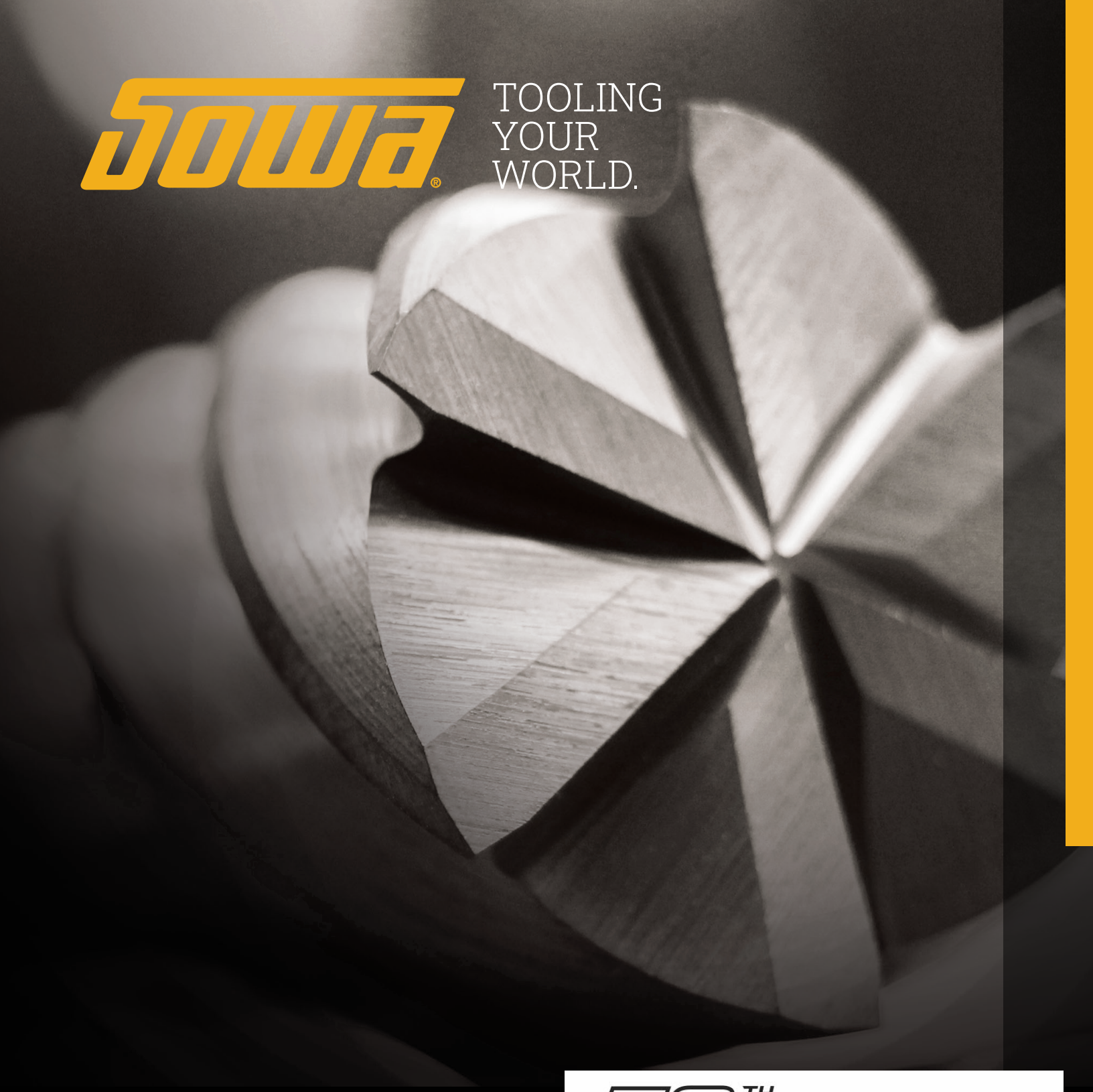
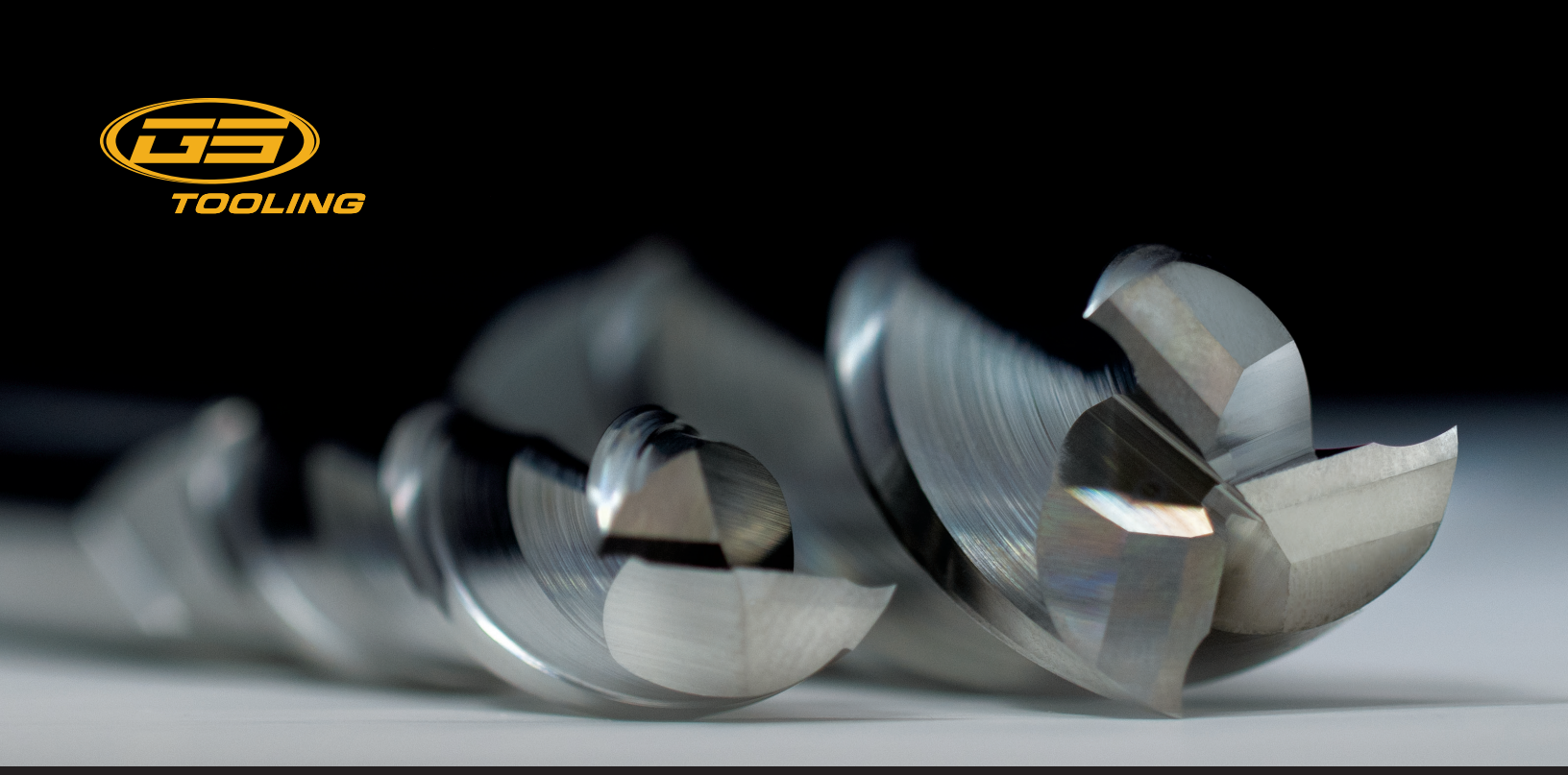


TOOLING YOUR WORLD.

Solid Carbide End Mills

G3 TOOLING

50TH ANNIVERSARY 1974-2024 UNITED TOOL SUPPLY LTD.



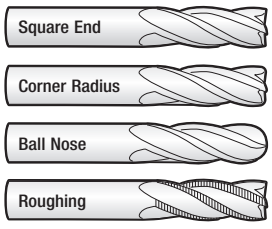
Solid Carbide End Mills

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, Shrink Fit Solutions, Retention Knobs, Vises & Workholding, Live Centers, Angle Heads, Carbide End Mills and more!

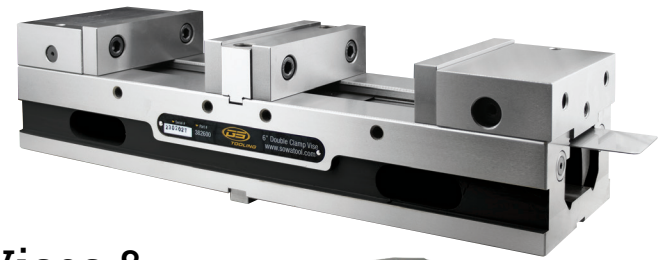
Shop GS Tooling

Tool Holding

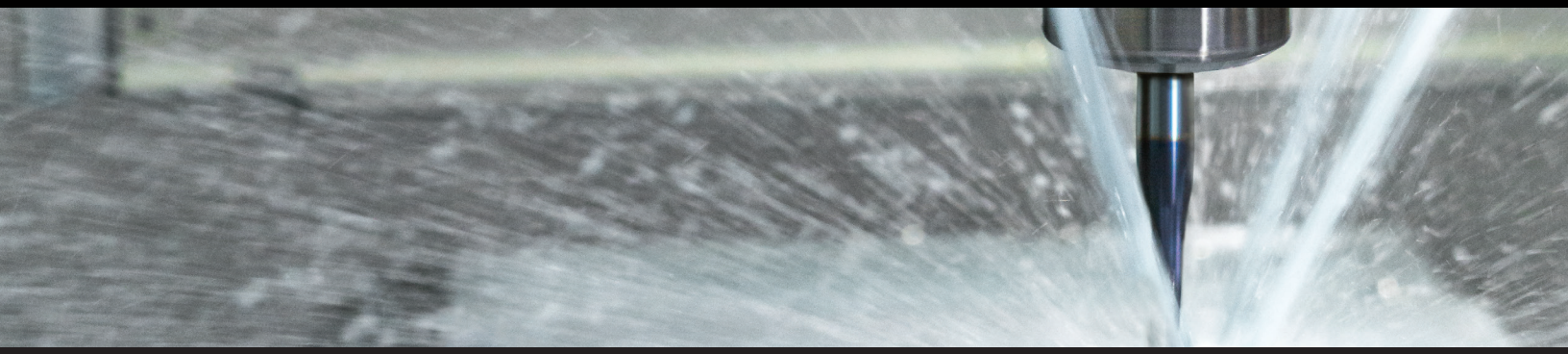
Angle Heads & Driven Tooling

Cutting Tools

Shrink Fit Solutions



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)

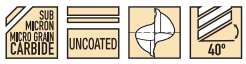
	25	50	75	100	125	150	175	200	225	250	275	300
Stainless Steel												
Tool Steels												
High Strength												
Nickel Alloys												
Titanium												

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

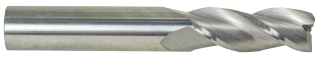
Designed specifically for milling aluminum and all non-ferrous materials, the 40º helix permits much higher speed and feed rates without chip loading. Spindle and feed rates can be increased by fifty percent for greater productivity while maintaining excellent part surface finish.



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

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

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

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.	TiCN Coated Code No.
1/8	1/8	3/8	1-1/2	0.010	153208	153400
3/16	3/16	5/8	2	0.010	153210	153402
1/4	1/4	3/4	2-1/2	0.010	153212	153404
1/4	1/4	1-1/8	3	0.010	153228	153420
5/16	5/16	13/16	2-1/2	0.010	153214	153406
5/16	5/16	1-1/8	3	0.010	153230	153422
3/8	3/8	1	2-1/2	0.015	153216	153408
3/8	3/8	1-1/8	3	0.015	153232	153424
7/16	7/16	1	2-3/4	0.015	153218	153410
1/2	1/2	1	3	0.020	153220	153412
1/2	1/2	2	4	0.020	153234	153426
5/8	5/8	1-1/4	3-1/2	0.020	153222	153414
5/8	5/8	2-1/4	5	0.020	153236	153428
3/4	3/4	1-1/2	4	0.030	153224	153416
3/4	3/4	2-1/4	5	0.030	153238	153430
1	1	1-1/2	4	0.030	153226	153418
1	1	2-1/4	5	0.030	153240	153432

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.	TiCN Coated Code No.
1/8	1/8	3/8	1-1/2	0.005	153150	153044
3/16	3/16	5/8	2	0.005	153152	153046
1/4	1/4	3/4	2-1/2	0.005	153154	153048
1/4	1/4	1-1/8	3	0.005	153170	153434
5/16	5/16	13/16	2-1/2	0.005	153156	153050
5/16	5/16	1-1/8	3	0.005	153172	153436
3/8	3/8	1	2-1/2	0.005	153158	153052
3/8	3/8	1-1/8	3	0.005	153174	153438
7/16	7/16	1	2-3/4	0.005	153160	153054
1/2	1/2	1-1/4	3	0.005	153162	153056
1/2	1/2	1-1/2	4	0.005	153176	153440
1/2	1/2	2	4	0.005	153178	153442
5/8	5/8	1-5/8	3-1/2	0.005	153164	153058
5/8	5/8	2-1/4	5	0.005	153180	153444
3/4	3/4	1-5/8	4	0.005	153166	153060
3/4	3/4	2-1/4	5	0.005	153182	153446
1	1	1-1/2	4	0.005	153168	153062
1	1	2-1/4	5	0.005	153184	153448

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.	TiAlN Code No.	AlTiN Code No.
1/32	1/8	5/64	1-1/2	101220	102202	-
1/32	1/8	1/8	1-1/2	103770	102677	-
3/64	1/8	3/32	1-1/2	101221	102221	-
3/64	1/8	9/64	1-1/2	103772	102799	-
1/16	1/8	1/8	1-1/2	101222	102222	-
1/16	1/8	3/16	1-1/2	103848	102800	104602
5/64	1/8	1/8	1-1/2	101223	102223	-
5/64	1/8	1/4	1-1/2	103773	102801	-
3/32	1/8	3/16	1-1/2	101224	102224	-
3/32	1/8	5/16	1-1/2	103849	102802	104601
7/64	1/8	7/32	1-1/2	101225	102225	-
7/64	1/8	3/8	1-1/2	103775	102803	-
1/8	1/8	1/4	1-1/2	101226	102226	-
1/8	1/8	1/2	1-1/2	103850	102804	104600
1/8	1/8	3/4	2-1/4	102961	102902	104815
1/8	1/8	1	3	102400	102500	-
9/64	3/16	9/32	2	101227	102227	-
9/64	3/16	1/2	2	103776	102805	-
5/32	3/16	5/16	2	101228	102228	-
5/32	3/16	9/16	2	103851	102806	104603
11/64	3/16	9/16	2	103777	102807	-
3/16	3/16	3/8	2	101229	102229	-
3/16	3/16	5/8	2	103852	102808	104604
3/16	3/16	3/4	2-1/4	102962	102904	104816
3/16	3/16	1-1/8	3	102402	102502	-
13/64	1/4	5/8	2-1/2	103778	102809	-
7/32	1/4	7/16	2	101230	102203	-
7/32	1/4	5/8	2-1/2	103853	102811	104605
1/4	1/4	1/2	2	101231	102231	-
1/4	1/4	3/4	2-1/2	103854	102810	104608
1/4	1/4	1-1/8	3	102963	102906	104818
1/4	1/4	1-1/2	4	102404	102504	-
9/32	5/16	3/4	2-1/2	103855	102813	104607
5/16	5/16	1/2	2	101232	102204	-
5/16	5/16	13/16	2-1/2	103856	102812	104612
5/16	5/16	1-1/8	3	102964	102908	104820
5/16	5/16	1-5/8	4	102406	102506	-
11/32	3/8	7/8	2-1/2	103779	102815	-
3/8	3/8	5/8	2	101233	102233	-
3/8	3/8	1	2-1/2	103857	102814	104616
3/8	3/8	1-1/8	3	102965	102910	104822
3/8	3/8	1-3/4	4	102408	102508	-
13/32	7/16	1	2-3/4	103780	102817	-
7/16	7/16	5/8	2-1/2	101234	102206	-
7/16	7/16	1	2-3/4	103858	102816	104618
7/16	7/16	2	4	102966	102912	-
7/16	7/16	3	6	102410	102510	-
1/2	1/2	5/8	2-1/2	101235	102235	-
1/2	1/2	1	3	103859	102818	104620
1/2	1/2	2	4	102967	102914	104824
1/2	1/2	3	6	102412	102512	-
9/16	9/16	1-1/8	3-1/2	103886	102820	104622
5/8	5/8	3/4	3	101236	102207	-
5/8	5/8	1-1/4	3-1/2	103887	102822	104624
5/8	5/8	2-1/4	5	102968	102916	104826
5/8	5/8	3	6	102414	102514	-
11/16	3/4	1-3/8	4	103888	102824	104630
3/4	3/4	1	3	101237	102237	-
3/4	3/4	1-1/2	4	103889	102826	104628
3/4	3/4	2-1/4	5	102969	102918	104830
3/4	3/4	3	6	102416	102516	-
7/8	7/8	1-1/2	4	103890	102828	104631
1	1	1-1/2	4	103891	102830	104632
1	1	2-1/4	5	102970	102920	104831
1	1	3	6	102418	102518	-
6pc set: 1/4", 5/16", 3/8", 1/2", 5/8", 3/4"				103846	-	-
5pc set: 3/16", 1/4", 5/16", 3/8", 1/2"				-	102957	-

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.	TiAlN Code No.	AlTiN Code No.
Metric						
0.5	3	1.5	39	101552	102819	-
1	3	3	39	101553	102821	101780
1.5	3	5	39	101432	102823	101781
2	3	7	39	102696	102825	101782
2.5	3	7	39	102697	102827	-
2.5	3	8	39	-	-	101783
3	3	9	39	102698	102829	-
3	3	10	39	-	-	101784
3	3	19	57	101560	102921	-
3.5	4	12	51	102699	102853	101785
4	4	14	51	102700	102855	101786
4	4	19	57	101561	102923	-
4.5	5	14	51	102701	102857	101787
5	5	16	51	102702	102859	101788
5	5	25	64	101562	102925	-
6	6	19	64	102703	102861	101789
6	6	28	76	101563	102927	-
7	8	19	64	102704	102863	101790
8	8	21	64	102705	102865	101791
8	8	29	76	101564	102929	-
9	10	22	70	102706	102867	101792
10	10	22	70	102707	102869	-
10	10	25	70	-	-	101793
10	10	32	76	101565	102931	-
11	11	25	70	102708	102871	-
11	12	25	70	-	-	101794
12	12	25	76	102709	102873	101795
12	12	51	102	101566	102933	-
14	14	30	89	102711	102875	101796
14	14	57	127	101567	-	-
16	16	32	89	102712	102881	101797
16	16	57	127	101568	102937	-
18	18	35	102	102713	102883	101798
18	18	57	127	101569	102939	-
20	20	38	102	102714	102885	101799
20	20	57	127	101570	-	-
22	22	38	102	101451	102887	101800
25	25	38	102	102715	102889	101801
25	25	57	127	101571	-	-

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.
1/8	1/8	5/16	2-3/8	104034
3/16	3/16	3/8	3-1/8	104036
1/4	1/4	1/2	3-1/2	104038
5/16	5/16	15/32	4	104040
3/8	3/8	3/4	4	104042
1/2	1/2	7/8	4-1/4	104044
5/8	5/8	15/16	6	104046
3/4	3/4	1-1/8	6	104048
1	1	1-1/2	6	104050

2-Flute High Performance Spherical Ball End Carbide End Mill

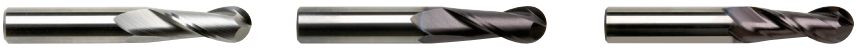
High performance ball nose end mills are used in the mold industry and have a full 220º arc cutting capability. AlTiN coating is designed for difficult to machine materials, and is better for dry machining applications, continuous cutting and for abrasive applications.

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

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

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.

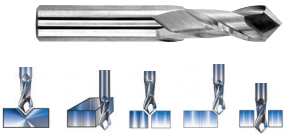


Speeds & Feeds: Uncoated - Page 5, TiAlN - Page 6, AlTiN - Page 7. *Link in header.*

Cutting Dia. (in.)	Shank Dia. (in.)	Flute Length (in.)	Overall Length (in.)	Uncoated Code No.	TiAlN Code No.	AlTiN Code No.
1/32	1/8	5/64	1-1/2	101240	102197	-
3/64	1/8	3/32	1-1/2	101241	102198	-
1/16	1/8	1/8	1-1/2	101242	102199	-
1/16	1/8	3/16	1-1/2	-	-	104649
5/64	1/8	5/32	1-1/2	101243	102201	-
3/32	1/8	3/16	1-1/2	101244	102239	-
3/32	1/8	5/16	1-1/2	-	-	104651
7/64	1/8	7/32	1-1/2	101245	102241	-
1/8	1/8	1/4	1-1/2	101246	102243	-
1/8	1/8	1/2	1-1/2	103872	102862	104650
1/8	1/8	3/4	2-1/4	102971	102780	104652
1/8	1/8	1	3	102420	102520	-
9/64	3/16	9/32	2	101247	102245	-
5/32	3/16	5/16	2	101248	102247	-
5/32	3/16	9/16	2	-	-	104653
3/16	3/16	3/8	2	101249	102249	-
3/16	3/16	5/8	2	103873	102864	104654
3/16	3/16	3/4	2-1/2	102972	102782	104656
3/16	3/16	1-1/8	3	102422	102522	-
7/32	1/4	7/16	2	101250	102251	-
7/32	1/4	5/8	2-1/2	-	-	104655
1/4	1/4	1/2	2	101251	102252	-
1/4	1/4	3/4	2-1/2	103874	102866	104658
1/4	1/4	1-1/8	3	102973	102784	104660
1/4	1/4	1-1/2	4	102424	102524	-
9/32	5/16	3/4	2-1/2	-	-	104657
5/16	5/16	1/2	2	101252	102253	-
5/16	5/16	13/16	2-1/2	103877	102868	104662
5/16	5/16	1-1/8	3	102974	102786	104663
5/16	5/16	1-5/8	4	102426	102526	-
3/8	3/8	5/8	2	101253	102254	-
3/8	3/8	1	2-1/2	103875	102870	104666
3/8	3/8	1-1/8	3	102975	102788	104667
3/8	3/8	1-3/4	4	102428	102528	-
7/16	7/16	5/8	2-1/2	101254	102255	-
7/16	7/16	1	2-3/4	-	-	104668
7/16	7/16	2	4	102976	102790	-
7/16	7/16	3	6	102430	102530	-
1/2	1/2	5/8	2-1/2	101255	102256	-
1/2	1/2	1	3	103876	102872	104670
1/2	1/2	2	4	102977	102792	104671
1/2	1/2	3	6	102432	102532	-
9/16	9/16	1-1/8	3-1/2	103892	102874	104672
5/8	5/8	3/4	3	101256	102257	-
5/8	5/8	1-1/4	3-1/2	103893	102876	104674
5/8	5/8	2-1/4	5	102978	102794	-
5/8	5/8	3	6	102434	102534	-
11/16	3/4	1-3/8	4	103894	102877	-
3/4	3/4	1	3	101257	102258	-
3/4	3/4	1-1/2	4	103895	102878	104678
3/4	3/4	2-1/4	5	102979	102796	104679
3/4	3/4	3	6	102436	102536	-
7/8	7/8	1-1/2	4	103896	102879	104681
1	1	1-1/2	4	103897	102880	104682
1	1	2-1/4	5	102980	102798	104683
1	1	3	6	102438	102538	-

Carbide Drill Mills

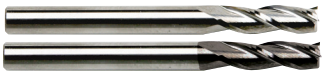
This versatile tool can be used for drilling, slotting, profile milling, spotting, and chamfering. 60° and 90° included point angles available. Made from sub-micron micrograin carbide with a cutting diameter tolerance of +0.000 / -0.002.



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

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

3-Flute Ball Nose 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.	TiAlN Code No.
1/16	1/8	3/16	1-1/2	101110	102455
5/64	1/8	3/16	1-1/2	101111	102457
3/32	1/8	5/16	1-1/2	101112	102459
7/64	1/8	7/16	1-1/2	101113	102461
1/8	1/8	1/2	1-1/2	101114	102463
9/64	3/16	1/2	2	101115	102465
5/32	3/16	9/16	2	101116	102467
11/64	3/16	5/8	2	101117	102469
3/16	3/16	5/8	2	101118	102470
13/64	1/4	5/8	2-1/2	101119	102471
7/32	1/4	5/8	2-1/2	101120	102472
15/64	1/4	3/4	2-1/2	101121	102473
1/4	1/4	3/4	2-1/2	101122	102474
17/64	5/16	3/4	2-1/2	101123	102475
9/32	5/16	3/4	2-1/2	101124	102476
19/64	5/16	13/16	2-1/2	101125	102477
5/16	5/16	13/16	2-1/2	101126	102478
3/8	3/8	1	2-1/2	101127	102479
7/16	7/16	1	2-3/4	101128	102481
1/2	1/2	1	3	101129	102483
9/16	9/16	1-1/8	3-1/2	101130	-
5/8	5/8	1-1/4	3-1/2	101131	102487
11/16	3/4	1-3/8	4	101132	-
3/4	3/4	1-1/2	4	101133	102491
7/8	7/8	1-1/2	4	101134	-
1	1	1-1/2	4	101135	102495

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

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.	TiAlN Code No.	AlTiN Code No.
1/32	1/8	5/64	1-1/2	101260	102540	-
1/32	1/8	1/8	1-1/2	103781	102899	-
3/64	1/8	3/32	1-1/2	101261	102541	-
3/64	1/8	9/64	1-1/2	103782	102831	-
1/16	1/8	1/8	1-1/2	101262	102542	-
1/16	1/8	3/16	1-1/2	103870	102832	104702
5/64	1/8	5/32	1-1/2	101263	102543	-
5/64	1/8	1/4	1-1/2	103783	102833	-
3/32	1/8	3/16	1-1/2	101264	102544	-
3/32	1/8	5/16	1-1/2	103871	102834	104701
7/64	1/8	7/32	1-1/2	101265	102545	-
7/64	1/8	3/8	1-1/2	103784	102835	-
1/8	1/8	1/4	1-1/2	101266	102546	-
1/8	1/8	1/2	1-1/2	103860	102836	104700
1/8	1/8	3/4	2-1/4	102981	102922	104832
1/8	1/8	1	3	102450	102550	-
9/64	3/16	9/32	2	101267	102547	-
9/64	3/16	1/2	2	103785	102837	-
5/32	3/16	5/16	2	101268	-	-
5/32	3/16	9/16	2	103861	102839	104703
11/64	3/16	9/16	2	103786	102841	-
3/16	3/16	3/8	2	101269	102549	-
3/16	3/16	5/8	2	103862	102838	104704
3/16	3/16	3/4	2-1/4	102982	102924	104834
3/16	3/16	1-1/8	3	102452	102552	-
13/64	1/4	5/8	2-1/2	103787	102843	-
7/32	1/4	7/16	2	101270	102551	-
7/32	1/4	5/8	2-1/2	103863	102845	104705
1/4	1/4	1/2	2	101271	102553	-
1/4	1/4	3/4	2-1/2	103864	102840	104708
1/4	1/4	1-1/8	3	102983	102926	104836
1/4	1/4	1-1/2	4	102454	102554	-
9/32	5/16	3/4	2-1/2	103865	102847	104707
5/16	5/16	1/2	2	101272	102555	-
5/16	5/16	13/16	2-1/2	103866	102842	104712
5/16	5/16	1-1/8	3	102984	102928	104838
5/16	5/16	1-5/8	4	102456	102556	-
11/32	3/8	7/8	2-1/2	103789	102849	-
3/8	3/8	5/8	2	101273	102557	-
3/8	3/8	1	2-1/2	103867	102844	104716
3/8	3/8	1-1/8	3	102985	102930	104840
3/8	3/8	1-3/4	4	102458	102558	-
13/32	7/16	1	2-3/4	103790	102851	-
7/16	7/16	5/8	2-1/2	101274	102559	-
7/16	7/16	1	2-3/4	103868	102846	104718
7/16	7/16	2	4	102986	102932	-
7/16	7/16	3	6	102460	102560	-
1/2	1/2	5/8	2-1/2	101275	102561	-
1/2	1/2	1	3	103869	102848	104720
1/2	1/2	2	4	102987	102934	104842
1/2	1/2	3	6	102462	102562	-
9/16	9/16	1-1/8	3-1/2	103933	102850	104722
5/8	5/8	3/4	3	101276	102563	-
5/8	5/8	1-1/4	3-1/2	103934	102852	104724
5/8	5/8	2-1/4	5	102988	102936	104844
5/8	5/8	3	6	102464	102564	-
11/16	3/4	1-3/8	4	103935	102854	104730
3/4	3/4	1	3	101277	102565	-
3/4	3/4	1-1/2	4	103936	102856	104728
3/4	3/4	2-1/4	5	102989	102938	104846
3/4	3/4	3	6	102466	102566	-
7/8	7/8	1-1/2	4	103937	102858	104731
1	1	1-1/2	4	103938	102860	104732
1	1	2-1/4	5	102990	102940	104848
1	1	3	6	102468	102568	-
6pc Set: 1/4", 5/16", 3/8", 1/2", 5/8", 3/4"				103847	-	-

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.	TiAlN Code No.	AlTiN Code No.
Metric						
1	3	2	39	101690	102567	-
1	3	3	39	101550	102601	101840
1.5	3	3	39	101691	102569	-
1.5	3	5	39	101551	102603	101841
2	3	4	39	101692	102570	-
2	3	7	39	102716	102605	101842
2.5	3	5	39	101693	102571	-
2.5	3	8	39	102717	102607	101843
3	3	6	39	101694	102572	-
3	3	10	39	102718	102609	101844
3	3	19	57	101600	102901	-
3.5	4	7	51	101695	102573	-
3.5	4	12	51	102719	102611	101845
4	4	8	51	101696	102574	-
4	4	14	51	102720	102613	101846
4	4	19	57	101601	102903	-
4.5	5	9	51	101697	-	-
4.5	5	14	51	102721	102615	101847
5	5	10	51	101698	-	-
5	5	16	51	102722	102617	101848
5	5	25	64	101602	102905	-
6	6	12	51	101699	102577	-
6	6	19	64	102723	102619	101849
6	6	28	76	101603	102907	-
7	8	12	51	101700	102578	-
7	8	19	64	102724	102621	101850
8	8	12	51	101701	102579	-
8	8	21	64	102725	102623	101851
8	8	29	76	101604	102909	-
9	10	22	70	102726	102625	101852
10	10	14	51	101703	102583	-
10	10	25	70	102727	102627	101853
10	10	32	76	101605	102911	-
11	11	16	64	101704	-	-
11	11	25	70	102728	102629	-
11	12	25	70	-	-	101854
12	12	16	64	101705	-	-
12	12	25	76	102729	102657	101855
12	12	51	102	101606	102913	-
14	14	30	89	102731	102659	101856
14	14	57	127	101607	102915	-
16	16	32	89	102732	102661	101857
18	18	35	102	102733	102663	101858
18	18	57	127	101609	102919	-
20	20	38	102	102734	102665	101859
20	20	57	127	101610	102917	-
22	22	38	102	102736	102667	101860
25	25	38	102	102735	102669	101861
25	25	57	127	101611	-	-

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.	TiAlN Code No.	AlTiN Code No.
1/8	0.015	1/8	1/2	1-1/2	101175	101833	102652
1/8	0.030	1/8	1/2	1-1/2	-	-	102656
3/16	0.020	3/16	5/8	2	101176	101834	102660
3/16	0.030	3/16	5/8	2	101177	101835	-
1/4	0.020	1/4	3/4	2-1/2	101178	101836	102666
1/4	0.030	1/4	3/4	2-1/2	101179	101837	102668
1/4	0.045	1/4	3/4	2-1/2	101180	101838	-
5/16	0.020	5/16	13/16	2-1/2	101181	101839	102670
5/16	0.030	5/16	13/16	2-1/2	101182	101862	102672
5/16	0.045	5/16	13/16	2-1/2	101183	101863	-
3/8	0.020	3/8	1	2-1/2	101184	101864	102678
3/8	0.030	3/8	1	2-1/2	101185	101865	102680
3/8	0.045	3/8	1	2-1/2	101186	101866	-
1/2	0.020	1/2	1	3	101187	101867	102686
1/2	0.030	1/2	1	3	101188	101868	102688
1/2	0.045	1/2	1	3	101189	101869	-
1/2	0.060	1/2	1	3	101190	101892	102690
5/8	0.020	5/8	1-1/4	3-1/2	101191	101893	-
5/8	0.030	5/8	1-1/4	3-1/2	101192	101894	-
5/8	0.045	5/8	1-1/4	3-1/2	101193	101895	-
5/8	0.060	5/8	1-1/4	3-1/2	101194	101896	-
5/8	0.090	5/8	1-1/4	3-1/2	101195	101897	-
3/4	0.020	3/4	1-1/2	4	101197	101898	-
3/4	0.030	3/4	1-1/2	4	101198	101899	-
3/4	0.045	3/4	1-1/2	4	101199	101990	-
3/4	0.060	3/4	1-1/2	4	101200	101991	-
3/4	0.090	3/4	1-1/2	4	101201	101992	-
3/4	0.125	3/4	1-1/2	4	101196	101993	-
1	0.020	1	1-1/2	4	101203	101994	-
1	0.030	1	1-1/2	4	101204	101995	-
1	0.045	1	1-1/2	4	101205	101996	-
1	0.060	1	1-1/2	4	101206	101997	-
1	0.090	1	1-1/2	4	101207	101998	-
1	0.125	1	1-1/2	4	101202	101999	-

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

4-Flute 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.
1/8	1/8	3/32	1-1/2	153130
1/8	1/8	3/32	3	153140
3/16	3/16	9/64	2	153132
3/16	3/16	9/64	3	153142
1/4	1/4	3/16	2-1/2	153134
1/4	1/4	3/16	4	153144
3/8	3/8	9/32	2-1/2	153136
3/8	3/8	9/32	4	153146
1/2	1/2	3/8	3	153138
1/2	1/2	3/8	6	153148

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.	TiAlN Code No.	AlTiN Code No.
1/32	1/8	5/64	1-1/2	101280	102681	-
3/64	1/8	3/32	1-1/2	101281	102683	-
1/16	1/8	1/8	1-1/2	101282	102685	-
1/16	1/8	3/16	1-1/2	-	-	104752
5/64	1/8	5/32	1-1/2	101283	102687	-
3/32	1/8	3/16	1-1/2	101284	102689	-
3/32	1/8	5/16	1-1/2	-	-	104751
7/64	1/8	7/32	1-1/2	101285	102691	-
1/8	1/8	1/4	1-1/2	101286	102693	-
1/8	1/8	1/2	1-1/2	103880	102882	104750
1/8	1/8	3/4	2-1/4	102991	102942	104833
1/8	1/8	1	3	102480	102580	-
9/64	3/16	9/32	2	101287	102694	-
5/32	3/16	5/16	2	101288	102695	-
5/32	3/16	9/16	2	-	-	104753
3/16	3/16	3/8	2	101289	102781	-
3/16	3/16	5/8	2	103881	102884	104754
3/16	3/16	3/4	2-1/2	102992	102944	104835
3/16	3/16	1-1/8	3	102482	102582	-
7/32	1/4	7/16	2	101290	102783	-
7/32	1/4	5/8	2-1/2	-	-	104755
1/4	1/4	1/2	2	101291	102785	-
1/4	1/4	3/4	2-1/2	103882	102886	104758
1/4	1/4	1-1/8	3	102993	102946	104837
1/4	1/4	1-1/2	4	102484	102584	-
9/32	5/16	3/4	2-1/2	-	-	104757
5/16	5/16	1/2	2	101292	102787	-
5/16	5/16	13/16	2-1/2	103883	102888	104762
5/16	5/16	1-1/8	3	102994	102948	104839
5/16	5/16	1-5/8	4	102486	102586	-
3/8	3/8	5/8	2	101293	102789	-
3/8	3/8	1	2-1/2	103884	102890	104766
3/8	3/8	1-1/8	3	102995	102950	104841
3/8	3/8	1-3/4	4	102488	102588	-
7/16	7/16	5/8	2-1/2	101294	102791	-
7/16	7/16	1	2-3/4	-	-	104768
7/16	7/16	2	4	102996	102952	-
7/16	7/16	3	6	102490	102590	-
1/2	1/2	5/8	2-1/2	101295	102793	-
1/2	1/2	1	3	103885	102892	104770
1/2	1/2	2	4	102997	102954	104843
1/2	1/2	3	6	102492	102592	-
9/16	9/16	1-1/8	3-1/2	103939	102894	104772
5/8	5/8	3/4	3	101296	102795	-
5/8	5/8	1-1/4	3-1/2	103940	102896	104774
5/8	5/8	2-1/4	5	102998	102956	104845
5/8	5/8	3	6	102494	102594	-
11/16	3/4	1-3/8	4	103941	102895	104780
3/4	3/4	1	3	101297	102797	-
3/4	3/4	1-1/2	4	103942	102898	104778
3/4	3/4	2-1/4	5	102999	102958	104847
3/4	3/4	3	6	102496	102596	-
7/8	7/8	1-1/2	4	103943	102897	104781
1	1	1-1/2	4	103944	102900	104782
1	1	2-1/4	5	103000	102960	104849
1	1	3	6	102498	102598	-

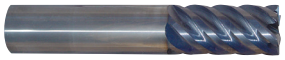
4-Flute High Performance Variable Helix Carbide End Mills

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

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.
1/4	1/4	3/4	2-1/2	0.015-0.020	153100
3/8	3/8	1	2-1/2	0.015-0.020	153102
1/2	1/2	1	3	0.025-0.030	153104
5/8	5/8	1-1/4	3-1/2	0.030-0.035	153106
3/4	3/4	1-1/2	4	0.030-0.035	153108
1	1	1-1/2	4	0.030-0.035	153109

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.
1/8	1/8	1/2	1-1/2	4	101050
3/16	3/16	5/8	2	4	101052
1/4	1/4	3/4	2-1/2	6	101054
5/16	5/16	13/16	2-1/2	6	101056
3/8	3/8	1	2-1/2	6	101058
7/16	7/16	1	2-3/4	6	101060
1/2	1/2	1	3	6	101062
9/16	9/16	1-1/8	3-1/2	6	101064
5/8	5/8	1-1/4	3-1/2	6	101066
3/4	3/4	1-1/2	4	6	101068
7/8	7/8	1-1/2	4	6	101070
1	1	1-1/2	4	8	101072

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.	TiAlN Code No.	AlTiN Code No.
1/4	1/4	3/4	2-1/2	3	-	-	104800
5/16	5/16	3/4	2-1/2	3	-	-	104802
3/8	3/8	7/8	2-1/2	3	-	-	104804
1/4	1/4	3/4	2-1/2	4	102150	102185	-
5/16	5/16	3/4	2-1/2	4	102155	102190	-
3/8	3/8	1	2-1/2	4	102160	102200	-
1/2	1/2	1-1/4	3	4	102165	102205	104806
5/8	5/8	1-1/4	3-1/2	4	102170	102210	104810
3/4	3/4	1-5/8	4	4	102175	102215	104812
1	1	1-3/4	4	4	102180	102220	-
1	1	1-3/4	4	5	-	-	104814

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