	**220.44**	102389	**250.56**
1	1	1-1/2	4	101105	**229.17**	102390	**259.26**
Metric							
1	3	3	39	101490	**14.85**	102391	**18.25**
1.5	3	5	39	101491	**14.85**	102392	**18.25**
2	3	7	39	101492	**13.76**	102393	**17.16**
3	3	10	39	101494	**12.03**	-	-
3.5	4	12	51	101495	**17.80**	102396	**21.20**
4	4	14	51	101496	**16.89**	-	-
4.5	5	14	51	101497	**20.66**	102398	**25.97**
5	5	16	51	101498	**19.70**	102399	**26.72**
6	6	19	64	101499	**20.33**	102401	**27.35**
7	8	19	64	101500	**27.93**	102403	**38.42**
8	8	21	64	101501	**28.51**	102405	**39.03**
9	10	22	70	101502	**35.51**	102407	**46.02**
10	10	25	70	101503	**41.17**	102409	**53.11**
11	11	25	70	101504	**43.35**	-	-
12	12	25	76	101505	**56.90**	102413	**68.83**
14	14	30	89	101506	**97.15**	102415	**114.43**
16	16	32	89	101507	**109.71**	102417	**127.00**
18	18	35	102	101508	**160.86**	102419	**181.25**
20	20	38	102	101509	**204.51**	102421	**234.65**
22	22	38	102	101510	**227.26**	102423	**257.37**
25	25	38	102	101511	**237.61**	102425	**285.13**

3-Flute Ball Nose Carbide End Mills

3-flute end mills offer maximum chip clearance therefore reducing chip packing. All end mills are center cutting and can be used for plunging applications. Ball end mills have a helical gash on ball end for reduced cutting force and better chip evacuation. The TiAlN coating is designed for difficult to machine materials and reduces heat in cases where interrupted cuts may be encountered.

Speeds & Feeds: Uncoated - Page 5, TiAlN - Page 6. *Link in header.*

Cutting Dia. (in.)	Shank Dia. (in.)	Flute Length (in.)	Overall Length (in.)	Uncoated Code No.	Price $	TiAlN Code No.	Price $
1/16	1/8	3/16	1-1/2	101110	**16.93**	102455	**20.33**
5/64	1/8	3/16	1-1/2	101111	**16.93**	102457	**20.33**
3/32	1/8	5/16	1-1/2	101112	**16.19**	102459	**19.59**
7/64	1/8	7/16	1-1/2	101113	**16.19**	102461	**19.59**
1/8	1/8	1/2	1-1/2	101114	**14.69**	102463	**18.09**
9/64	3/16	1/2	2	101115	**21.55**	102465	**24.98**
5/32	3/16	9/16	2	101116	**21.55**	102467	**24.98**
11/64	3/16	5/8	2	101117	**21.55**	102469	**24.98**
3/16	3/16	5/8	2	101118	**19.36**	102470	**22.76**
13/64	1/4	5/8	2-1/2	101119	**25.07**	102471	**32.10**
7/32	1/4	5/8	2-1/2	101120	**25.07**	102472	**32.10**
15/64	1/4	3/4	2-1/2	101121	**25.07**	102473	**32.10**
1/4	1/4	3/4	2-1/2	101122	**24.05**	102474	**31.04**
17/64	5/16	3/4	2-1/2	101123	**37.64**	102475	**48.14**
9/32	5/16	3/4	2-1/2	101124	**37.64**	102476	**48.14**
19/64	5/16	13/16	2-1/2	101125	**37.64**	102477	**48.14**
5/16	5/16	13/16	2-1/2	101126	**31.52**	102478	**42.07**
3/8	3/8	1	2-1/2	101127	**38.58**	102479	**49.13**
7/16	7/16	1	2-3/4	101128	**47.49**	102481	**59.40**
1/2	1/2	1	3	101129	**71.81**	102483	**83.80**
9/16	9/16	1-1/8	3-1/2	101130	**104.59**	-	-
5/8	5/8	1-1/4	3-1/2	101131	**116.15**	102487	**133.41**
11/16	3/4	1-3/8	4	101132	**193.35**	-	-
3/4	3/4	1-1/2	4	101133	**170.93**	102491	**191.32**
7/8	7/8	1-1/2	4	101134	**273.84**	-	-
1	1	1-1/2	4	101135	**296.49**	102495	**326.63**

3-Flute 60° High-Helix Carbide End Mills

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.

Speeds & Feeds: Uncoated - Page 8, TiAlN - Page 8. *Link in header.*

Cutting Dia. (in.)	Shank Dia. (in.)	Flute Length (in.)	Overall Length (in.)	Uncoated Code No.	Price $	TiAlN Code No.	Price $
1/8	1/8	1/2	1-1/2	101000	**20.39**	102427	**27.41**
3/16	3/16	5/8	2	101002	**20.39**	102429	**27.41**
1/4	1/4	3/4	2-1/2	101004	**20.39**	102431	**27.41**
5/16	5/16	13/16	2-1/2	101006	**28.60**	102433	**39.07**
3/8	3/8	1	2-1/2	101008	**35.60**	102435	**46.11**
7/16	7/16	1	2-3/4	101010	**43.46**	102437	**55.44**
1/2	1/2	1	3	101012	**57.03**	102439	**68.96**
5/8	5/8	1-1/4	3-1/2	101014	**109.99**	102440	**127.25**
3/4	3/4	1-1/2	4	101016	**161.27**	102441	**181.64**
1	1	1-1/2	4	101018	**241.21**	102442	**271.35**
Metric							
6	6	19	64	101730	**20.39**	-	-
8	8	21	64	101731	**28.60**	-	-
10	10	25	70	101732	**43.46**	-	-
12	12	25	76	101733	**57.03**	-	-
14	14	29	89	101734	**109.99**	-	-
16	16	32	89	101735	**109.99**	-	-
18	18	38	102	101736	**161.27**	-	-
20	20	38	102	101737	**161.27**	-	-
25	25	38	102	101738	**241.21**	-	-

4-Flute Square End Carbide End Mills

General purpose end mills are ideal for deeper slotting applications where a balance of cutting edges, chip evacuation and heat dissipation is required. All end mills are center cutting and can be used for plunging applications. Both TiAlN and AlTiN coatings are designed for difficult to machine materials. TiAlN coating reduces heat in cases where interrupted cuts may be encountered. AlTiN coating is better for dry machining applications, continuous cutting and for abrasive applications.

Speeds & Feeds: Uncoated - Page 8, TiAlN - Page 9, AlTiN - Page 10. *Link in header.*

Cutting Dia. (in.)	Shank Dia. (in.)	Flute Length (in.)	Overall Length (in.)	Uncoated Code No.	Price $	TiAlN Code No.	Price $	AlTiN Code No.	Price $
1/32	1/8	5/64	1-1/2	101260	**14.14**	102540	**17.54**	-	**-**
1/32	1/8	1/8	1-1/2	103781	**14.14**	102899	**17.54**	-	**-**
3/64	1/8	3/32	1-1/2	101261	**14.14**	102541	**17.54**	-	**-**
3/64	1/8	9/64	1-1/2	103782	**14.14**	102831	**17.54**	-	**-**
1/16	1/8	1/8	1-1/2	101262	**13.12**	102542	**16.54**	-	**-**
1/16	1/8	3/16	1-1/2	103870	**13.12**	102832	**16.54**	104702	**17.96**
5/64	1/8	5/32	1-1/2	101263	**13.12**	102543	**16.54**	-	**-**
5/64	1/8	1/4	1-1/2	103783	**13.12**	102833	**16.54**	-	**-**
3/32	1/8	3/16	1-1/2	101264	**12.41**	102544	**15.81**	-	**-**
3/32	1/8	5/16	1-1/2	103871	**12.41**	102834	**15.81**	104701	**17.15**
7/64	1/8	7/32	1-1/2	101265	**12.41**	102545	**15.81**	-	**-**
7/64	1/8	3/8	1-1/2	103784	**12.41**	102835	**15.81**	-	**-**
1/8	1/8	1/4	1-1/2	101266	**11.45**	102546	**14.85**	-	**-**
1/8	1/8	1/2	1-1/2	103860	**11.45**	102836	**14.85**	104700	**16.11**
1/8	1/8	3/4	2-1/4	102981	**19.16**	102922	**20.17**	104832	**21.23**
1/8	1/8	1	3	102450	**25.94**	102550	**30.09**	-	**-**
9/64	3/16	9/32	2	101267	**16.93**	102547	**20.33**	-	**-**
9/64	3/16	1/2	2	103785	**16.93**	102837	**20.33**	-	**-**
5/32	3/16	5/16	2	101268	**16.93**	-	**-**	-	**-**
5/32	3/16	9/16	2	103861	**16.93**	102839	**20.33**	104703	**21.23**
11/64	3/16	9/16	2	103786	**16.93**	102841	**20.33**	-	**-**
3/16	3/16	3/8	2	101269	**16.07**	102549	**19.44**	-	**-**
3/16	3/16	5/8	2	103862	**16.07**	102838	**19.44**	104704	**20.31**
3/16	3/16	3/4	2-1/4	102982	**20.54**	102924	**21.62**	104834	**22.76**
3/16	3/16	1-1/8	3	102452	**28.61**	102552	**33.92**	-	**-**
13/64	1/4	5/8	2-1/2	103787	**21.27**	102843	**28.32**	-	**-**
7/32	1/4	7/16	2	101270	**18.19**	102551	**23.51**	-	**-**
7/32	1/4	5/8	2-1/2	103863	**21.27**	102845	**28.32**	104705	**29.74**
1/4	1/4	1/2	2	101271	**17.93**	102553	**23.25**	-	**-**
1/4	1/4	3/4	2-1/2	103864	**19.36**	102840	**26.39**	104708	**27.41**
1/4	1/4	1-1/8	3	102983	**33.13**	102926	**40.16**	104836	**45.99**
1/4	1/4	1-1/2	4	102454	**34.99**	102554	**43.20**	-	**-**
9/32	5/16	3/4	2-1/2	103865	**33.96**	102847	**44.48**	104707	**46.70**
5/16	5/16	1/2	2	101272	**24.54**	102555	**32.11**	-	**-**
5/16	5/16	13/16	2-1/2	103866	**27.16**	102842	**37.68**	104712	**39.07**
5/16	5/16	1-1/8	3	102984	**40.89**	102928	**51.41**	104838	**58.65**
5/16	5/16	1-5/8	4	102456	**45.66**	102556	**58.98**	-	**-**
11/32	3/8	7/8	2-1/2	103789	**40.22**	102849	**50.73**	-	**-**
3/8	3/8	5/8	2	101273	**30.31**	102557	**37.87**	-	**-**
3/8	3/8	1	2-1/2	103867	**33.84**	102844	**44.32**	104716	**46.11**
3/8	3/8	1-1/8	3	102985	**46.01**	102930	**56.54**	104840	**64.65**
3/8	3/8	1-3/4	4	102458	**50.51**	102558	**63.88**	-	**-**
13/32	7/16	1	2-3/4	103790	**48.10**	102851	**60.06**	-	**-**
7/16	7/16	5/8	2-1/2	101274	**37.48**	102559	**49.42**	-	**-**
7/16	7/16	1	2-3/4	103868	**41.27**	102846	**53.24**	104718	**55.44**
7/16	7/16	2	4	102986	**69.53**	102932	**84.99**	-	**-**
7/16	7/16	3	6	102460	**92.43**	102560	**114.18**	-	**-**
1/2	1/2	5/8	2-1/2	101275	**49.99**	102561	**61.93**	-	**-**
1/2	1/2	1	3	103869	**54.17**	102848	**66.13**	104720	**68.96**
1/2	1/2	2	4	102987	**73.96**	102934	**89.42**	104842	**93.32**
1/2	1/2	3	6	102462	**106.93**	102562	**128.67**	-	**-**
9/16	9/16	1-1/8	3-1/2	103933	**92.55**	102850	**109.81**	104722	**114.68**
5/8	5/8	3/4	3	101276	**95.54**	102563	**109.40**	-	**-**
5/8	5/8	1-1/4	3-1/2	103934	**104.48**	102852	**121.77**	104724	**127.25**
5/8	5/8	2-1/4	5	102988	**152.42**	102936	**178.08**	104844	**199.63**
5/8	5/8	3	6	102464	**152.42**	102564	**178.08**	-	**-**
11/16	3/4	1-3/8	4	103935	**173.99**	102854	**194.40**	104730	**204.12**
3/4	3/4	1	3	101277	**137.42**	102565	**154.00**	-	**-**
3/4	3/4	1-1/2	4	103936	**153.17**	102856	**173.57**	104728	**181.64**
3/4	3/4	2-1/4	5	102989	**220.02**	102938	**231.60**	104846	**243.79**
3/4	3/4	3	6	102466	**242.81**	102566	**272.51**	-	**-**
7/8	7/8	1-1/2	4	103937	**220.44**	102858	**250.56**	104731	**271.35**
1	1	1-1/2	4	103938	**229.17**	102860	**259.26**	104732	**271.35**
1	1	2-1/4	5	102990	**327.81**	102940	**345.07**	104848	**363.23**
1	1	3	6	102468	**412.80**	102568	**451.35**	-	**-**
6pc Set: 1/4", 5/16", 3/8", 1/2", 5/8", 3/4"				103847	**372.57**	-	**-**	-	**-**

4-Flute Square End Carbide End Mills – Metric

General purpose end mills are ideal for deeper slotting applications where a balance of cutting edges, chip evacuation and heat dissipation is required. All end mills are center cutting and can be used for plunging applications. Both TiAlN and AlTiN coatings are designed for difficult to machine materials. TiAlN coating reduces heat in cases where interrupted cuts may be encountered. AlTiN coating is better for dry machining applications, continuous cutting and for abrasive applications.



Speeds & Feeds: Uncoated - Page 8, TiAlN - Page 9, AlTiN - Page 10. *Link in header.*

Cutting Dia. (in.)	Shank Dia. (in.)	Flute Length (in.)	Overall Length (in.)	Uncoated Code No.	Price $	TiAlN Code No.	Price $	AlTiN Code No.	Price $
Metric									
1	3	2	39	101690	**14.85**	102567	**18.28**	-	**-**
1	3	3	39	101550	**14.85**	102601	**18.25**	101840	**19.05**
1.5	3	3	39	101691	**14.85**	102569	**18.28**	-	**-**
1.5	3	5	39	101551	**14.85**	102603	**18.25**	101841	**19.05**
2	3	4	39	101692	**13.76**	102570	**17.16**	-	**-**
2	3	7	39	102716	**13.76**	102605	**17.16**	101842	**17.96**
2.5	3	5	39	101693	**13.02**	102571	**16.45**	-	**-**
2.5	3	8	39	102717	**13.02**	102607	**16.45**	101843	**17.27**
3	3	6	39	101694	**12.03**	102572	**15.45**	-	**-**
3	3	10	39	102718	**12.03**	102609	**15.45**	101844	**16.11**
3	3	19	57	101600	**16.07**	102901	**30.69**	-	**-**
3.5	4	7	51	101695	**17.80**	102573	**21.20**	-	**-**
3.5	4	12	51	102719	**17.80**	102611	**21.20**	101845	**30.24**
4	4	8	51	101696	**16.89**	102574	**20.29**	-	**-**
4	4	14	51	102720	**16.89**	102613	**20.29**	101846	**30.24**
4	4	19	57	101601	**16.89**	102903	**33.20**	-	**-**
4.5	5	9	51	101697	**20.66**	-	**-**	-	**-**
4.5	5	14	51	102721	**20.66**	102615	**25.97**	101847	**32.35**
5	5	10	51	101698	**19.70**	-	**-**	-	**-**
5	5	16	51	102722	**19.70**	102617	**26.72**	101848	**32.35**
5	5	25	64	101602	**30.12**	102905	**37.11**	-	**-**
6	6	12	51	101699	**18.90**	102577	**24.19**	-	**-**
6	6	19	64	102723	**20.33**	102619	**27.35**	101849	**28.38**
6	6	28	76	101603	**34.90**	102907	**41.88**	-	**-**
7	8	12	51	101700	**24.57**	102578	**32.14**	-	**-**
7	8	19	64	102724	**27.93**	102621	**38.42**	101850	**49.94**
8	8	12	51	101701	**25.79**	102579	**33.39**	-	**-**
8	8	21	64	102725	**28.51**	102623	**39.03**	101851	**40.50**
8	8	29	76	101604	**43.07**	102909	**53.55**	-	**-**
9	10	22	70	102726	**35.51**	102625	**46.02**	101852	**62.54**
10	10	14	51	101703	**35.22**	102583	**43.81**	-	**-**
10	10	25	70	102727	**41.17**	102627	**53.11**	101853	**55.29**
10	10	32	76	101605	**49.94**	102911	**61.89**	-	**-**
11	11	16	64	101704	**41.17**	-	**-**	-	**-**
11	11	25	70	102728	**43.35**	102629	**55.29**	-	**-**
11	12	25	70	-	**-**	-	**-**	101854	**67.31**
12	12	16	64	101705	**52.60**	-	**-**	-	**-**
12	12	25	76	102729	**56.90**	102657	**68.83**	101855	**71.81**
12	12	51	102	101606	**78.42**	102913	**93.87**	-	**-**
14	14	30	89	102731	**97.15**	102659	**114.43**	101856	**127.07**
14	14	57	127	101607	**107.66**	102915	**166.02**	-	**-**
16	16	32	89	102732	**109.71**	102661	**127.00**	101857	**132.74**
18	18	35	102	102733	**160.86**	102663	**181.25**	101858	**199.86**
18	18	57	127	101609	**229.17**	102919	**258.87**	-	**-**
20	20	38	102	102734	**204.51**	102665	**234.65**	101859	**245.40**
20	20	57	127	101610	**255.79**	102917	**294.37**	-	**-**
22	22	38	102	102736	**227.26**	102667	**257.37**	101860	**297.44**
25	25	38	102	102735	**237.61**	102669	**267.73**	101861	**280.24**
25	25	57	127	101611	**394.15**	-	**-**	-	**-**

4-Flute Corner Radius Carbide End Mills

These end mills are ideal for deeper slotting applications where a balance of cutting edges, chip evacuation and heat dissipation is required. These tools will break up a sharp corner with its radius formation, this rounding helps distribute cutting forces more evenly across the corner, helping to prevent wear or chipping while prolonging functional tool life. All end mills are center cutting and can be used for plunging applications. Both TiAlN and AlTiN coatings are designed for difficult to machine materials. TiAlN coating reduces heat in cases where interrupted cuts may be encountered. AlTiN coating is better for dry machining applications, continuous cutting and for abrasive applications.

Speeds & Feeds: Uncoated - Page 8, TiAlN - Page 9, AlTiN - Page 10. *Link in header.*

Cutting Dia.	Corner Radius (in.)	Shank Dia.	Flute Length	Overall Length	Uncoated Code No.	Price $	TiAlN Code No.	Price $	AlTiN Code No.	Price $
1/8	0.015	1/8	1/2	1-1/2	101175	**14.69**	101833	**18.09**	102652	**19.00**
1/8	0.030	1/8	1/2	1-1/2	-	**-**	-	**-**	102656	**18.12**
3/16	0.020	3/16	5/8	2	101176	**19.36**	101834	**22.76**	102660	**23.89**
3/16	0.030	3/16	5/8	2	101177	**19.36**	101835	**22.76**	-	**-**
1/4	0.020	1/4	3/4	2-1/2	101178	**24.05**	101836	**31.04**	102666	**32.59**
1/4	0.030	1/4	3/4	2-1/2	101179	**24.05**	101837	**31.04**	102668	**32.59**
1/4	0.045	1/4	3/4	2-1/2	101180	**24.05**	101838	**31.04**	-	**-**
5/16	0.020	5/16	13/16	2-1/2	101181	**31.52**	101839	**42.07**	102670	**44.17**
5/16	0.030	5/16	13/16	2-1/2	101182	**31.52**	101862	**42.07**	102672	**44.17**
5/16	0.045	5/16	13/16	2-1/2	101183	**31.52**	101863	**42.07**	-	**-**
3/8	0.020	3/8	1	2-1/2	101184	**38.58**	101864	**49.13**	102678	**51.59**
3/8	0.030	3/8	1	2-1/2	101185	**38.58**	101865	**49.13**	102680	**51.59**
3/8	0.045	3/8	1	2-1/2	101186	**38.58**	101866	**49.13**	-	**-**
1/2	0.020	1/2	1	3	101187	**71.81**	101867	**83.80**	102686	**87.99**
1/2	0.030	1/2	1	3	101188	**71.81**	101868	**83.80**	102688	**87.99**
1/2	0.045	1/2	1	3	101189	**71.81**	101869	**83.80**	-	**-**
1/2	0.060	1/2	1	3	101190	**71.81**	101892	**83.80**	102690	**87.99**
5/8	0.020	5/8	1-1/4	3-1/2	101191	**116.15**	101893	**133.41**	-	**-**
5/8	0.030	5/8	1-1/4	3-1/2	101192	**116.15**	101894	**133.41**	-	**-**
5/8	0.045	5/8	1-1/4	3-1/2	101193	**116.15**	101895	**133.41**	-	**-**
5/8	0.060	5/8	1-1/4	3-1/2	101194	**116.15**	101896	**133.41**	-	**-**
5/8	0.090	5/8	1-1/4	3-1/2	101195	**116.15**	101897	**133.41**	-	**-**
3/4	0.020	3/4	1-1/2	4	101197	**170.93**	101898	**191.32**	-	**-**
3/4	0.030	3/4	1-1/2	4	101198	**170.93**	101899	**191.32**	-	**-**
3/4	0.045	3/4	1-1/2	4	101199	**170.93**	101990	**191.32**	-	**-**
3/4	0.060	3/4	1-1/2	4	101200	**170.93**	101991	**191.32**	-	**-**
3/4	0.090	3/4	1-1/2	4	101201	**170.93**	101992	**191.32**	-	**-**
3/4	0.125	3/4	1-1/2	4	101196	**170.93**	101993	**191.32**	-	**-**
1	0.020	1	1-1/2	4	101203	**296.49**	101994	**326.63**	-	**-**
1	0.030	1	1-1/2	4	101204	**296.49**	101995	**326.63**	-	**-**
1	0.045	1	1-1/2	4	101205	**296.49**	101996	**326.63**	-	**-**
1	0.060	1	1-1/2	4	101206	**296.49**	101997	**326.63**	-	**-**
1	0.090	1	1-1/2	4	101207	**296.49**	101998	**326.63**	-	**-**
1	0.125	1	1-1/2	4	101202	**296.49**	101999	**326.63**	-	**-**

4-Flute Double End Stub Length Carbide End Mills

One tool, two cutting edges. 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. Be careful not to chip the cutting edges when loading into your tool holder of choice.

LIMITED SUPPLY
While quantities last.

Speeds & Feeds: Uncoated - Page 8, TiAlN - Page 9. *Link in header.*

Cutting Dia. (in.)	Shank Dia. (in.)	Flute Length (in.)	Overall Length (in.)	Uncoated Code No.	Price $	TiAlN Code No.	Price $
1/16	1/8	1/8	1-1/2	102230	**25.41**	102330	**30.52**
3/32	1/8	3/16	1-1/2	102232	**25.41**	102332	**30.52**
1/8	1/8	1/4	1-1/2	102234	**15.75**	102334	**20.85**
5/32	3/16	5/16	2	102236	**27.97**	102336	**33.09**
3/16	3/16	3/8	2	102238	**22.83**	102338	**27.94**
7/32	1/4	1/2	2-1/2	102240	**32.62**	102340	**43.16**
1/4	1/4	1/2	2-1/2	102242	**29.72**	102342	**40.22**
5/16	5/16	1/2	2-1/2	102244	**36.98**	102344	**52.72**
3/8	3/8	1/2	2-1/2	102246	**39.32**	102346	**55.10**
7/16	7/16	9/16	2-3/4	102248	**66.83**	102348	**84.74**
1/2	1/2	5/8	3	102250	**66.83**	102350	**84.74**

4-Flute High Performance Spherical Ball Carbide End Mills

High performance ball nose end mills are used in the mold industry and have a full 220° arc cutting capability. The AlTiN coating is designed for difficult to machine materials, and is better for dry machining applications, continuous cutting and for abrasive applications.

Speeds & Feeds: AlTiN - Page 7. *Link in header.*

Cutting Dia. (in.)	Shank Dia. (in.)	Flute Length (in.)	Overall Length (in.)	AlTiN Code No.	Price $
1/8	1/8	3/32	1-1/2	153130	**35.23**
1/8	1/8	3/32	3	153140	**41.78**
3/16	3/16	9/64	2	153132	**47.82**
3/16	3/16	9/64	3	153142	**42.44**
1/4	1/4	3/16	2-1/2	153134	**66.60**
1/4	1/4	3/16	4	153144	**76.76**
3/8	3/8	9/32	2-1/2	153136	**76.37**
3/8	3/8	9/32	4	153146	**86.02**
1/2	1/2	3/8	3	153138	**157.50**
1/2	1/2	3/8	6	153148	**227.83**

4-Flute Ball Nose Carbide End Mills

4-flute ball nose end mills offer wear resistance and minimal deflection for excellent size control. All end mills are center cutting and can be used for plunging applications. Ball end mills have a helical gash on ball end for reduced cutting force and better chip evacuation. Both TiAlN and AlTiN coatings are designed for difficult to machine materials. TiAlN coating reduces heat in cases where interrupted cuts may be encountered. AlTiN coating is better for dry machining applications, continuous cutting and for abrasive applications.



Speeds & Feeds: Uncoated - Page 5, TiAlN - Page 6, AlTiN - Page 7. *Link in header.*

Cutting Dia. (in.)	Shank Dia. (in.)	Flute Length (in.)	Overall Length (in.)	Uncoated Code No.	Price $	TiAlN Code No.	Price $	AlTiN Code No.	Price $
1/32	1/8	5/64	1-1/2	101280	**17.93**	102681	**21.36**	-	**-**
3/64	1/8	3/32	1-1/2	101281	**17.93**	102683	**21.36**	-	**-**
1/16	1/8	1/8	1-1/2	101282	**13.22**	102685	**16.61**	-	**-**
1/16	1/8	3/16	1-1/2	-	**-**	-	**-**	104752	**17.96**
5/64	1/8	5/32	1-1/2	101283	**12.48**	102687	**15.88**	-	**-**
3/32	1/8	3/16	1-1/2	101284	**12.48**	102689	**15.88**	-	**-**
3/32	1/8	5/16	1-1/2	-	**-**	-	**-**	104751	**17.15**
7/64	1/8	7/32	1-1/2	101285	**12.79**	102691	**16.19**	-	**-**
1/8	1/8	1/4	1-1/2	101286	**12.16**	102693	**15.56**	-	**-**
1/8	1/8	1/2	1-1/2	103880	**14.69**	102882	**18.09**	104750	**19.00**
1/8	1/8	3/4	2-1/4	102991	**19.78**	102942	**23.15**	104833	**24.98**
1/8	1/8	1	3	102480	**30.52**	102580	**34.67**	-	**-**
9/64	3/16	9/32	2	101287	**17.03**	102694	**20.42**	-	**-**
5/32	3/16	5/16	2	101288	**17.03**	102695	**20.42**	-	**-**
5/32	3/16	9/16	2	-	**-**	-	**-**	104753	**24.98**
3/16	3/16	3/8	2	101289	**16.16**	102781	**19.56**	-	**-**
3/16	3/16	5/8	2	103881	**19.36**	102884	**22.76**	104754	**23.89**
3/16	3/16	3/4	2-1/2	102992	**19.36**	102944	**22.76**	104835	**23.89**
3/16	3/16	1-1/8	3	102482	**33.65**	102582	**38.94**	-	**-**
7/32	1/4	7/16	2	101290	**21.43**	102783	**26.74**	-	**-**
7/32	1/4	5/8	2-1/2	-	**-**	-	**-**	104755	**32.10**
1/4	1/4	1/2	2	101291	**21.08**	102785	**26.42**	-	**-**
1/4	1/4	3/4	2-1/2	103882	**24.05**	102886	**31.04**	104758	**32.59**
1/4	1/4	1-1/8	3	102993	**38.96**	102946	**45.99**	104837	**48.29**
1/4	1/4	1-1/2	4	102484	**40.98**	102584	**49.23**	-	**-**
9/32	5/16	3/4	2-1/2	-	**-**	-	**-**	104757	**42.07**
5/16	5/16	1/2	2	101292	**28.84**	102787	**36.41**	-	**-**
5/16	5/16	13/16	2-1/2	103883	**31.52**	102888	**42.07**	104762	**44.17**
5/16	5/16	1-1/8	3	102994	**48.13**	102948	**58.65**	104839	**61.58**
5/16	5/16	1-5/8	4	102486	**53.69**	102586	**67.05**	-	**-**
3/8	3/8	5/8	2	101293	**35.63**	102789	**43.20**	-	**-**
3/8	3/8	1	2-1/2	103884	**38.58**	102890	**49.13**	104766	**51.59**
3/8	3/8	1-1/8	3	102995	**54.14**	102950	**64.65**	104841	**67.88**
3/8	3/8	1-3/4	4	102488	**59.40**	102588	**72.76**	-	**-**
7/16	7/16	5/8	2-1/2	101294	**44.09**	102791	**56.03**	-	**-**
7/16	7/16	1	2-3/4	-	**-**	-	**-**	104768	**59.40**
7/16	7/16	2	4	102996	**81.78**	102952	**97.30**	-	**-**
7/16	7/16	3	6	102490	**106.31**	102590	**128.06**	-	**-**
1/2	1/2	5/8	2-1/2	101295	**58.78**	102793	**70.71**	-	**-**
1/2	1/2	1	3	103885	**71.81**	102892	**83.80**	104770	**87.99**
1/2	1/2	2	4	102997	**83.54**	102954	**99.03**	104843	**103.98**
1/2	1/2	3	6	102492	**118.33**	102592	**140.05**	-	**-**
9/16	9/16	1-1/8	3-1/2	103939	**104.59**	102894	**121.86**	104772	**127.95**
5/8	5/8	3/4	3	101296	**161.70**	102795	**126.27**	-	**-**
5/8	5/8	1-1/4	3-1/2	103940	**116.15**	102896	**133.41**	104774	**140.08**
5/8	5/8	2-1/4	5	102998	**173.99**	102956	**199.63**	104845	**209.61**
5/8	5/8	3	6	102494	**173.99**	102594	**178.08**	-	**-**
11/16	3/4	1-3/8	4	103941	**193.35**	102895	**213.72**	104780	**224.41**
3/4	3/4	1	3	101297	**161.70**	102797	**178.30**	-	**-**
3/4	3/4	1-1/2	4	103942	**170.93**	102898	**191.32**	104778	**200.88**
3/4	3/4	2-1/4	5	102999	**285.53**	102958	**315.22**	104847	**330.98**
3/4	3/4	3	6	102496	**285.53**	102596	**315.22**	-	**-**
7/8	7/8	1-1/2	4	103943	**273.84**	102897	**303.97**	104781	**326.63**
1	1	1-1/2	4	103944	**296.49**	102900	**326.63**	104782	**342.96**
1	1	2-1/4	5	103000	**362.68**	102960	**381.78**	104849	**401.87**
1	1	3	6	102498	**485.54**	102598	**524.13**	-	**-**

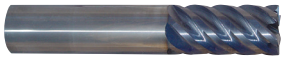
4-Flute High Performance Variable Helix Carbide End Mills

Variable helix end mills deploy a unique flute geometry that changes along the cutting length. This allows the cutting edge to impact the machined material at a different location per rotation which helps reduce harmonics and vibration, increase stability and dissipate heat during the cutting action. These factors combined offer a substantial increase in machining speed. Choose the corner radius tools for added strength in corners and smoother cutting action. The AlTiN coating is designed for difficult to machine materials, and is better for dry machining applications, continuous cutting and for abrasive applications.

Speeds & Feeds: AlTiN - Page 11. *Link in header.*

Cutting Dia. (in.)	Shank Dia. (in.)	Flute Length (in.)	Overall Length (in.)	Corner Radius	AlTiN With Radius Code No.	Price $	AlTiN Without Radius Code No.	Price $	AlTiN Weldon Flat Without Radius Code No.	Price $
1/8	1/8	1/2	1-1/2	0.010-0.015	153000	**18.12**	153250	**16.11**	-	**-**
3/16	3/16	3/8	1-1/2	0.010-0.015	153001	**22.76**	-	**-**	-	**-**
3/16	3/16	5/8	2	0.015-0.020	153002	**22.76**	153252	**20.31**	-	**-**
1/4	1/4	1/2	2	0.015-0.020	153004	**28.02**	153254	**28.02**	-	**-**
1/4	1/4	3/4	2-1/2	0.015-0.020	153006	**31.04**	153256	**27.41**	-	**-**
1/4	1/4	1-1/8	3	0.015-0.020	153008	**45.99**	153258	**45.99**	-	**-**
5/16	5/16	1/2	2	0.015-0.020	153010	**38.27**	153260	**33.39**	-	**-**
5/16	5/16	13/16	2-1/2	0.015-0.020	153012	**42.07**	153262	**39.07**	-	**-**
5/16	5/16	1-1/8	3	0.015-0.020	153014	**58.65**	153264	**58.65**	-	**-**
3/8	3/8	5/8	2	0.015-0.020	153016	**45.18**	153266	**39.45**	153500	**39.45**
3/8	3/8	1	2-1/2	0.015-0.020	153018	**49.13**	153268	**46.11**	153502	**46.11**
3/8	3/8	1-1/8	3	0.015-0.020	153020	**64.65**	153270	**64.65**	153504	**64.65**
7/16	7/16	1	2-3/4	0.015-0.020	153022	**59.40**	153272	**55.44**	153506	**55.44**
1/2	1/2	5/8	2-1/2	0.025-0.030	153024	**75.08**	153274	**64.55**	153508	**64.55**
1/2	1/2	1	3	0.025-0.030	153026	**83.80**	153276	**68.96**	153510	**68.96**
1/2	1/2	1-1/4	3	0.025-0.030	153027	**83.80**	153277	**68.96**	153512	**68.96**
1/2	1/2	2	4	0.025-0.030	153028	**99.03**	153278	**93.32**	153514	**93.32**
5/8	5/8	3/4	3	0.030-0.035	153030	**129.81**	153280	**123.63**	153516	**123.63**
5/8	5/8	1-1/4	3-1/2	0.030-0.035	153032	**133.41**	153282	**127.25**	-	**-**
5/8	5/8	2-1/4	5	0.030-0.035	153034	**199.63**	153284	**199.63**	153518	**199.63**
3/4	3/4	1	3	0.030-0.035	153036	**187.25**	153286	**177.74**	153520	**177.74**
3/4	3/4	1-1/2	4	0.030-0.035	153038	**191.32**	153288	**181.64**	-	**-**
3/4	3/4	2-1/4	5	0.030-0.035	153040	**265.37**	153290	**243.79**	153522	**243.79**
1	1	1-1/2	4	0.030-0.035	153042	**326.63**	153292	**271.35**	153526	**271.35**
1	1	2-1/4	5	0.030-0.035	153041	**401.87**	153293	**363.23**	153524	**363.23**
1-1/4	1-1/4	2-1/4	5	0.030-0.035	153043	**942.30**	153294	**753.78**	-	**-**

5-Flute High Performance Variable Helix Carbide End Mills



Variable helix end mills deploy a unique flute geometry that changes along the cutting length. This allows the cutting edge to impact the machined material at a different location per rotation which helps reduce harmonics and vibration, increase stability, and dissipate heat during the cutting action. These factors combined offer a substantial increase in machining speed. Choose the corner radius tools for added strength in corners and smoother cutting action. The AlTiN coating is designed for difficult to machine materials, and is better for dry machining applications, continuous cutting and for abrasive applications. The 5-flute tools can offer 25% more material removal than a 4-flute tool at the expense of efficient chip removal. These tools are typically deployed in hard to machine materials where feed rates are slower and spindle rates are higher and tool strength is a priority.

Speeds & Feeds: AlTiN - Page 11. *Link in header.*

Cutting Dia. (in.)	Shank Dia. (in.)	Flute Length (in.)	Overall Length (in.)	Corner Radius	AlTiN Code No.	Price $
1/4	1/4	3/4	2-1/2	0.015-0.020	153100	**35.67**
3/8	3/8	1	2-1/2	0.015-0.020	153102	**56.50**
1/2	1/2	1	3	0.025-0.030	153104	**96.37**
5/8	5/8	1-1/4	3-1/2	0.030-0.035	153106	**153.42**
3/4	3/4	1-1/2	4	0.030-0.035	153108	**220.01**
1	1	1-1/2	4	0.030-0.035	153109	**375.63**

Multi-Flute 50º High Spiral High Performance Carbide End Mills

Multi-flute high performance end mills are designed to run at higher rpms and feed rates without sacrificing tool life, performance, and part finish. Suitable for hard to machine, <HRC 45 materials like stainless steels, inconel, and titanium. The AlTiN coating is designed for difficult to machine materials, and is better for dry machining applications, continuous cutting and for abrasive applications.

Speeds & Feeds: AlTiN - Page 11. *Link in header.*

Cutting Dia. (in.)	Shank Dia. (in.)	Flute Length (in.)	Overall Length (in.)	No. of Flutes	AlTiN Code No.	Price $
1/8	1/8	1/2	1-1/2	4	101050	**16.11**
3/16	3/16	5/8	2	4	101052	**20.31**
1/4	1/4	3/4	2-1/2	6	101054	**27.41**
5/16	5/16	13/16	2-1/2	6	101056	**39.07**
3/8	3/8	1	2-1/2	6	101058	**46.11**
7/16	7/16	1	2-3/4	6	101060	**55.44**
1/2	1/2	1	3	6	101062	**68.96**
9/16	9/16	1-1/8	3-1/2	6	101064	**114.68**
5/8	5/8	1-1/4	3-1/2	6	101066	**127.25**
3/4	3/4	1-1/2	4	6	101068	**181.64**
7/8	7/8	1-1/2	4	6	101070	**271.35**
1	1	1-1/2	4	8	101072	**271.35**

Multi-Flute Rougher Carbide End Mills

These fine pitch roughing end mills have an excellent flute design for roughing applications in a variety of materials. Both TiAlN and AlTiN coatings are designed for difficult to machine materials. TiAlN coating reduces heat in cases where interrupted cuts may be encountered. AlTiN coating is better for dry machining applications, continuous cutting and for abrasive applications.

Speeds & Feeds: Uncoated - Page 11, TiAlN - Page 11, AlTiN - Page 11. *Link in header.*

Cutting Dia. (in.)	Shank Dia. (in.)	Flute Length (in.)	Overall Length (in.)	No. of Flutes	Uncoated Code No.	Price $	TiAlN Code No.	Price $	AlTiN Code No.	Price $
1/4	1/4	3/4	2-1/2	3	-	**-**	-	**-**	104800	**51.99**
5/16	5/16	3/4	2-1/2	3	-	**-**	-	**-**	104802	**59.69**
3/8	3/8	7/8	2-1/2	3	-	**-**	-	**-**	104804	**72.31**
1/4	1/4	3/4	2-1/2	4	102150	**45.83**	102185	**51.99**	-	**-**
5/16	5/16	3/4	2-1/2	4	102155	**50.73**	102190	**59.69**	-	**-**
3/8	3/8	1	2-1/2	4	102160	**63.37**	102200	**72.31**	-	**-**
1/2	1/2	1-1/4	3	4	102165	**87.45**	102205	**92.88**	104806	**97.76**
5/8	5/8	1-1/4	3-1/2	4	102170	**140.91**	102210	**147.97**	104810	**155.76**
3/4	3/4	1-5/8	4	4	102175	**206.06**	102215	**212.46**	104812	**223.65**
1	1	1-3/4	4	4	102180	**349.91**	102220	**375.64**	-	**-**
1	1	1-3/4	4	5	-	**-**	-	**-**	104814	**375.64**

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Our approach to this brand ensures that our customers receive the best value for their investment by delivering a broad assortment of cutting tools at an exceptional value. These tools typically apply to less demanding applications seen on the standard shop floor where the cost of the tool has the greatest influence on the selection process.

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Sowa Tool & Machine Co. Ltd.

Canadian Headquarters
500 Manitou Drive, Kitchener, ON, N2C 1L3

US Headquarters
101-137 Overhill Drive, Mooresville, NC 28117

TF: 1-800-265-8221
Tel: 519-748-5750
Fax: 519-748-9304
sales@sowatool.com
www.**SowaTool**.com

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