BREAKTHROUGHS

2009

HANITA®

To Our Valued Customers:

Over the past 50 years, Hanita has earned a reputation for enabling our customers to be more competitive and profitable by developing and delivering high-performance metalcutting products and value-added services.

This new catalog includes some of our latest solid end mill breakthroughs — products specifically designed to help you produce more parts in less time, with fewer tool changes and longer tool life.

In addition, we are pleased to introduce our Carbide Recycling and Reconditioning Services Programs. These new services will help you to optimize your full investment in cutting tools throughout their life cycle by reducing your overall tooling spend and improving your profitability.

Trust Hanita to deliver the ultimate in customer satisfaction. For more information about how our products and services can impact your bottom line, please contact your local Authorized Hanita Distributor today!

The Hanita Sales and Marketing Team

HANITA®

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The Hanita brand is recognized around the world as a leader in high-quality, high-performance solid carbide end mills and solid carbide drills.

Broad Offering of Standard Products

Our solid end mill products are manufactured in a wide range of standard styles, including roughing, semi-finishing, finishing, and specialty tools that are made from the world's finest quality sub-micrograin carbide and premium conventional and powdered metal high-speed steels.

Our solid carbide drills are the perfect solution for high-performance holemaking. They combine unique geometry and point styles to provide high throughput, high accuracy, and consistent performance in a wide variety of materials.

Hanita also provides the widest range of in-house PVD coating capabilities, including TiN, TiCN, TiAlN, AlTiN, and Diamond coatings, as well as a variety of unique proprietary coatings for critical applications. We manufacture tools to standard industry specifications, such as metric DIN, JIS, NAS 986, Imperial, and ANSI requirements. Hanita is ISO 9001, ISO 14001, and OHSAS 18001 certified.

Custom Solutions with Quick Delivery

When your application requires a customized or specialty tool, you can rely on Hanita to deliver the right solution. By working closely with our customers to understand their unique needs, we have earned a reputation for creative versatility in designing innovative tools for demanding operations. Our engineering and design services, combined with our quick-delivery capabilities, make Hanita your ideal custom solutions partner.

Global Reach, Local Support

Hanita's products and services are available via a global network of dedicated distributors, who deliver local technical support designed to help you significantly optimize productivity. You can rely on your local Hanita Distributor to provide onsite demonstrations of our latest tooling and to recommend the correct end mill or drill for your specific application.

Vendor of Choice

Hanita serves every major industrial market throughout the world and is a vendor of choice in the most demanding industries, including Aerospace, Die and Mold, Automotive, Heavy Equipment, Medical, and General Engineering.

Throughout our 50-year history, Hanita has achieved a reputation for providing our customers with a constant flow of new and unique products and services, specially designed for maximum efficiency and performance. We have enabled customers to become more competitive and more profitable in their own industries, producing parts in less time, with fewer tool changes and longer tool life.

We are committed to providing you with tools and services that deliver the ultimate in customer satisfaction, and we are pleased to feature some of our latest breakthroughs in this Catalog. For more information about how these products can impact your bottom line, please contact your local Authorized Hanita Distributor today!

HANITA®

Services

Hanita offers superb quality high-performance solid end mills, carbide drills, and a lot more! Behind the Hanita® brand is an array of premium services that can help you get more from your tooling budget.

Our Carbide Recycling Program is a simple and economical way to recycle used tooling. Spent tools can be returned to one of our approved recycling centers for cash or credit! It's good for business and good for the environment. Read about recycling your used carbide on page B2.

Reconditioning Services provided by Hanita and our authorized partners optimize the total value of your metalcutting tools. Get added useful life out of your cutting tools by reconditioning them to Hanita's original specifications. Read more on page B3.

It's all part of the Hanita package — quality tools, engineering expertise, application support, and cost-cutting services for the entire life cycle of your metalcutting tools. Join with Hanita to reduce your production costs and achieve operational excellence.

Hanita Services

Carbide Recycling Program

HANITA

Get Cash or Credit for Your Used Carbide

Why recycle?

It's the right thing to do!

It's easy for your company to be environmentally conscious with our Carbide Recycling Program.

By sending us your used carbide tools, you will help to preserve and protect the environment and ensure that these products are responsibly recycled.

It's profitable!

Not only does Hanita make it easy for your company to be environmentally conscious, we offer an added incentive — it is profitable.

Through our Carbide Recycling Program, you can systematically get the full value of your investment in metalcutting tools, improve your profitability, and reduce your overall tooling spend. When you send us your used carbide, we will reward you with cash or credit. (Credit offer valid in U.S.A. only.)

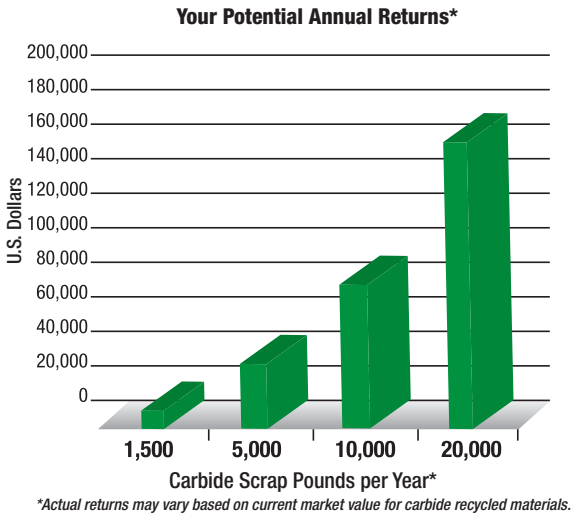
It's EASY!

Our Recycling Program is available on the Web and is easy to use. You can request a quote, arrange to send us your used carbide, and check the status of your shipment. To find out more, please visit www.kennametal.com/carbiderecycling.

For more information:

Phone: 1-TON-CARBIDE
(1.866.227.2433)

e-mail: usa.toncarbide@kennametal.com



Actual returns may vary based on current market value for carbide recycled materials.

Green Boxes for Green Companies

The Green Box™ program is a safe and efficient way for you to package and ship your spent carbide tools to an authorized recycling location.

Qualified used carbide includes: mixed coated and uncoated metalcutting tools free of chips, oil, and steel contamination. Material must be free of braze.

Get the Most Out of Your Cutting Tools

Why recondition?

Our Reconditioning Services help you optimize the total value of your metalcutting tools throughout their entire life cycle by giving them "like-new" performance characteristics — with rapid turnaround time — so the tools you need are always on-hand.

By sending your worn drills and end mills to Hanita for reconditioning, you will get:

- Proprietary geometry.
- Certified coatings.
- Superior quality.
- Like-new performance.
- Fast turnaround time.
- Easy logistics through the Blue Box™ program.
- Application support throughout the entire tool life cycle.

Did you know:

Your cutting tools can be reground by Hanita as many as five times!

How does it work?

Using our Reconditioning Service is easy:

1. Visit: www.kennametal.com/completeservices
2. Click "Tool Reconditioning."
3. Click "Learn more about Tool Reconditioning."
4. Download the Reconditioning Order Form.
5. Complete the Order Form, enclose it with your worn tools, and ship your tools to the address on the Form.
6. Receive your reconditioned drills or end mills in like-new condition.

Contact your Authorized Hanita Distributor for more information.

Reconditioning Logistics Made Simple

The Blue Box™ program offers a safe and efficient way for you to package and ship your tools to an authorized Reconditioning Center.

Contact your Authorized Hanita Distributor to request a Blue Box.

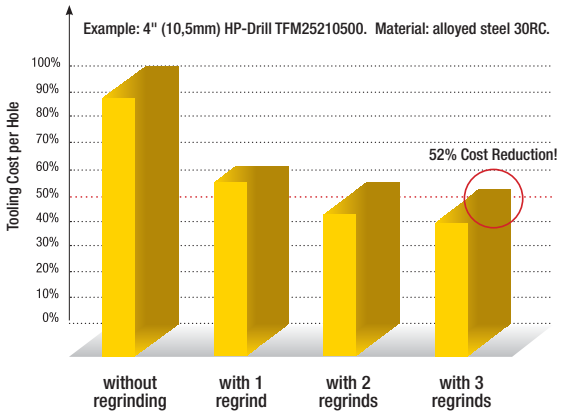
Hanita's Reconditioning Services Make Perfect Sense

Our Reconditioning Services deliver considerable savings throughout the life of your cutting tools and can reduce your overall tooling costs by more than 50%.

Hanita's Carbide Recycling Program

As an added bonus, Hanita will buy back your carbide tools once they can no longer be reconditioned — for even greater value.

Reduce Tooling Costs by More than 50%



Authorized Reconditioning Facilities

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HANITA®

Solid End Mills

VariMill II Carbide End Mills

AluSurf Carbide End Mills

X-Feed Carbide End Mills

Custom Solutions

Hanita is dedicated to the design and manufacturing of special milling solutions for high-demanding operations and focused manufacturing. Our factory engineers, production experts, and field application engineers are available to work with you to design solutions to provide maximum productivity and throughput.

Unique advantages such as in-house PVD high-quality coating facilities (TiN, TiCN, TiAlN, AlTiN, and Z-coat), a wide range of raw materials (HSS, HSSE, HSS-Powder; Solid Carbide, Brazed Carbide) and capabilities for a wide range of diameters (0.010" to 3.000") position Hanita as the preferred partner for high-quality, application-specific tools.

Hanita specializes in designing and manufacturing blueprint specials in the following tool styles:

- End Mills
- Arbor Style Milling Cutters
- Carbide Drills (straight and step)
- Routers
- Reamers
- Counterbores
- Tapered Tools
- Thread Milling Cutters

VariMill II Carbide End Mills

Markets and Applications

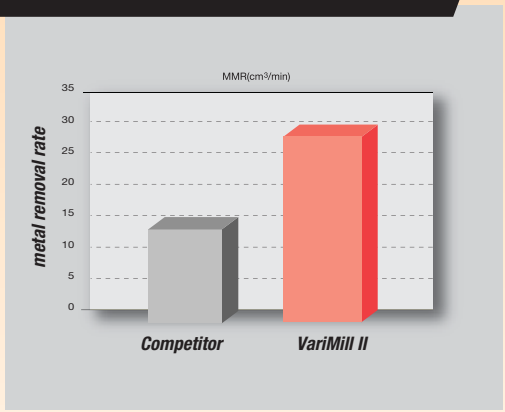
- Best suited for applications in the Aerospace, Medical, Die and Mold, Automotive, and General Engineering markets.
- Outstanding performance in stainless steel, titanium, Inconel, and other high-temperature alloys.
- Increased metal removal rates in roughing and finishing operations.
- Excellent performance in both slotting and profiling operations.

Featured Application: Slotting an Engine Ring

Operation:	Slotting
Customer:	Aerospace Manufacturer
Workpiece:	Engine Ring
Material:	SST nickel-based alloy EZ3NCT25 (25% nickel, 13% chromium) at 245 HB
Solution:	VariMill II™ 5-Flute with AlTiN Coating
Results:	90% increase in metal removal rate

		COMPETITOR	HANITA
coating:	*TiAlN*	*AlTiN*	
end mill:	*4-flute 12mm 1mm radius*	*5-flute 12mm 1mm radius*	
material:	*SST nickel-based alloy*	*SST nickel-based alloy*	
depth of cut (ap):	*11,15mm (0.439 in)*	*11,15mm (0.439 in)*	
width of cut (ae):	*12mm (0.472 in)*	*12mm (0.472 in)*	
speed (Vc):	*30 m/min (100 sfm)*	*40 m/min (132 sfm)*	
rpm (N):	*800 rpm*	*1,060 rpm*	
feed rate (Vf):	*112mm/min (4.4 in/min)*	*212mm/min (8.3 in/min)*	
chip load per tooth (fz):	*0,035mm/th (0.0014 in/th)*	*0,04mm/th (0.0016 in/th)*	
metal removal rate:	*15 cm^3/min (1.00 in^3/min)*	*28 cm^3/min (1.75 in^3/min)*	

90% Productivity Increase!



Solid End Mills

VariMill II™ Carbide End Mills

HANITA

Hanita VariMill II 5-Flute End Mills

Increase metal removal rates without loss of speed or tool life in stainless steel and high-temperature alloys!

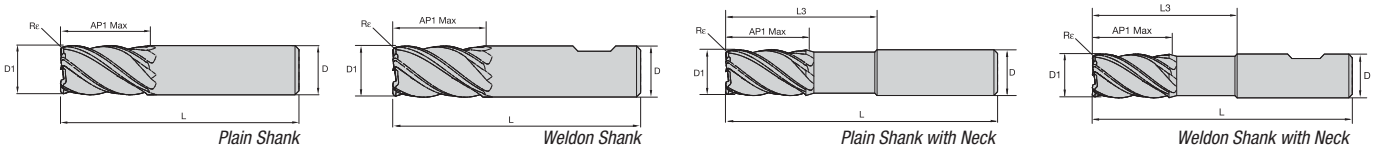
- Five-flute geometry enables slotting up to 1 x D.
- Unequal flute spacing minimizes chatter for smoother machining.
- Single tool for both roughing and finishing operations for fewer setups.
- Available with multiple neck, shank, and corner radius variations.

Recommended Cutting Parameters — Metric and Inch

		Depth of Cut			Vc	Chip Load per Tooth (shown in decimal millimeters)										
		Axial	Radial	Axial	Cutting Speed											
		Side Milling		Slotting	AlTiN											
Material Group		ap	ae	ap	m/min	4	5	6	8	10	12	14	16	18	20	25
P2	Medium and high carbon steels > 0.3% C	1.5 x D	0.5 x D	1 x D	160-200	0,03	0,04	0,05	0,06	0,07	0,07	0,08	0,08	0,09	0,10	0,11
P3	Alloy steels and tool steels < 330 HB, < 35 HRc	1.5 x D	0.5 x D	1 x D	160-180	0,03	0,03	0,04	0,05	0,06	0,07	0,07	0,08	0,08	0,09	0,10
P4	Alloy steels and tool steels 340-450 HB, 36-48 HRc	1.5 x D	1.5 x D	1 x D	140-160	0,02	0,03	0,04	0,04	0,05	0,06	0,07	0,07	0,08	0,08	0,10
M1	Austenitic stainless steel (302, 303, 304)	1.5 x D	0.5 x D	1 x D	90-115	0,03	0,03	0,04	0,05	0,06	0,07	0,07	0,08	0,08	0,09	0,10
M2	Austenitic stainless steel (316, 316L)	1.5 x D	0.5 x D	1 x D	60-80	0,02	0,03	0,03	0,04	0,05	0,06	0,06	0,07	0,07	0,08	0,08
M3	Austenitic stainless steel: Duplex	1.5 x D	0.5 x D	1 x D	60-70	0,02	0,02	0,03	0,04	0,04	0,05	0,05	0,05	0,06	0,06	0,07
K1	Grey cast iron (GG)	1.5 x D	0.5 x D	1 x D	130-170	0,03	0,04	0,05	0,06	0,08	0,08	0,10	0,10	0,11	0,12	0,13
K2	Ductile, CGI, and malleable cast iron < 80 KSI	1.5 x D	0.5 x D	1 x D	110-130	0,02	0,03	0,03	0,05	0,05	0,06	0,07	0,07	0,08	0,08	0,10
S3	Nickel-based heat-resistant alloys	1.5 x D	0.5 x D	1 x D	25-40	0,01	0,01	0,02	0,03	0,03	0,04	0,04	0,05	0,06	0,06	0,07
S4	Alpha-Beta titanium alloys (Ti6Al4V)	1.5 x D	0.5 x D	1 x D	50-60	0,02	0,02	0,03	0,04	0,04	0,05	0,05	0,06	0,07	0,08	0,09

		Depth of Cut			Vc	Chip Load per Tooth (shown in decimal millimeters)							
		Axial	Radial	Axial	Cutting Speed								
		Side Milling		Slotting	AlTiN								
Material Group		ap	ae	ap	SFM	3/16	1/4	5/16	3/8	1/2	5/8	3/4	1
P2	Medium and high carbon steels > .3% C	1.5 x D	0.5 x D	1 x D	520-650	.0015	.0021	.0023	.0026	.0030	.0031	.0038	.0044
P3	Alloy steels and tool steels < 330 HB, < 35 HRc	1.5 x D	0.5 x D	1 x D	520-590	.0011	.0017	.0020	.0023	.0029	.0029	.0034	.0040
P4	Alloy steels and tool steels 340-450 HB, 36-48 HRc	1.5 x D	0.5 x D	1 x D	460-520	.0010	.0015	.0016	.0020	.0026	.0027	.0030	.0038
M1	Austenitic stainless steel (302, 303, 304)	1.5 x D	0.5 x D	1 x D	290-370	.0011	.0017	.0020	.0023	.0027	.0029	.0032	.0040
M2	Austenitic stainless steel (316, 316L)	1.5 x D	0.5 x D	1 x D	190-260	.0009	.0013	.0016	.0019	.0025	.0025	.0028	.0032
M3	Austenitic stainless steel: Duplex	1.5 x D	0.5 x D	1 x D	190-230	.0008	.0010	.0014	.0015	.0019	.0020	.0023	.0028
K1	Grey cast iron (GG)	1.5 x D	0.5 x D	1 x D	430-550	.0014	.0022	.0025	.0030	.0035	.0040	.0045	.0050
K2	Ductile, CGI, and malleable cast iron < 80 KSI	1.5 x D	0.5 x D	1 x D	360-430	.0009	.0013	.0018	.0019	.0025	.0027	.0030	.0040
S3	Nickel-based heat-resistant alloys	1.5 x D	0.5 x D	1 x D	80-130	.0004	.0007	.0011	.0015	.0016	.0019	.0023	.0028
S4	Alpha-Beta titanium alloys (Ti6Al4V)	1.5 x D	0.5 x D	1 x D	160-200	.0008	.0010	.0014	.0015	.0021	.0023	.0028	.0036

Hanita VariMill II 5-Flute End Mills — For Stainless Steel, High-Temperature Alloys, and Other Ferrous Materials



Plain Shank | *Weldon Shank* | *Plain Shank with Neck* | *Weldon Shank with Neck*

Metric Sizes — Series 5777 — VariMill II 5-Flute, Plain and Weldon Shanks

				Plain Shanks AlTiN-Coated End Mills with Square Corners — Rε 0	Plain Shanks AlTiN-Coated End Mills with Corner Radius		Weldon Shanks AlTiN-Coated End Mills with Corner Radius	
D1	D	AP1 Max	L	catalog number	Rε mm	catalog number	Rε mm	catalog number
4	6	11	55	577704012MT	0,25	577704002MT	0,25	577704002MW
5	6	13	57	–	0,25	577705002MT	0,25	577705002MW
6	6	13	57	577706012MT	0,4	577706002MT	0,4	577706002MW
7	8	16	63	–	0,4	577707003MT	0,4	577707003MW
8	8	19	63	577708013MT	0,5	577708003MT	0,5	577708003MW
9	10	19	72	–	0,5	577709004MT	0,5	577709004MW
10	10	22	72	577710014MT	0,5	577710004MT	0,5	577710004MW
12	12	26	83	577712015MT	0,75	577712005MT	0,75	577712005MW
14	14	26	83	577714014MT	0,75	577714004MT	0,75	577714004MW
16	16	32	92	577716016MT	0,75	577716006MT	0,75	577716006MW
18	18	32	92	577718018MT	–	–	0,75	577718008MW
20	20	38	104	577720017MT	0,75	577720007MT	0,75	577720007MW
25	25	45	121	–	0,75	577725008MT	0,75	577725008MW

Inch Sizes — Series 5V0S — VariMill II 5-Flute, Plain Shanks

				Catalog Number Standard Corner Conditions — AlTiN-Coated End Mills					
D1	D	AP1 Max	L	Rε 0	Rε .015 in	Rε .030 in	Rε .060 in	Rε .090 in	Rε .120/.125 in
3/16	3/16	5/8	2 1/4	TM5V0S05000S	TM5V0S05000A	TM5V0S05000B	–	–	–
1/4	1/4	3/4	2 1/2	TM5V0S07002S	TM5V0S07002A	TM5V0S07002B	TM5V0S07002C	–	–
5/16	5/16	3/4	2 1/2	TM5V0S08003S	TM5V0S08003A	TM5V0S08003B	TM5V0S08003C	–	–
3/8	3/8	7/8	2 1/2	TM5V0S10004S	TM5V0S10004A	TM5V0S10004B	TM5V0S10004C	–	–
1/2	1/2	1 1/4	3	TM5V0S13015S	TM5V0S13015A	TM5V0S13015B	TM5V0S13015C	TM5V0S13015D	TM5V0S13015E
5/8	5/8	1 1/4	3 1/2	TM5V0S16006S	–	TM5V0S16006B	TM5V0S16006C	TM5V0S16006D	–
3/4	3/4	1 1/2	4	TM5V0S19007S	–	TM5V0S19007B	TM5V0S19007C	TM5V0S19007D	TM5V0S19007E
1	1	1 3/4	4	TM5V0S25008S	–	TM5V0S25008B	TM5V0S25008C	TM5V0S25008D	TM5V0S25008E

Inch Sizes — Series 5V0S — VariMill II 5-Flute, Weldon Shanks

				Catalog Number Standard Corner Conditions — AlTiN-Coated End Mills					
D1	D	AP1 Max	L	Rε 0	Rε .015 in	Rε .030 in	Rε .060 in	Rε .090 in	Rε .120/.125 in
1/2	1/2	1 1/4	3	TM5V0S13015SW	TM5V0S13015AW	TM5V0S13015BW	TM5V0S13015CW	TM5V0S13015DW	TM5V0S13015EW
5/8	5/8	1 1/4	3 1/2	TM5V0S16006SW	–	TM5V0S16006BW	TM5V0S16006CW	TM5V0S16006DW	–
3/4	3/4	1 1/2	4	TM5V0S19007SW	–	TM5V0S19007BW	TM5V0S19007CW	TM5V0S19007DW	TM5V0S19007EW
1	1	1 3/4	4	TM5V0S25008SW	–	TM5V0S25008BW	TM5V0S25008CW	TM5V0S25008DW	TM5V0S25008EW

Inch Sizes — Series 5VNS — Inch — VariMill II Extended Neck 5-Flute, Plain and Weldon Shank

					Plain Shanks AlTiN-Coated End Mills with Corner Radius		Weldon Shanks AlTiN-Coated End Mills with Corner Radius	
D1	D	AP1 Max	L3	L	Rε in	catalog number	Rε in	catalog number
1/4	1/4	1/2	1 1/4	4	.015	TM5VNS07012A	–	–
3/8	3/8	7/8	1 7/8	4	.015	TM5VNS10014A	–	–
1/2	1/2	1 1/4	2 1/4	4	.030	TM5VNS13005B	.030	TM5VNS13005BW
5/8	5/8	1 1/4	2 1/4	4	.030	TM5VNS16006B	.030	TM5VNS16006BW
3/4	3/4	1 1/2	3 1/4	5 1/2	.030	TM5VNS19017B	.030	TM5VNS19017BW
1	1	1 3/4	3 1/4	5 1/2	.030	TM5VNS25018B	.030	TM5VNS25018BW

Solid End Mills

VariMill II™ Carbide End Mills

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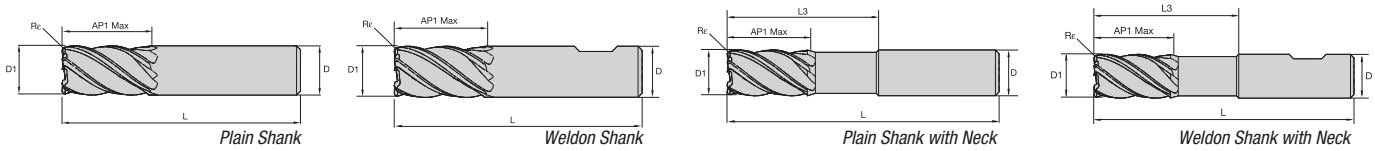
Hanita VariMill II 5-Flute End Mills — For Titanium



Plain Shank *Weldon Shank* *Plain Shank with Neck* *Weldon Shank with Neck*

Metric Sizes — Series 57N8 — VariMill II Extended Neck 5-Flute, Plain Shanks

					Catalog Number Optional Corner Conditions — AlTiN-Coated End Mills					
D1	D	AP1 Max	L3	L	Rε 0	Rε 0,5mm	Rε 1,0mm	Rε 2,0mm	Rε 3,0mm	Rε 4,0mm
6	6	13	18	63	57N806002MT	57N806022MT	57N806032MT	—	—	—
8	8	19	24	76	57N808003MT	57N808023MT	57N808033MT	—	—	—
10	10	22	30	76	57N810004MT	57N810024MT	57N810034MT	57N810054MT	—	—
12	12	26	36	84	57N812005MT	57N812025MT	57N812035MT	57N812055MT	—	—
16	16	32	48	100	57N816006MT	57N816026MT	57N816036MT	57N816056MT	57N816076MT	—
20	20	38	60	115	57N820007MT	57N820027MT	57N820037MT	57N820057MT	57N820077MT	57N820087MT
25	25	45	75	135	57N825008MT	57N825028MT	57N825038MT	57N825058MT	57N825078MT	57N825088MT

Metric Sizes — Series 57N8 — VariMill II Extended Neck 5-Flute, Weldon Shanks

					Catalog Number Optional Corner Conditions — AlTiN-Coated End Mills					
D1	D	AP1 Max	L3	L	Rε 0,5mm	Rε 1,0mm	Rε 1,5mm	Rε 2,0mm	Rε 3,0mm	Rε 4,0mm
6	6	13	18	63	57N806022MW	57N806032MW	57N806042MW	—	—	—
8	8	19	24	76	57N808023MW	57N808033MW	—	57N808053MW	—	—
10	10	22	30	76	57N810024MW	57N810034MW	—	57N810054MW	—	—
12	12	26	36	84	57N812025MW	57N812035MW	—	57N812055MW	—	—
16	16	32	48	100	57N816026MW	57N816036MW	—	57N816056MW	57N816076MW	—
20	20	38	60	115	57N820027MW	57N820037MW	—	57N820057MW	57N820077MW	57N820087MW
25	25	45	75	135	57N825028MW	57N825038MW	—	57N825058MW	57N825078MW	57N825088MW

Inch Sizes — Series 5V0T — VariMill II 5-Flute, Plain Shanks

				Catalog Number Optional Corner Conditions — AlTiN-Coated End Mills					
D1	D	AP1 Max	L	Rε 0	Rε .015 in	Rε .030 in	Rε .060 in	Rε .090 in	Rε .120/.125 in
1/4	1/4	3/4	2 1/2	TM5V0T07002S	TM5V0T07002A	TM5V0T07002B	TM5V0T07002C	—	—
5/16	5/16	3/4	2 1/2	TM5V0T08003S	TM5V0T08003A	TM5V0T08003B	TM5V0T08003C	—	—
3/8	3/8	7/8	2 1/2	TM5V0T10004S	TM5V0T10004A	TM5V0T10004B	TM5V0T10004C	—	—
1/2	1/2	1 1/4	3	TM5V0T13015S	TM5V0T13015A	TM5V0T13015B	TM5V0T13015C	TM5V0T13015D	TM5V0T13015E
5/8	5/8	1 1/4	3 1/2	TM5V0T16006S	—	TM5V0T16006B	TM5V0T16006C	TM5V0T16006D	—
3/4	3/4	1 1/2	4	TM5V0T19007S	—	TM5V0T19007B	TM5V0T19007C	TM5V0T19007D	TM5V0T19007E
1	1	1 3/4	4	TM5V0T25008S	—	TM5V0T25008B	TM5V0T25008C	TM5V0T25008D	TM5V0T25008E

Inch Sizes — Series 5V0T — VariMill II 5-Flute, Weldon Shanks

				Catalog Number Optional Corner Conditions — AlTiN-Coated End Mills					
D1	D	AP1 Max	L	Rε 0	Rε .015 in	Rε .030 in	Rε .060 in	Rε .090 in	Rε .120/0.125 in
1/2	1/2	1 1/4	3	TM5V0T13015SW	TM5V0T13015AW	TM5V0T13015BW	TM5V0T13015CW	TM5V0T13015DW	TM5V0T13015EW
5/8	5/8	1 1/4	3 1/2	TM5V0T16006SW	—	TM5V0T16006BW	TM5V0T16006CW	TM5V0T16006DW	—
3/4	3/4	1 1/2	4	TM5V0T19007SW	—	TM5V0T19007BW	TM5V0T19007CW	TM5V0T19007DW	TM5V0T19007EW
1	1	1 3/4	4	TM5V0T25008SW	—	TM5V0T25008BW	TM5V0T25008CW	TM5V0T25008DW	TM5V0T25008EW

To place an order, contact your local Authorized Hanita Distributor. Visit www.hanita.com to find the Distributor nearest you.

VariMill End Mills

Up to 200% longer tool life!

- Increase feed rates by up to 20% over any 4-flute variable flute/helix style end mill.
- In-house TiAlN coating extends tool life!
- Use in slotting operations up to .5 x diameter!
- Use in profiling operations up to .25 x diameter radial depth and 2 x diameter axial depth!
- Chatter-free machining without resonance vibration due to constant, unequal flute spacing.
- Smooth, silent machining with superb surface finish at high speeds.
- Easy to resharpen.
- Up to 200% longer tool life compared to traditional high-performance tools.
- Available with square corners or corner radius standard from stock.

Recommended Cutting Parameters — Metric

VariMill Series 4777 and 4778

Material	Application: Side Milling ap	Application: Side Milling ae	Application: Slotting ap	Vc SFM TiAlN/AlTiN	fZ – feed per tooth in mm, D – diameter in mm: 4	5	6	8	10	12	16	18	20	25
Easy to cut stainless steels (304)	1 x D	0.5 x D	1 x D	90~115	0,025	0,030	0,040	0,050	0,060	0,065	0,070	0,072	0,075	0,075
Moderately difficult to cut stainless steels	1 x D	0,5 x D	1 x D	70~85	0,020	0,025	0,035	0,045	0,050	0,055	0,060	0,065	0,065	0,070
Difficult to cut stainless steels (316L)	1 x D	0,5 x D	1 x D	60~80	0,015	0,025	0,030	0,040	0,045	0,050	0,055	0,060	0,060	0,060
High-temperature alloys	1 x D	0,2 x D	0,3 x D	25~35	0,011	0,011	0,017	0,027	0,027	0,038	0,049	0,055	0,055	0,055
Soft steels 1020	1 x D	0,5 x D	1 x D	150~180	0,025	0,030	0,040	0,060	0,060	0,070	0,075	0,080	0,090	0,100
Titanium Alpha Beta Alloys (6Al4V)	1 x D	0,5 x D	1 x D	50~60	0,012	0,015	0,020	0,030	0,030	0,040	0,045	0,050	0,060	0,070
Gray Cast Iron	1 x D	0,5 x D	1 x D	120~150	0,025	0,030	0,040	0,060	0,060	0,070	0,075	0,080	0,090	0,100

VariMill Series 47N0

Material	Application: Side Milling ap	Application: Side Milling ae	Application: Slotting ap	Vc SFM TiAlN/AlTiN	fZ – feed per tooth in mm, D – diameter in mm: 5	6	8	10	12	16	20
Easy to cut stainless steels (304)	1 x D	0,5 x D	1 x D	80~100	0,027	0,036	0,045	0,054	0,059	0,063	0,068
Moderately difficult to cut stainless steels	1 x D	0,4 x D	1 x D	60~75	0,023	0,032	0,041	0,045	0,050	0,054	0,059
Difficult to cut stainless steels (316L)	1 x D	0,4 x D	1 x D	55~70	0,023	0,027	0,036	0,041	0,045	0,050	0,054
High-temperature alloys	1 x D	0,2 x D	0,5 x D	22~30	0,010	0,015	0,024	0,024	0,034	0,044	0,050
Soft steels 1020	1 x D	0,5 x D	1 x D	135~160	0,027	0,036	0,054	0,054	0,063	0,068	0,081
Titanium Alpha Beta Alloys (6Al4V)	1 x D	0,3 x D	0,5 x D	45~55	0,014	0,018	0,027	0,027	0,036	0,041	0,054
Gray Cast Iron	1 x D	0,4 x D	1 x D	110~135	0,027	0,036	0,054	0,054	0,063	0,068	0,081

Recommended Cutting Parameters — Inch

VariMill Extended Neck Series 4VN5

Material	Application: Side Milling ap	Application: Side Milling ae	Application: Slotting ap	Vc SFM TiAlN	fZ – feed per tooth in inch, D – diameter in inch (TiAlN): 5/32	3/16	1/4	5/8	3/8	1/2	5/8	3/4	1
Easy to cut stainless steels (304)	1 x D	0.3 x D	0.3-0.5 x D	280	.0009	.0011	.0014	.0018	.0022	.0023	.0025	.0025	.0027
Moderately difficult to cut stainless steels	1 x D	0.3 x D	0.3-0.5 x D	240	.0007	.0009	.0013	.0016	.0018	.0020	.0022	.0023	.0025
Difficult to cut stainless steels (316L)	1 x D	0.3 x D	0.3-0.5 x D	200	.0005	.0009	.0011	.0014	.0016	.0018	.0020	.0022	.0022
Soft steels 1020	1 x D	0.3 x D	0.3-0.5 x D	500	.0009	.0011	.0014	.0022	.0022	.0025	.0027	.0028	.0035
Titanium Alpha Beta Alloys (6Al4V)	1 x D	0.3 x D	0.3-0.5 x D	170	.0005	.0005	.0007	.0011	.0011	.0014	.0016	.0018	.0025
Gray Cast Iron	1 x D	0.3 x D	0.3-0.5 x D	500	.0009	.0011	.0014	.0022	.0022	.0025	.0027	.0028	.0035

VariMill Long Reach Ball Nose Series 4VP0

Material	Application: Slotting ap	Vc SFM TiAlN	fZ – feed per tooth in inch, D – diameter in inch (TiAlN): 5/32	3/16	1/4	5/8	3/8	1/2	5/8	3/4	1
Easy to cut stainless steels (304)	0.3-0.5 x D	280	.0009	.0011	.0014	.0018	.0022	.0023	.0025	.0025	.0027
Moderately difficult to cut stainless steels	0.3-0.5 x D	240	.0007	.0009	.0013	.0016	.0018	.0020	.0022	.0023	.0025
Difficult to cut stainless steels (316L)	0.3-0.5 x D	200	.0005	.0009	.0011	.0014	.0016	.0018	.0020	.0022	.0022
Soft steels 1020	0.3-0.5 x D	500	.0009	.0011	.0014	.0022	.0022	.0025	.0027	.0028	.0035
Titanium Alpha Beta Alloys (6Al4V)	0.3-0.5 x D	170	.0005	.0005	.0007	.0011	.0011	.0014	.0016	.0018	.0025
Gray Cast Iron	0.3-0.5 x D	500	.0009	.0011	.0014	.0022	.0022	.0025	.0027	.0028	.0035

VariMill Stub and Regular Length Series 4V45, 4V05

Material	Application: Side Milling ap	Application: Side Milling ae	Application: Slotting ap	Vc SFM TiAlN	fZ – feed per tooth in inch, D – diameter in inch (TiAlN): 5/32	3/16	1/4	5/8	3/8	1/2	5/8	3/4	1
Easy to cut stainless steels (304)	1.5 x D	0.5 x D	1 x D	280	.0010	.0012	.0016	.0020	.0024	.0026	.0028	.0028	.0030
Moderately difficult to cut stainless steels	1.5 x D	0.5 x D	1 x D	240	.0008	.0010	.0014	.0018	.0020	.0022	.0024	.0026	.0028
Difficult to cut stainless steels (316L)	1.5 x D	0.5 x D	1 x D	200	.0006	.0010	.0012	.0016	.0018	.0020	.0022	.0024	.0024
Soft steels 1020	1.5 x D	0.5 x D	1 x D	500	.0010	.0012	.0016	.0024	.0024	.0028	.0030	.0031	.0039
Titanium Alpha Beta Alloys (6Al4V)	1.5 x D	0.5 x D	1 x D	170	.0005	.0006	.0008	.0012	.0012	.0016	.0018	.0020	.0028
Gray Cast Iron	1.5 x D	0.5 x D	1 x D	500	.0010	.0012	.0016	.0024	.0024	.0028	.0030	.0031	.0039

VariMill Long Length Series 4V15, 4V25, 4V65

Material	Application: Side Milling ap	Application: Side Milling ae	Vc SFM TiAlN	fZ – feed per tooth in inch, D – diameter in inch (TiAlN): 5/32	3/16	1/4	5/8	3/8	1/2	5/8	3/4	1
Easy to cut stainless steels (304)	2-3 x D	0.2 x D	280	.009	.0011	.0014	.0018	.0022	.0023	.0025	.0025	.0027
Moderately difficult to cut stainless steels	2-3 x D	0.2 x D	240	.0007	.0009	.0013	.0016	.0019	.0020	.0022	.0023	.0025
Difficult to cut stainless steels (316L)	2-3 x D	0.2 x D	200	.0005	.0009	.0011	.0014	.0016	.0018	.0020	.0022	.0022
Soft steels 1020	2-3 x D	0.2 x D	500	.0009	.0011	.0014	.0022	.0022	.0025	.0027	.0028	.0035
Titanium Alpha Beta Alloys (6Al4V)	2-3 x D	0.2 x D	170	.0005	.0005	.0007	.0011	.0011	.0014	.0016	.0019	.0025
Gray Cast Iron	2-3 x D	0.2 x D	500	.0009	.0011	.0014	.0022	.0022	.0025	.0027	.0028	.0035

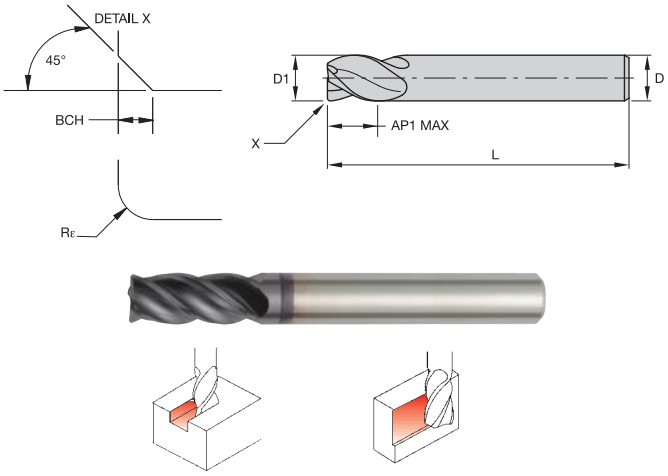
VariMill Ball Nose Series 4V00

Material	Application: Slotting ap	Vc SFM TiAlN	fZ – feed per tooth in inch, D – diameter in inch (TiAlN): 3/16	1/4	5/16	3/8	1/2	5/8	3/4
Easy to cut stainless steels (304)	1 x D	280	.0010	.0014	.0018	.0021	.0023	.0025	.0027
Moderately difficult to cut stainless steels	1 x D	240	.0009	.0012	.0016	.0018	.0019	.0021	.0023
Difficult to cut stainless steels (316L)	1 x D	200	.0009	.0011	.0014	.0016	.0018	.0019	.0021
Soft steels 1020	1 x D	500	.0011	.0014	.0021	.0021	.0025	.0027	.0032
Titanium Alpha Beta Alloys (6Al4V)	0.5 x D	170	.0005	.0007	.0011	.0011	.0014	.0016	.0021
Gray Cast Iron	1 x D	500	.0011	.0014	.0021	.0021	.0025	.0027	.0032

For high-speed machining or Kellering, use axial equal to 5% of the diameter, then multiply speeds by 2 to 3 times.

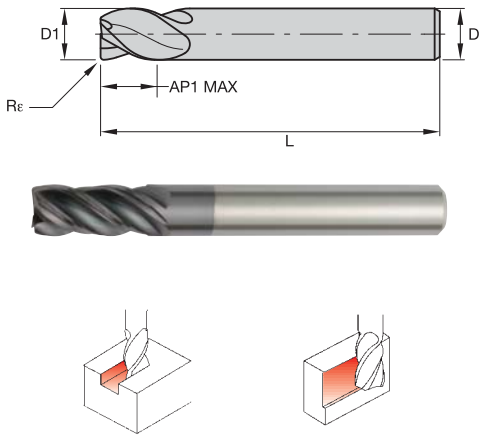
VariMill 4-Flute End Mills

Metric Sizes — Series 4777 — VariMill High-Perfomance End Mills for Stainless Steel, High-Temperature Alloys, and Other Ferrous Materials



D1	D	AP1 Max	L	flutes	BCH	Plain Shank	Weldon Shank
4	6	12	55	4	0,4	477704002LT	477704002LW
5	6	13	57	4	0,4	477705002LT	477705002LW
6	6	13	57	4	0,4	477706002LT	477706002LW
7	8	16	63	4	0,4	477707003LT	477707003LW
8	8	16	63	4	0,4	477708003LT	477708003LW
9	10	19	72	4	0,4	477709004LT	477709004LW
10	10	22	72	4	0,5	477710004LT	477710004LW
12	12	26	83	4	0,5	477712005LT	477712005LW
14	14	26	83	4	0,5	477714014LT	477714014LW
16	16	32	92	4	0,5	477716006LT	477716006LW
18	18	32	92	4	0,5	477718018LT	477718018LW
20	20	38	104	4	0,5	477720007LT	477720007LW
25	25	45	121	4	0,5	477725008LT	477725008LW

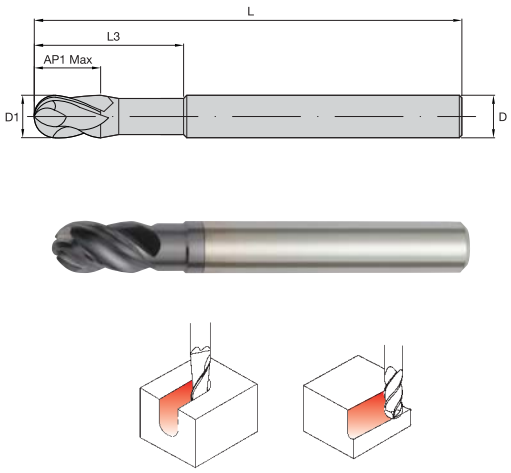
Metric Sizes — Series 4778 — VariMill High-Performance End Mills for Titanium



D1	D	AP1 Max	L	Rε	flutes	Plain Shank	Weldon Shank
4	6	12	55	0,2	4	477804002MT	477804002MW
5	6	13	57	0,2	4	477805002MT	477805002MW
6	6	13	57	0,2	4	477806002MT	477806002MW
7	8	16	63	0,2	4	477807003MT	477807003MW
8	8	16	63	0,2	4	477808003MT	477808003MW
9	10	19	72	0,3	4	477809004MT	477809004MW
10	10	22	72	0,3	4	477810004MT	477810004MW
12	12	26	83	0,3	4	477812005MT	477812005MW
14	14	26	83	0,3	4	477814014MT	477814014MW
16	16	32	92	0,3	4	477816006MT	477816006MW
18	18	32	92	0,3	4	477818018MT	477818018MW
20	20	38	104	0,3	4	477820007MT	477820007MW
25	25	45	121	0,3	4	477825008MT	477825008MW

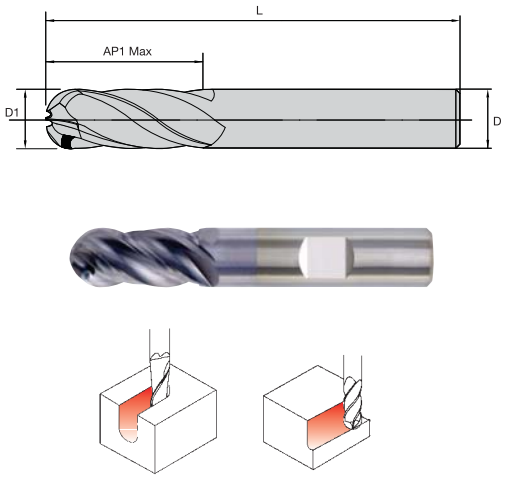
VariMill 4-Flute Ball Nose End Mills

Metric Sizes — Series 47N0 — VariMill 4-Flute Ball Nose with Extended Neck, High-Performance End Mill for Stainless Steel, High-Temperature Alloys, and Other Ferrous Materials



D1	D	AP1 Max	L	L3	flutes	TiAlN
5	6	9	57	15	4	47N005002LT
6	6	10	57	15	4	47N006002LT
8	8	12	63	20	4	47N008003LT
10	10	14	72	25	4	47N010004LT
12	12	16	83	30	4	47N012005LT
16	16	22	92	38	4	47N016006LT
20	20	26	104	50	4	47N020007LT

Inch Sizes — Series 4V00 — VariMill 4-Flute Ball Nose End Mill for Stainless Steel, High-Temperature Alloys, and Other Ferrous Materials

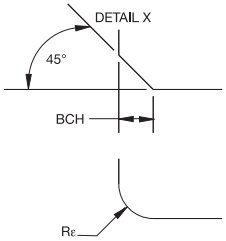


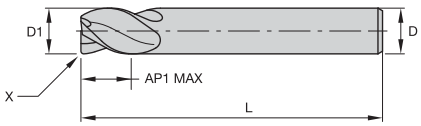
D1	D	AP1 Max	L	flutes	TiAlN
1/8	1/8	1/2	2	4	TF4V0003001
3/16	3/16	5/8	2 1/4	4	TF4V0005000
1/4	1/4	3/4	2 1/2	4	TF4V0007002
5/16	5/16	3/4	2 1/2	4	TF4V0008003
3/8	3/8	7/8	2 1/2	4	TF4V0010004
7/16	7/16	7/8	2 1/2	4	TF4V001101A
1/2	1/2	1	3	4	TF4V0013005
1/2	1/2	1 1/4	3	4	TF4V0013015
5/8	5/8	1 1/4	3 1/2	4	TF4V0016006
3/4	3/4	1 1/2	4	4	TF4V0019007
1	1	1 1/2	4	4	TF4V0025008
1 1/4	1 1/4	2 1/4	5	4	TF4V0032009

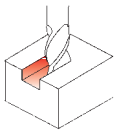
Tools 1/2" and larger have Weldon shanks.

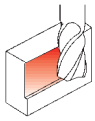
VariMill 4-Flute End Mills

Inch Sizes — Series 4V05 — (4V05, 4V15, 4V25, 4V45, 4V65) VariMill 4-Flute End Mills for Stainless Steel, High-Temperature Alloys, and Other Ferrous Materials









D1	D	AP1 Max	L	Rε	BCH	TiAlN	AlTiN
1/8	1/8	1/4	1 1/2	—	.016	TF4V4503001	—
1/8	1/8	1/4	1 1/2	.000	—	TF4V4503001S	—
1/8	1/8	1/2	2	—	.016	TF4V0503001	—
1/8	1/8	1/2	2	.000	—	TF4V0503001S	—
1/8	1/8	1/2	2	.015	—	TF4V0503001A	—
3/16	3/16	5/16	1 1/2	—	.016	TF4V4505000	—
3/16	3/16	5/16	1 1/2	.000	—	TF4V4505000S	—
3/16	3/16	5/8	2 1/4	—	.016	TF4V0505000	—
3/16	3/16	5/8	2 1/4	.000	—	TF4V0505000S	—
3/16	3/16	5/8	2 1/4	.015	—	TF4V0505000A	—
3/16	3/16	5/8	2 1/4	.030	—	TF4V0505000B	—
1/4	1/4	3/8	2	—	.016	TF4V4507002	TM4V4507002
1/4	1/4	3/8	2	.000	—	TF4V4507002S	TM4V4507002S
1/4	1/4	3/8	2	.030	—	TF4V4507002B	—
1/4	1/4	3/4	2 1/2	—	.016	TF4V0507002	TM4V0507002
1/4	1/4	3/4	2 1/2	.000	—	TF4V0507002S	TM4V0507002S
1/4	1/4	3/4	2 1/2	.015	—	TF4V0507002A	—
1/4	1/4	3/4	2 1/2	.030	—	TF4V0507002B	—
1/4	1/4	3/4	2 1/2	.060	—	TF4V0507002C	—
1/4	1/4	1 1/4	3 1/4	.000	—	TF4V1507002S	—
1/4	1/4	1 1/4	3 1/4	.015	—	TF4V1507002A	—
1/4	1/4	1 1/4	3 1/4	.030	—	TF4V1507002B	—
1/4	1/4	1 3/4	4	.000	—	TF4V2507002S	—
1/4	1/4	1 3/4	4	.015	—	TF4V2507002A	—
1/4	1/4	1 3/4	4	.030	—	TF4V2507002B	—
5/16	5/16	1/2	2	—	.016	TF4V4508003	—
5/16	5/16	1/2	2	.000	—	TF4V4508003S	—
5/16	5/16	1/2	2	.030	—	TF4V4508003B	—
5/16	5/16	3/4	2 1/2	—	.016	TF4V0508003	—

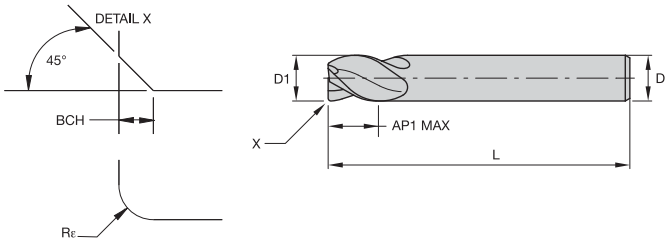
D1	D	AP1 Max	L	Rε	BCH	TiAlN	AlTiN
5/16	5/16	3/4	2 1/2	.000	—	TF4V0508003S	—
5/16	5/16	3/4	2 1/2	.015	—	TF4V0508003A	—
5/16	5/16	3/4	2 1/2	.030	—	TF4V0508003B	—
5/16	5/16	3/4	2 1/2	.060	—	TF4V0508003C	—
5/16	5/16	1 1/4	3 1/4	.000	—	TF4V1508003S	—
5/16	5/16	1 1/4	3 1/4	.030	—	TF4V1508003B	—
5/16	5/16	1 5/8	4	.000	—	TF4V2508003S	—
3/8	3/8	1/2	2	—	.020	TF4V4510004	TM4V4510004
3/8	3/8	1/2	2	.000	—	TF4V4510004S	TM4V4510004S
3/8	3/8	1/2	2	.030	—	TF4V4510004B	—
3/8	3/8	7/8	2 1/2	—	.020	TF4V0510004	TM4V0510004
3/8	3/8	7/8	2 1/2	.000	—	TF4V0510004S	TM4V0510004S
3/8	3/8	7/8	2 1/2	.015	—	TF4V0510004A	—
3/8	3/8	7/8	2 1/2	.030	—	TF4V0510004B	TM4V0510004B
3/8	3/8	7/8	2 1/2	.060	—	TF4V0510004C	—
3/8	3/8	7/8	2 1/2	.090	—	TF4V0510004D	—
3/8	3/8	1 1/2	4	.000	—	TF4V1510004S	TM4V1510004S
3/8	3/8	1 1/2	4	.030	—	TF4V1510004B	—
3/8	3/8	1 1/2	4	.060	—	TF4V1510004C	—
3/8	3/8	2 1/2	4	.000	—	TF4V2510004S	—
3/8	3/8	2 1/2	4	.030	—	TF4V2510004B	—
3/8	3/8	2 1/2	4	.060	—	TF4V2510004C	—
7/16	7/16	5/8	2 1/2	—	.020	TF4V451101A	—
7/16	7/16	5/8	2 1/2	.000	—	TF4V451101AS	—
7/16	7/16	7/8	2 1/2	—	.020	TF4V051101A	—
7/16	7/16	7/8	2 1/2	.000	—	TF4V051101AS	—
7/16	7/16	2	4	.000	—	TF4V151100AS	—
7/16	7/16	3	5	.000	—	TF4V251100AS	—

Continued on next page.

VariMill 4-Flute End Mills

Continued from previous page.

Inch Sizes — Series 4V05 — (4V05, 4V15, 4V25, 4V45, 4V65) VariMill 4-Flute End Mills for Stainless Steel, High-Temperature Alloys, and Other Ferrous Materials

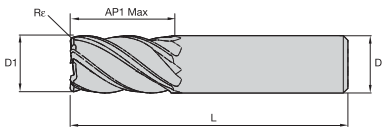


D1	D	AP1 Max	L	Rε	BCH	TiAlN	AlTiN
1/2	1/2	5/8	2 1/2	—	.020	TF4V4513005	TM4V4513005
1/2	1/2	5/8	2 1/2	.000	—	TF4V4513005S	TM4V4513005S
1/2	1/2	5/8	2 1/2	.030	—	TF4V4513015B	—
1/2	1/2	5/8	2 1/2	.060	—	TF4V4513015C	—
1/2	1/2	1	3	—	.020	TF4V0513005	TM4V0513005
1/2	1/2	1	3	.000	—	TF4V0513005S	TM4V0513005S
1/2	1/2	1 1/4	3	—	.020	TF4V0513015	TM4V0513015
1/2	1/2	1 1/4	3	.000	—	TF4V0513015S	TM4V0513015S
1/2	1/2	1 1/4	3	.015	—	TF4V0513015A	—
1/2	1/2	1 1/4	3	.030	—	TF4V0513015B	TM4V0513015B
1/2	1/2	1 1/4	3	.060	—	TF4V0513015C	—
1/2	1/2	1 1/4	3	.090	—	TF4V0513015D	—
1/2	1/2	1 1/4	3	.120	—	TF4V0513015E	—
1/2	1/2	1 1/2	4	—	.020	TF4V6513015	TM4V6513015
1/2	1/2	1 1/2	4	.000	—	TF4V6513015S	TM4V6513015S
1/2	1/2	1 1/2	4	.030	—	TF4V6513015B	—
1/2	1/2	1 1/2	4	.060	—	TF4V6513015C	—
1/2	1/2	2	4	.000	—	TF4V1513005S	TM4V1513005S
1/2	1/2	2	4	.030	—	TF4V1513005B	—
1/2	1/2	2	4	.060	—	TF4V1513005C	—
1/2	1/2	2 1/2	4 1/2	.000	—	TF4V6513025S	—
1/2	1/2	2 1/2	4 1/2	.030	—	TF4V6513025B	—
1/2	1/2	2 1/2	4 1/2	.060	—	TF4V6513025C	—
1/2	1/2	3	5	.000	—	TF4V2513005S	—
1/2	1/2	3	5	.030	—	TF4V2513005B	—
1/2	1/2	3	5	.060	—	TF4V2513005C	—
5/8	5/8	3/4	3	—	.020	TF4V4516006	—
5/8	5/8	3/4	3	.000	—	TF4V4516006S	—
5/8	5/8	3/4	3	.060	—	TF4V4516006C	—
5/8	5/8	3/4	3	.120	—	TF4V4516006E	—
5/8	5/8	1 1/4	3 1/2	—	.020	TF4V0516006	TM4V0516006
5/8	5/8	1 1/4	3 1/2	.000	—	TF4V0516006S	—
5/8	5/8	1 1/4	3 1/2	.030	—	TF4V0516006B	TM4V0516006B
5/8	5/8	1 1/4	3 1/2	.060	—	TF4V0516006C	—
5/8	5/8	1 1/4	3 1/2	.090	—	TF4V0516006D	—
5/8	5/8	1 1/4	3 1/2	.250	—	TF4V0516006E	—
5/8	5/8	1 5/8	4 1/8	—	.020	TF4V6516016	—
5/8	5/8	1 5/8	4 1/8	.000	—	TF4V6516016S	—
5/8	5/8	1 5/8	4 1/8	.060	—	TF4V6516016C	—
5/8	5/8	2 1/4	5	.000	—	TF4V1516006S	—
5/8	5/8	2 1/4	5	.060	—	TF4V1516006C	—
5/8	5/8	3	5 1/4	.000	—	TF4V2516006S	—
3/4	3/4	7/8	3 1/2	—	.020	TF4V4519007	TM4V4519007
3/4	3/4	7/8	3 1/2	.000	—	TF4V4519007S	TM4V4519007S
3/4	3/4	7/8	3 1/2	.030	—	TF4V4519007B	—
3/4	3/4	7/8	3 1/2	.060	—	TF4V4519007C	—
3/4	3/4	7/8	3 1/2	.120	—	TF4V4519007E	—
3/4	3/4	1 1/2	4	—	.020	TF4V0519007	TM4V0519007
3/4	3/4	1 1/2	4	.000	—	TF4V0519007S	TM4V0519007S
3/4	3/4	1 1/2	4	.030	—	TF4V0519007B	TM4V0519007B
3/4	3/4	1 1/2	4	.060	—	TF4V0519007C	TM4V0519007C
3/4	3/4	1 1/2	4	.090	—	TF4V0519007D	TM4V0519007D
3/4	3/4	1 1/2	4	.120	—	TF4V0519007E	TM4V0519007E
3/4	3/4	1 5/8	4	—	.020	TF4V6519017	—
3/4	3/4	1 5/8	4	.000	—	TF4V6519017S	—
3/4	3/4	2 1/4	5	—	.020	TF4V1519007	TM4V1519007
3/4	3/4	2 1/4	5	.000	—	TF4V1519007S	TM4V1519007S
3/4	3/4	2 1/4	5	.030	—	TF4V1519007B	—
3/4	3/4	2 1/4	5	.060	—	TF4V1519007C	—
3/4	3/4	3	6	—	.020	TF4V6519007	—
3/4	3/4	3	6	.000	—	TF4V6519007S	TM4V6519007S
3/4	3/4	3	6	.030	—	TF4V6519007B	—
3/4	3/4	3	6	.060	—	TF4V6519007C	—
3/4	3/4	4	6 1/4	.000	—	TF4V2519007S	—
3/4	3/4	4	6 1/4	.030	—	TF4V2519007B	—
3/4	3/4	4	6 1/4	.060	—	TF4V2519007C	—
1	1	1 1/2	4	—	.020	TF4V0525008	TM4V0525008
1	1	1 1/2	4	.000	—	TF4V0525008S	TM4V0525008S
1	1	1 1/2	4	.030	—	TF4V0525008B	TM4V0525008B
1	1	1 1/2	4	.060	—	TF4V0525008C	TM4V0525008C
1	1	1 1/2	4	.090	—	TF4V0525008D	TM4V0525008D
1	1	1 1/2	4	.120	—	TF4V0525008E	TM4V0525008E
1	1	1 1/2	4	.250	—	TF4V0525008F	—
1	1	2	5	.000	—	TF4V6525018S	—
1	1	2	5	—	.020	TF4V6525018	—
1	1	2 1/4	5	.000	—	TF4V1525008S	TM4V1525008S
1	1	2 1/4	5	—	.020	TF4V1525008	—
1	1	2 1/4	5	.030	—	TF4V1525008B	—
1	1	2 1/4	5	.060	—	TF4V1525008C	—
1	1	3	6	.000	—	TF4V2525008S	—
1	1	3	6	—	.020	TF4V2525008	—
1	1	3	6	.030	—	TF4V2525008B	—
1	1	3	6	.060	—	TF4V2525008C	—
1	1	4	7	—	.020	TF4V6525028	—
1	1	4	7	.000	—	TF4V6525028S	TM4V6525028S
1	1	4	7	.030	—	TF4V6525028B	—
1	1	4	7	.060	—	TF4V6525028C	—
1 1/4	1 1/4	2 1/4	5	—	.020	TF4V0532009	—
1 1/4	1 1/4	2 1/4	5	.000	—	TF4V0532009S	—
1 1/4	1 1/4	2 1/4	5	.030	—	TF4V0532009B	—
1 1/4	1 1/4	2 1/4	5	.120	—	TF4V0532009E	—

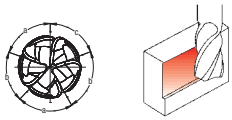
Tools 1/2" and larger have Weldon shanks.

VariMill End Mills

Inch Sizes — Series 4V0F — VariMill 5-Flute End Mill for Side Milling and Shallow Slotting in Stainless Steel, High-Temperature Alloys, and Other Ferrous Materials



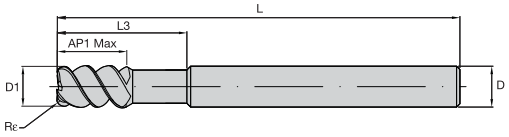
Constant, unequal flute space delivers free machining without chatter.

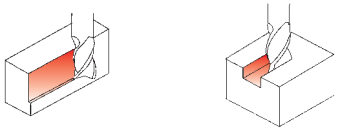


D1	D	AP1 Max	L	flutes	Rε	TiAlN
1/4	1/4	3/4	2 1/2	5	0.000	TF4V0F07002S
1/4	1/4	3/4	2 1/2	5	0.015	TF4V0F07002A
1/4	1/4	3/4	2 1/2	5	0.030	TF4V0F07002B
5/16	5/16	3/4	2 1/2	5	0.000	TF4V0F08003S
5/16	5/16	3/4	2 1/2	5	0.015	TF4V0F08003A
3/8	3/8	7/8	2 1/2	5	0.000	TF4V0F10004S
3/8	3/8	7/8	2 1/2	5	0.030	TF4V0F10004B
3/8	3/8	7/8	2 1/2	5	0.060	TF4V0F10004C
1/2	1/2	1 1/4	3	5	0.000	TF4V0F13015S
1/2	1/2	1 1/4	3	5	0.030	TF4V0F13015B
1/2	1/2	1 1/4	3	5	0.120	TF4V0F13015E
5/8	5/8	1 1/4	3 1/2	5	0.000	TF4V0F16006S
5/8	5/8	1 1/4	3 1/2	5	0.030	TF4V0F16006B
3/4	3/4	1 1/2	4	5	0.000	TF4V0F19007S
3/4	3/4	1 1/2	4	5	0.030	TF4V0F19007B
3/4	3/4	1 1/2	4	5	0.120	TF4V0F19007E
1	1	1 1/2	4	5	0.000	TF4V0F25008S
1	1	1 1/2	4	5	0.030	TF4V0F25008B
1	1	1 1/2	4	5	0.120	TF4V0F25008E

Tools with 1/2" shank and larger have Weldon flats.

Inch Sizes — Series 4VN5 — VariMill 4-Flute End Mill — Extended Neck with Neck Clearance Relief for Stainless Steel, High-Temperature Alloys, and Other Ferrous Materials



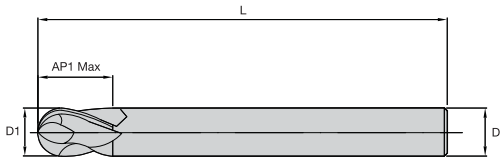


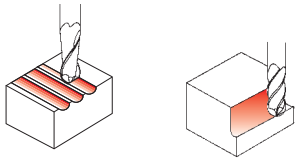
D1	D	AP1 Max	L3	L	flutes	Rε	BCH	TiAlN
1/4	1/4	3/8	4	1 1/4	4	—	.016	TF4VN507012
1/4	1/4	3/8	4	1 1/4	4	.015	—	TF4VN507012A
1/4	1/4	3/8	4	1 1/4	4	.030	—	TF4VN507012B
3/8	3/8	1/2	4	1 7/8	4	—	.020	TF4VN510014
3/8	3/8	1/2	4	1 7/8	4	.030	—	TF4VN510014B
3/8	3/8	1/2	4	1 7/8	4	.060	—	TF4VN510014C
1/2	1/2	5/8	4	2 1/4	4	—	.020	TF4VN513005
1/2	1/2	5/8	4	2 1/4	4	.030	—	TF4VN513005B
1/2	1/2	5/8	4	2 1/4	4	.060	—	TF4VN513005C
1/2	1/2	5/8	4	2 1/4	4	.120	—	TF4VN513005E
5/8	5/8	3/4	4	2 1/4	4 1/8	—	.020	TF4VN516006
5/8	5/8	3/4	4	2 1/4	4 1/8	.060	—	TF4VN516006C
5/8	5/8	3/4	4	2 1/4	4 1/8	.120		TF4VN516006E
5/8	5/8	3/4	4	3 1/4	5	—	.020	TF4VN516016
3/4	3/4	1	4	2 1/4	4 1/4	—	.020	TF4VN519007
3/4	3/4	1	4	3 1/4	5 1/2	—	.020	TF4VN519017
3/4	3/4	1	4	3 1/4	5 1/2	.030	—	TF4VN519017B
3/4	3/4	1	4	3 1/4	5 1/2	.060	—	TF4VN519017C
3/4	3/4	1	4	3 1/4	5 1/2	.120	—	TF4VN519017E
1	1	1 1/8	4	2 1/4	4 1/2	—	.020	TF4VN525008
1	1	1 1/8	4	3 1/4	5 1/2	—	.020	TF4VN525018
1	1	1 1/8	4	3 1/4	5 1/2	.030	—	TF4VN525018B
1	1	1 1/8	4	3 1/4	5 1/2	.060	—	TF4VN525018C
1	1	1 1/8	4	3 1/4	5 1/2	.120	—	TF4VN525018E
1	1	1 1/8	4	4 1/4	6 1/2	—	.020	TF4VN525028

Tools 1/2" and larger have Weldon shanks.

VariMill 4-Flute End Mills

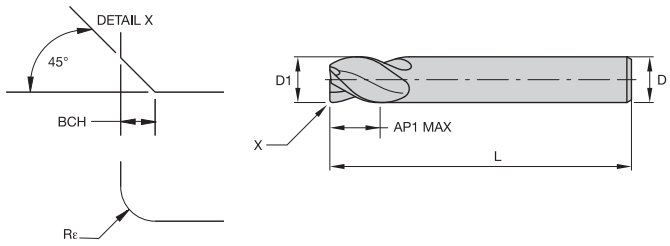
Inch Sizes — Series 4VP0 — VariMill 4-Flute Ball Nose End Mill with Long Reach, without Neck Clearance Relief for Close Chucking or Grinding Your Own Neck, in Stainless Steel, High-Temperature Alloys, and Other Ferrous Materials

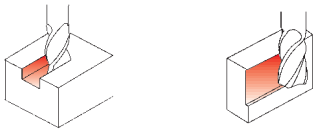




D1	D	AP1 Max	L	flutes	TiAlN
1/4	1/4	3/8	4	4	TF4VP007012
3/8	3/8	1/2	4	4	TF4VP010014
1/2	1/2	5/8	5	4	TF4VP013005
5/8	5/8	3/4	6	4	TF4VP016016
3/4	3/4	1	6	4	TF4VP019017
1	1	1 1/8	6	4	TF4VP025018

Inch Sizes — Series 4VP5 — VariMill 4-Flute End Mill with Long Reach, without Neck Clearance Relief for Close Chucking or Grinding Your Own Neck, for Stainless Steel, High-Temperature Alloys, and Other Ferrous Materials

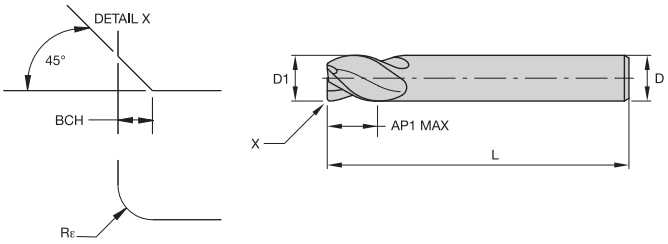


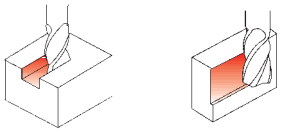


D1	D	AP1 Max	L	flutes	Rε	BCH	TiAlN
1/4	1/4	3/8	4	4	.000	—	TF4VP507012S
1/4	1/4	3/8	4	4	—	.016	TF4VP507012
3/8	3/8	1/2	4	4	.000	—	TF4VP510014S
3/8	3/8	1/2	4	4	—	.020	TF4VP510014
1/2	1/2	5/8	5	4	.000	—	TF4VP513005S
1/2	1/2	5/8	5	4	—	.020	TF4VP513005
1/2	1/2	5/8	6	4	—	.020	TF4VP513015
1/2	1/2	5/8	6	4	.000	—	TF4VP513015S
5/8	5/8	3/4	5	4	.000	—	TF4VP516006S
5/8	5/8	3/4	5	4	—	.020	TF4VP516006
5/8	5/8	3/4	6	4	.000	—	TF4VP516016S
5/8	5/8	3/4	6	4	—	.020	TF4VP516016
5/8	5/8	3/4	7	4	—	.020	TF4VP516026
5/8	5/8	3/4	7	4	.000	—	TF4VP516026S
3/4	3/4	1	5	4	.000	—	TF4VP519007S
3/4	3/4	1	5	4	—	.020	TF4VP519007
3/4	3/4	1	6	4	—	.020	TF4VP519017
3/4	3/4	1	6	4	.000	—	TF4VP519017S
3/4	3/4	1	7	4	—	.020	TF4VP519027
3/4	3/4	1	7	4	.000	—	TF4VP519027S
1	1	1 1/8	5	4	—	.020	TF4VP525008
1	1	1 1/8	5	4	.000	—	TF4VP525008S
1	1	1 1/8	6	4	.000	—	TF4VP525018S
1	1	1 1/8	6	4	—	.020	TF4VP525018
1	1	1 1/8	7	4	.000	—	TF4VP525028S
1	1	1 1/8	7	4	—	.020	TF4VP525028

VariMill 4-Flute End Mills

Inch Sizes — Series 4V0T — VariMill 4-Flute End Mills for Titanium

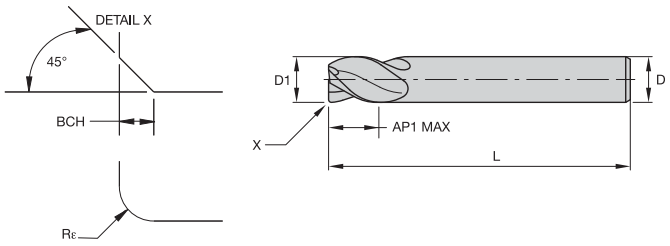


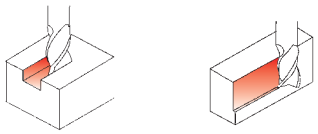


D1	D	AP1 Max	L	flutes	Rε	BCH	AlTiN
1/2	1/2	5/8	2 1/2	4	.000	—	TM4V4T13005S
1/2	1/2	5/8	2 1/2	4	—	.020	TM4V4T13005
1/2	1/2	1 1/4	3	4	.000	—	TM4V0T13015S
1/2	1/2	1 1/4	3	4	—	.020	TM4V0T13015
5/8	5/8	3/4	3	4	—	.020	TM4V4T16006
5/8	5/8	3/4	3	4	.000	—	TM4V4T16006S
5/8	5/8	1 1/4	3 1/2	4	—	.020	TM4V0T16006
5/8	5/8	1 1/4	3 1/2	4	.000	—	TM4V0T16006S
3/4	3/4	7/8	3 1/2	4	.000	—	TM4V4T19007S
3/4	3/4	7/8	3 1/2	4	—	.020	TM4V4T19007
3/4	3/4	1 1/2	4	4	.000	—	TM4V0T19007S
3/4	3/4	1 1/2	4	4	—	.020	TM4V0T19007
1	1	1 1/2	4	4	.000	—	TM4V0T25008S
1	1	1 1/2	4	4	—	.020	TM4V0T25008
1 1/4	1 1/4	2 1/4	5	4	—	.020	TM4V0T32009
1 1/4	1 1/4	2 1/4	5	4	.000	—	TM4V0T32009S

Tools 1/2" and larger have Weldon shanks.

Inch Sizes — Series 4VPT — VariMill 4-Flute End Mill with Long Reach, without Neck Clearance Relief for Close Chucking and Grinding Your Own Neck, for Titanium





D1	D	AP1 Max	L	flutes	Rε	BCH	AlTiN
1/2	1/2	5/8	5	4	.000	—	TM4VPT13005S
1/2	1/2	5/8	5	4	—	.020	TM4VPT13005
1/2	1/2	5/8	6	4	—	.020	TM4VPT13015
1/2	1/2	5/8	6	4	.000	—	TM4VPT13015S
5/8	5/8	3/4	5	4	.000	—	TM4VPT16006S
5/8	5/8	3/4	5	4	—	.020	TM4VPT16006
5/8	5/8	3/4	6	4	.000	—	TM4VPT16016S
5/8	5/8	3/4	6	4	—	.020	TM4VPT16016
5/8	5/8	3/4	7	4	—	.020	TM4VPT16026
5/8	5/8	3/4	7	4	.000	—	TM4VPT16026S
3/4	3/4	1	5	4	—	.020	TM4VPT19007
3/4	3/4	1	5	4	.000	—	TM4VPT19007S
3/4	3/4	1	6	4	.000	—	TM4VPT19017S
3/4	3/4	1	6	4	—	.020	TM4VPT19017
3/4	3/4	1	7	4	—	.020	TM4VPT19027
3/4	3/4	1	7	4	.000	—	TM4VPT19027S
1	1	1 1/8	5	4	.000	—	TM4VPT25008S
1	1	1 1/8	5	4	—	.020	TM4VPT25008
1	1	1 1/8	6	4	—	.020	TM4VPT25018
1	1	1 1/8	6	4	.000	—	TM4VPT25018S
1	1	1 1/8	7	4	—	.020	TM4VPT25028
1	1	1 1/8	7	4	.000	—	TM4VPT25028S

Solid End Mills

AluSurf™ Carbide End Mills

HANITA

AluSurf End Mills

Designed to significantly reduce machining time in aluminum!

- Effective in a full range of machine speeds, from 3,000 to 50,000 RPMs.
- 3-flute series uses unequal flute spacing for chatter-free performance.
- Use only one tool for roughing and finishing operations.
- Slotting is effective up to full, 1 x D axial depth; side milling (profiling) is effective up to 0.5 x D radial by 1.5 x D axial depth.
- Multiple corner radii and extended neck configurations are available as standard.

3-flute end mills should be balanced with the toolholder if operating in excess of 15,000 RPM.

Recommended Cutting Parameters — Metric

		Application				Cutting Speed (Vc) Maximum Feed per Tooth for Side Milling Operations** Cutting Diameter						
		Side Milling		Slotting								
		Axial Depth	Radial Depth	Max Axial Depth	Uncoated and TiCN Coated							
Tool Series	Material	ap	ae	ap	m/min	3mm	6mm	8mm	10mm	12mm	16mm	20mm
Series 5102 and 5103	Aluminum Alloys	1.5 x D	0.5 x D	1 x D	max RPM	0,027	0,054	0,072	0,090	0,108	0,144	0,180
	Aluminum with High Silicon	1.5 x D	0.5 x D	1 x D	max RPM*	0,022	0,043	0,058	0,072	0,086	0,115	0,144
Series 51N3	AluminumAlloys	1 x D	0.5 x D	1 x D	max RPM	0,030	0,060	0,080	0,100	0,120	0,160	0,200
	Aluminum with High Silicon	1 x D	0.5 x D	1 x D	max RPM*	0,024	0,048	0,064	0,080	0,096	0,128	0,160

Recommended Cutting Parameters — Inch

		Application				Cutting Speed (Vc) Maximum Feed per Tooth for Side Milling Operations** Cutting Diameter						
		Side Milling		Slotting								
		Axial Depth	Radial Depth	Max Axial Depth	Uncoated and TiCN Coated							
Tool Series	Material	ap	ae	ap	SFM	1/4 in	5/16 in	3/8 in	1/2 in	5/8 in	3/4 in	1 in
Series 5A02 and 5A03	Aluminum Alloys	1.5xD	0.5xD	1xD	max RPM	.0023	.0028	.0034	.0045	.0056	.0068	.0090
	Aluminum with High Silicon	1.5xD	0.5xD	1xD	max RPM*	.0018	.0023	.0027	.0036	.0045	.0054	.0072
Series 5AN2	Aluminum Alloys	1xD	0.5xD	1xD	max RPM	.0025	.0031	.0038	.0050	.0063	.0075	.0100
	Aluminum with High Silicon	1xD	0.5xD	1xD	max RPM*	.0020	.0025	.0030	.0040	.0050	.0060	.0080
Series 5AN3	Aluminum Alloys	1xD	0.5xD	1xD	max RPM	.0025	.0031	.0038	.0050	.0063	.0075	.0100
	Aluminum with High Silicon	1xD	0.5xD	1xD	max RPM*	.0020	.0025	.0030	.0040	.0050	.0060	.0080

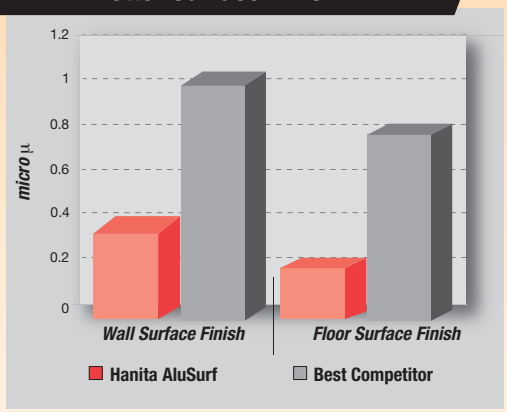
** When machining aluminum with high silicon content, TiCN coating is recommended.*
*** Feed per tooth in slotting applications should not exceed 90% of feed per tooth for side milling.*

Featured Application: Machining a Block

Operation: Slotting
Workpiece: Aluminum block
Material: 6061 Aluminum
Solution: AluSurf solid carbide end mill
Results: 100% better surface finish on walls and floor

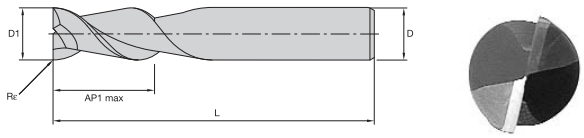
	COMPETITOR	HANITA
grade:	*uncoated tools*	*uncoated tools*
end mill:	*16mm (5/8 in) 3 flute*	*16mm (5/8 in) 3 flute AluSurf*
material:	*aluminum*	*aluminum*
depth of cut (ap):	*8mm (.3150 in)*	*8mm (.3150 in)*
width of cut (ae):	*8mm (.3150 in)*	*8mm (.3150 in)*
speed (Vc):	*610 m/min (2,000SFM)*	*610 m/min (2,000SFM)*
RPM (N):	*12,000 RPM*	*12,000 RPM*
feed rate (Vf):	*3,600mm/min (142 ipm)*	*3,600 mm/min (142 ipm)*
chip load per tooth (fz):	*0,1mm/th (.004 in/th)*	*0,1mm/th (.004 in/th)*
metal removal rate:	*230 cm³/min (14 in³/min)*	*230 cm³/min (14 in³/min)*

AluSurf Delivered 100% Better Surface Finish!

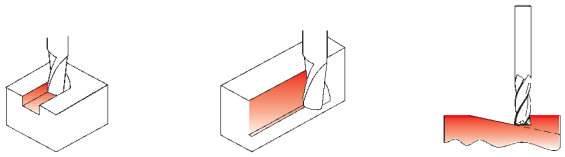


AluSurf 2- and 3-Flute End Mills for Aluminum

Metric Sizes — Series 5102 — 2-Flute with Square Corners



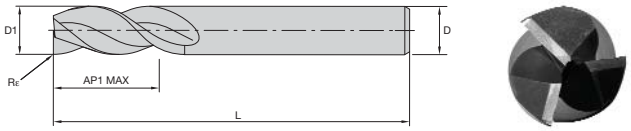
2-flute



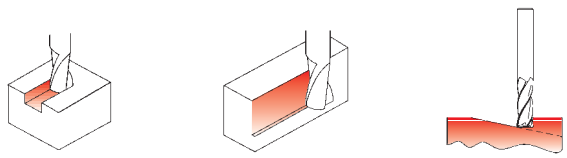
D1	D	AP1 Max	L	Uncoated End Mills — Rε 0
1,5	3	6	38	510201500..
2	3	8	38	510202000..
2,5	3	9	38	510202500..
3	3	12	38	510203000..
4	4	12	50	510204001..
5	5	14	50	510205001..
5	6	14	50	510205002..
6	6	16	50	510206002..
8	8	20	63	510208003..
10	10	22	76	510210004..
12	12	25	76	510212005..
14	14	32	83	510214014..
16	16	32	89	510216006..
18	18	38	100	510218018..
20	20	38	104	510220007..

".." suffix is required when ordering.

Metric Sizes — Series 5103 — 3-Flute with Square Corners



3-flute

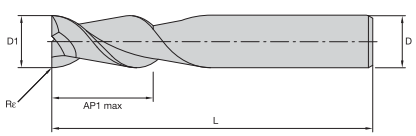


D1	D	AP1 Max	L	Uncoated End Mills — Rε 0
3	3	12	38	510303000..
4	4	12	50	510304001..
5	5	14	50	510305001..
6	6	16	50	510306002..
8	8	20	63	510308003..
10	10	22	76	510310004..
12	12	25	76	510312005..
14	14	32	83	510314014..
16	16	32	89	510316006..
18	18	38	100	510318018..
20	20	38	104	510320007..

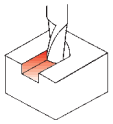
".." suffix is required when ordering.

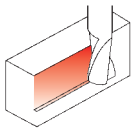
AluSurf 2- and 3-Flute End Mills for Aluminum

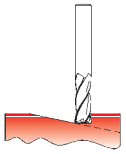
Inch Sizes — Series 5A02 — 2-Flute with Standard Corner Conditions



2-flute



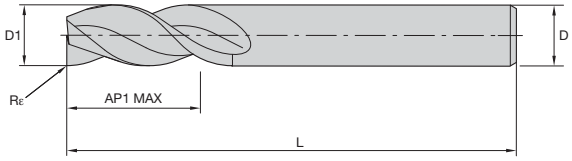




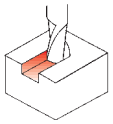
Standard Corner Conditions — Uncoated End Mills

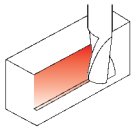
D1	D	AP1 Max	L	Rε 0	Rε .015 in	Rε .030 in	Rε .060 in	Rε .090 in	Rε .120/.125 in
1/4	1/4	1/2	2 1/2	5A0207002	5A0207002A	5A0207002B	5A0207002C	—	—
5/16	5/16	5/8	2 1/2	5A0208003	—	5A0208003B	—	—	—
3/8	3/8	3/4	2 1/2	5A0210004	—	5A0210004B	5A0210004C	—	—
1/2	1/2	1 1/4	3	5A0213015	—	5A0213015B	5A0213015C	5A0213015D	5A0213015E
5/8	5/8	1 1/4	3 1/2	5A0216006	—	5A0216006B	5A0216006C	5A0216006D	—
3/4	3/4	1 1/2	4	5A0219007	—	5A0219007B	5A0219007C	5A0219007D	5A0219007E
1	1	1 1/2	4	5A0225008	—	5A0225008B	5A0225008C	5A0225008D	5A0225008E

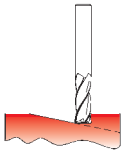
Inch Sizes — Series 5A03 — 3-Flute with Standard Corner Conditions



3-flute





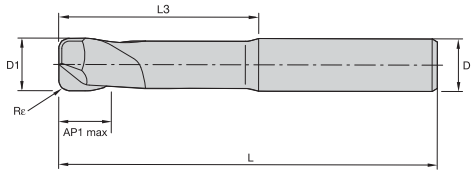


Standard Corner Conditions — Uncoated End Mills

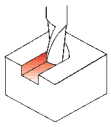
D1	D	AP1 Max	L	Rε 0	Rε .015 in	Rε .030 in	Rε .060 in	Rε .090 in	Rε .120/.125 in
1/4	1/4	1/2	2 1/2	5A0307002	5A0307002A	5A0307002B	5A0307002C	—	—
5/16	5/16	5/8	2 1/2	5A0308003	—	5A0308003B	—	—	—
3/8	3/8	3/4	2 1/2	5A0310004	—	5A0310004B	5A0310004C	—	—
1/2	1/2	1 1/4	3	5A0313015	—	5A0313015B	5A0313015C	5A0313015D	5A0313015E
5/8	5/8	1 1/4	3 1/2	5A0316006	—	5A0316006B	5A0316006C	5A0316006D	—
3/4	3/4	1 1/2	4	5A0319007	—	5A0319007B	5A0319007C	5A0319007D	5A0319007E
1	1	1 1/2	4	5A0325008	—	5A0325008B	5A0325008C	5A0325008D	5A0325008E

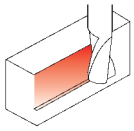
AluSurf 2- and 3-Flute Extended Neck End Mills for Aluminum

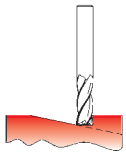
Metric Sizes — Series 51N3 — 3-Flute Extended Neck with Standard Corner Conditions



3-flute







Standard Corner Conditions — Uncoated End Mills

D1	D	AP1 Max	L3	L	Rε 0,2mm	Rε 0,5mm	Rε 1mm	Rε 1,5mm	Rε 2mm	Re 4mm
6	6	9	18	63	51N306022..	51N306002..	51N306012..	—	—	—
8	8	12	24	76	51N308023..	51N308003..	51N308013..	—	—	—
10	10	15	30	89	51N310024..	51N310004..	—	51N310014..	—	—
12	12	18	36	100	51N312025..	51N312005..	—	51N312015..	—	—
16	16	24	48	110	51N316036..	51N316006..	51N316016..	—	51N316026..	—
20	20	30	60	125	51N320037..	51N320007..	—	51N320017..	—	51N320027..

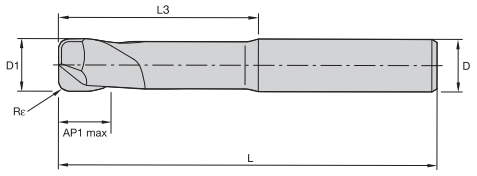
".." suffix is required when ordering

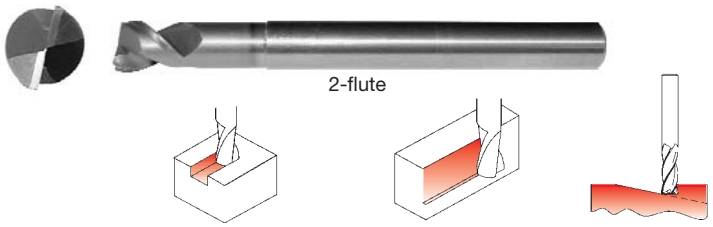
Markets and Applications for AluSurf End Mills

- Especially useful in airframe construction and other Aerospace applications.
- Also used in General Engineering, Machine Tool, and Vehicle markets.
- Designed for customers machining a large volume of aluminum products.
- Effective in high-speed machining, conventional milling, and MQL applications.

AluSurf 2- and 3-Flute Extended Neck End Mills for Aluminum

Inch Sizes — Series 5AN2 — 2-Flute Extended Neck with Standard Corner Conditions



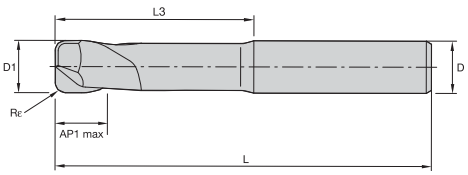


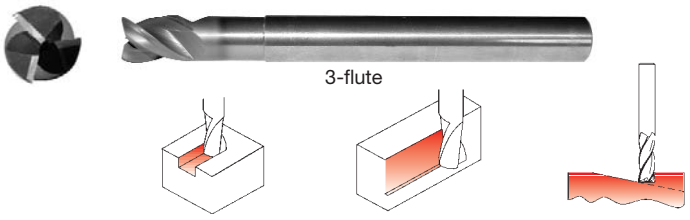
Standard Corner Conditions — Uncoated End Mills

D1	D	AP1 Max	L3	L	Rε 0	Rε .015 in	Rε .030 in	Rε .060 in	Rε .090 in
1/8	1/4	3/16	1/2	3	—	5AN203042A	—	—	—
3/16	1/4	1/4	9/16	3	—	5AN205042A	—	—	—
1/4	1/4	5/16	3/4	3	5AN207042	5AN207042A	—	—	—
1/4	1/4	3/8	2 1/4	4	5AN207012	—	5AN207012B	—	—
5/16	5/16	3/8	1	4	—	—	5AN208043B	—	—
5/16	5/16	3/8	2	4	5AN208023	—	5AN208023B	—	—
3/8	3/8	7/16	1 1/8	4	5AN210044	—	5AN210044B	5AN210044C	—
3/8	3/8	7/16	2 1/4	4	5AN210014	—	5AN210014B	5AN210014C	—
1/2	1/2	9/16	1 1/2	5	5AN213045	—	5AN213045B	5AN213045C	5AN213045D
1/2	1/2	9/16	2 1/4	5	5AN213005	—	5AN213005B	5AN213005C	5AN213005D
1/2	1/2	9/16	3 1/4	6	5AN213015	—	5AN213015B	5AN213015C	5AN213015D
5/8	5/8	3/4	3 1/4	6	5AN216016	—	5AN216016B	5AN216016C	5AN216016D
3/4	3/4	1	1 1/2	6	5AN219057	—	5AN219057B	5AN219057C	5AN219057D
3/4	3/4	1	2 1/4	6	5AN219077	—	5AN219077B	5AN219077C	5AN219077D
3/4	3/4	1	3 1/4	6	5AN219017	—	5AN219017B	5AN219017C	5AN219017D
1	1	1 1/8	3	5 1/2	5AN225048	—	5AN225048B	5AN225048C	—
1	1	1 1/8	4 1/4	7	5AN225028	—	5AN225028B	5AN225028C	5AN225028D

".." suffix is required when ordering

Inch Sizes — Series 5AN3 — 3-Flute Extended Neck with Standard Corner Conditions





Standard Corner Conditions — Uncoated End Mills

D1	D	AP1 Max	L3	L	Rε 0	Rε .015 in	Rε .030 in	Rε .060 in	Rε .090 in
1/8	1/4	3/16	1/2	3	—	5AN303042A	—	—	—
3/16	1/4	1/4	9/16	3	—	5AN305042A	—	—	—
1/4	1/4	5/16	3/4	3	—	5AN307042A	—	—	—
5/16	5/16	3/8	1	4	—	—	5AN308043B	—	—
3/8	3/8	7/16	1 1/8	4	5AN310044	—	5AN310044B	5AN310044C	—
3/8	3/8	7/16	2 1/4	4	5AN310014	—	5AN310014B	5AN310014C	—
1/2	1/2	9/16	1 1/2	5	5AN313045	—	5AN313045B	5AN313045C	5AN313045D
1/2	1/2	9/16	2 1/4	5	5AN313005	—	5AN313005B	5AN313005C	5AN313005D
1/2	1/2	9/16	3 1/4	6	5AN313015	—	5AN313015B	5AN313015C	5AN313015D
5/8	5/8	3/4	3 1/4	6	5AN316016	—	5AN316016B	5AN316016C	5AN316016D
3/4	3/4	1	1 1/2	6	5AN319057	—	5AN319057B	5AN319057C	5AN319057D
3/4	3/4	1	2 1/4	6	5AN319077	—	5AN319077B	5AN319077C	5AN319077D
3/4	3/4	1	3 1/4	6	5AN319017	—	5AN319017B	5AN319017C	5AN319017D
3/4	3/4	1	4 1/4	7	5AN319067	—	5AN319067B	—	—
1	1	1 1/8	3	5 1/2	5AN325048	—	5AN325048B	5AN325048C	—
1	1	1 1/8	4 1/4	7	5AN325028	—	5AN325028B	5AN325028C	5AN325028D

ArCut 2- and 3-Flute Center Cutting, Chatter-Free End Mills for Aluminum

- Double rake flute form provides chatter-free machining.
- Excellent performance in pocketing or slotting operations up to 2 x D.
- Enables faster feed rates at lower RPMs.

Recommended Cutting Parameters — Inch

ArCut Series 4K02

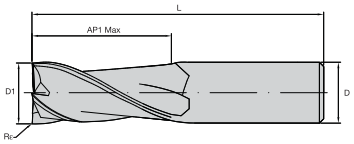
Material	Application: Side Milling ap	Side Milling ae	Slotting ap	Vc: SFM Uncoated	Vc: SFM TiCN	fZ – feed per tooth in inch, D – diameter in inch (TiAlN): 1/8	1/4	5/16	3/8	1/2	5/8	3/4	1
Aluminum Alloys	1 x D	0.5 x D	1 x D	≤6000	≤6000	.0010	.0020	.0025	.0040	.0060	.0070	.0085	.0100
Aluminum High Silicon	1 x D	0.5 x D	1 x D	≤6000	≤6000	.0010	.0020	.0025	.0040	.0060	.0070	.0085	.0100

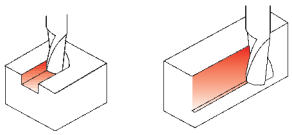
ArCut Series 4K03

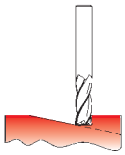
Material	Application: Side Milling ap	Side Milling ae	Slotting ap	Vc: SFM Uncoated	Vc: SFM TiCN	fZ – feed per tooth in inch, D – diameter in inch (TiAlN): 1/8	1/4	5/16	3/8	1/2	5/8	3/4	1
Aluminum Alloys	1 x D	0.5 x D	1 x D	≤6000	≤6000	.0008	.0018	.0022	.0035	.0055	.0065	.0080	.095
Aluminum High Silicon	1 x D	0.5 x D	1 x D	≤6000	≤6000	.0008	.0018	.0022	.0035	.0055	.0065	.0080	.095

ArCut 2-Flute End Mills

■ Inch Sizes — Series 4K02 (4K02, 4K12, 4K22, 4K42, 4K62) — ArCut 2-Flute Center Cutting, Chatter-Free End Mills for Aluminum





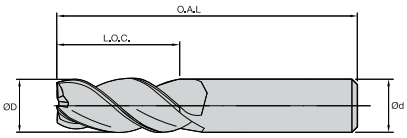


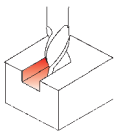
D1	D	AP1 Max	L	flutes	Rε	Uncoated	TiCN
1/8	1/8	1/4	2	2	—	4K4203071	TC4K4203071
1/8	1/8	1/2	2	2	—	4K0203071	TC4K0203071
1/8	1/8	1/2	2	2	.0150	4K0203071A	—
3/16	3/16	5/16	2	2	—	4K4205070	TC4K4205070
3/16	3/16	5/8	2	2	—	4K0205070	TC4K0205070
3/16	3/16	5/8	2	2	.0150	4K0205070A	—
1/4	1/4	3/8	2	2	—	4K4207072	TC4K4207072
1/4	1/4	3/8	2	2	.0300	4K4207072B	—
1/4	1/4	3/4	2 1/2	2	—	4K0207072	TC4K0207072
1/4	1/4	3/4	2 1/2	2	.0150	4K0207072A	—
1/4	1/4	3/4	2 1/2	2	.0300	4K0207072B	—
1/4	1/4	1 1/4	3 1/4	2	—	4K1207072	TC4K1207072
1/4	1/4	1 1/4	3 1/4	2	.0150	4K1207072A	—
1/4	1/4	1 1/4	3 1/4	2	.0300	4K1207072B	—
1/4	1/4	1 3/4	4	2	—	4K2207072	TC4K2207072
1/4	1/4	1 3/4	4	2	.0150	4K2207072A	—
1/4	1/4	1 3/4	4	2	.0300	4K2207072B	—
5/16	5/16	7/16	2	2	—	4K4208073	TC4K4208073
5/16	5/16	7/16	2	2	.0300	4K4208073B	—
5/16	5/16	13/16	2 1/2	2	—	4K0208073	TC4K0208073
5/16	5/16	13/16	2 1/2	2	.0300	4K0208073B	—
5/16	5/16	13/16	2 1/2	2	.0600	4K0208073C	—
5/16	5/16	1 1/4	3 1/4	2	—	4K1208073	TC4K1208073
5/16	5/16	1 1/4	3 1/4	2	.0300	4K1208073B	—
3/8	3/8	1/2	2	2	—	4K4210074	TC4K4210074
3/8	3/8	1/2	2	2	.0300	4K4210074B	—
3/8	3/8	7/8	2 1/2	2	—	4K0210074	TC4K0210074
3/8	3/8	7/8	2 1/2	2	.0300	4K0210074B	—
3/8	3/8	7/8	2 1/2	2	.0600	4K0210074C	—
3/8	3/8	1 1/2	4	2	—	4K1210074	TC4K1210074
3/8	3/8	1 1/2	4	2	.0300	4K1210074B	—
3/8	3/8	1 1/2	4	2	.0600	4K1210074C	—
3/8	3/8	2 1/2	4	2	—	4K2210074	TC4K2210074
3/8	3/8	2 1/2	4	2	.0300	4K2210074B	—
3/8	3/8	2 1/2	4	2	.0600	4K2210074C	—
7/16	7/16	7/8	2 1/2	2	—	4K021107A	TC4K021107A
1/2	1/2	5/8	2 1/2	2	—	4K4213075	TC4K4213075
1/2	1/2	5/8	2 1/2	2	.0300	4K4213075B	—
1/2	1/2	5/8	2 1/2	2	.0600	4K4213075C	—
1/2	1/2	1	3	2	—	4K0213075	TC4K0213075
1/2	1/2	1 1/4	3	2	—	4K0213085	TC4K0213085
1/2	1/2	1 1/4	3	2	.0300	4K0213085B	—
1/2	1/2	1 1/4	3	2	.0600	4K0213085C	—
1/2	1/2	1 1/4	3	2	.1200	4K0213085E	—
1/2	1/2	1 1/2	4	2	—	4K6213055	TC4K6213055
1/2	1/2	1 1/2	4	2	.0300	4K6213055B	—
1/2	1/2	1 1/2	4	2	.0600	4K6213055C	—

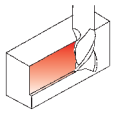
D1	D	AP1 Max	L	flutes	Rε	Uncoated	TiCN
1/2	1/2	2	4	2	—	4K1213075	TC4K1213075
1/2	1/2	2	4	2	.0300	4K1213075B	—
1/2	1/2	2	4	2	.0600	4K1213075C	—
1/2	1/2	2 1/2	5	2	—	4K6213065	TC4K6213065
1/2	1/2	2 1/2	5	2	.0300	4K6213065B	—
1/2	1/2	2 1/2	5	2	.0600	4K6213065C	—
1/2	1/2	3	5	2	—	4K2213075	TC4K2213075
1/2	1/2	3	5	2	.0300	4K2213075B	—
1/2	1/2	3	5	2	.0600	4K2213075C	—
5/8	5/8	3/4	3	2	—	4K4216076	TC4K4216076
5/8	5/8	3/4	3	2	.0600	4K4216076C	—
5/8	5/8	3/4	3	2	.1200	4K4216076E	—
5/8	5/8	1 1/4	3 1/2	2	—	4K0216076	TC4K0216076
5/8	5/8	1 1/4	3 1/2	2	.0600	4K0216076C	—
5/8	5/8	1 5/8	3 1/2	2	—	4K6216076	TC4K6216076
5/8	5/8	1 5/8	3 1/2	2	.0600	4K6216076C	—
5/8	5/8	2 1/4	5	2	—	4K1216076	TC4K1216076
5/8	5/8	2 1/4	5	2	.0600	4K1216076C	—
5/8	5/8	3	5 1/4	2	—	4K2216076	TC4K2216076
5/8	5/8	3	5 1/4	2	.0600	4K2216076C	—
3/4	3/4	7/8	3	2	—	4K4219077	TC4K4219077
3/4	3/4	7/8	3	2	.0300	4K4219077B	—
3/4	3/4	7/8	3	2	.0600	4K4219077C	—
3/4	3/4	7/8	3	2	.1200	4K4219077E	—
3/4	3/4	1 1/2	4	2	—	4K0219077	TC4K0219077
3/4	3/4	1 1/2	4	2	.0300	4K0219077B	—
3/4	3/4	1 1/2	4	2	.0600	4K0219077C	—
3/4	3/4	1 1/2	4	2	.1200	4K0219077E	—
3/4	3/4	1 5/8	4	2	—	4K6219067	TC4K6219067
3/4	3/4	2 1/4	5	2	—	4K1219077	TC4K1219077
3/4	3/4	2 1/4	5	2	.0300	4K1219077B	—
3/4	3/4	2 1/4	5	2	.0600	4K1219077C	—
3/4	3/4	3	5 1/4	2	—	4K6219077	TC4K6219077
3/4	3/4	3	5 1/4	2	.0300	4K6219077B	—
3/4	3/4	3	5 1/4	2	.0600	4K6219077C	—
3/4	3/4	4	6 1/4	2	—	4K2219077	TC4K2219077
1	1	1 1/2	4	2	—	4K0225078	TC4K0225078
1	1	1 1/2	4	2	.0300	4K0225078B	—
1	1	1 1/2	4	2	.0600	4K0225078C	—
1	1	1 1/2	4	2	.1200	4K0225078E	—
1	1	2	4 1/2	2	—	4K6225078	TC4K6225078
1	1	2 1/4	5	2	—	4K1225078	TC4K1225078
1	1	2 1/4	5	2	.0300	4K1225078B	—
1	1	2 1/4	5	2	.0600	4K1225078C	—
1	1	3	5 1/2	2	—	4K2225078	TC4K2225078
1	1	3	5 1/2	2	.0600	4K2225078C	—
1	1	3	5 1/2	2	.0300	4K2225078B	—
1	1	4	7	2	—	4K6225088	TC4K6225088

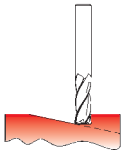
ArCut 3-Flute End Mills

Inch Sizes — Series 4K03 (4K03, 4K13, 4K23, 4K43, 4K63) — ArCut 3-Flute Center Cutting, Chatter-Free End Mills for Aluminum









D1	D	AP1 Max	L	flutes	Rε	Uncoated	TiCN
1/4	1/4	3/8	2	3	—	4K4307072	TC4K4307072
1/4	1/4	3/8	2	3	.0300	4K4307072B	—
1/4	1/4	3/4	2 1/2	3	—	4K0307072	TC4K0307072
1/4	1/4	3/4	2 1/2	3	.0150	4K0307072A	—
1/4	1/4	3/4	2 1/2	3	.0300	4K0307072B	—
1/4	1/4	1 1/4	3 1/4	3	—	4K1307072	TC4K1307072
1/4	1/4	1 1/4	3 1/4	3	.0150	4K1307072A	—
1/4	1/4	1 1/4	3 1/4	3	.0300	4K1307072B	—
1/4	1/4	1 3/4	4	3	—	4K2307072	TC4K2307072
1/4	1/4	1 3/4	4	3	.0150	4K2307072A	—
1/4	1/4	1 3/4	4	3	.0300	4K2307072B	—
5/16	5/16	7/16	2	3	—	4K4308073	TC4K4308073
5/16	5/16	7/16	2	3	.0300	4K4308073B	—
5/16	5/16	13/16	2 1/2	3	—	4K0308073	TC4K0308073
5/16	5/16	13/16	2 1/2	3	.0300	4K0308073B	—
5/16	5/16	13/16	2 1/2	3	.0600	4K0308073C	—
5/16	5/16	1 1/4	3 1/4	3	—	4K1308073	TC4K1308073
5/16	5/16	1 1/4	3 1/4	3	.0300	4K1308073B	—
3/8	3/8	1/2	2	3	—	4K4310074	TC4K4310074
3/8	3/8	1/2	2	3	.0300	4K4310074B	—
3/8	3/8	7/8	2 1/2	3	—	4K0310074	TC4K0310074
3/8	3/8	7/8	2 1/2	3	.0300	4K0310074B	—
3/8	3/8	7/8	2 1/2	3	.0600	4K0310074C	—
3/8	3/8	1 1/2	4	3	—	4K1310074	TC4K1310074
3/8	3/8	1 1/2	4	3	.0300	4K1310074B	—
3/8	3/8	1 1/2	4	3	.0600	4K1310074C	—
3/8	3/8	2 1/2	4	3	—	4K2310074	TC4K2310074
3/8	3/8	2 1/2	4	3	.0300	4K2310074B	—
3/8	3/8	2 1/2	4	3	.0600	4K2310074C	—
7/16	7/16	7/8	2 1/2	3	—	4K031107A	TC4K031107A
1/2	1/2	5/8	2 1/2	3	—	4K4313075	TC4K4313075
1/2	1/2	5/8	2 1/2	3	.0300	4K4313075B	—
1/2	1/2	5/8	2 1/2	3	.0600	4K4313075C	—
1/2	1/2	1	3	3	—	4K0313075	TC4K0313075
1/2	1/2	1 1/4	3	3	—	4K0313085	TC4K0313085
1/2	1/2	1 1/4	3	3	.0300	4K0313085B	—
1/2	1/2	1 1/4	3	3	.0600	4K0313085C	—
1/2	1/2	1 1/4	3	3	.1200	4K0313085E	—
1/2	1/2	1 1/2	4	3	—	4K6313055	TC4K6313055
1/2	1/2	1 1/2	4	3	.0300	4K6313055B	—
1/2	1/2	1 1/2	4	3	.0600	4K6313055C	—
1/2	1/2	2	4	3	—	4K1313075	TC4K1313075
1/2	1/2	2	4	3	.0300	4K1313075B	—
1/2	1/2	2	4	3	.0600	4K1313075C	—
1/2	1/2	2 1/2	5	3	—	4K6313065	TC4K6313065

D1	D	AP1 Max	L	flutes	Rε	Uncoated	TiCN
1/2	1/2	2 1/2	5	3	.0300	4K6313065B	—
1/2	1/2	2 1/2	5	3	.0600	4K6313065C	—
1/2	1/2	3	5	3	—	4K2313075	TC4K2313075
1/2	1/2	3	5	3	.0300	4K2313075B	—
1/2	1/2	3	5	3	.0600	4K2313075C	—
5/8	5/8	3/4	3	3	—	4K4316076	TC4K4316076
5/8	5/8	3/4	3	3	.0600	4K4316076C	—
5/8	5/8	3/4	3	3	.1200	4K4316076E	—
5/8	5/8	1 1/4	3 1/2	3	—	4K0316076	TC4K0316076
5/8	5/8	1 1/4	3 1/2	3	.0600	4K0316076C	—
5/8	5/8	1 5/8	3 1/2	3	—	4K6316076	TC4K6316076
5/8	5/8	1 5/8	3 1/2	3	.0600	4K6316076C	—
5/8	5/8	2 1/4	5	3	—	4K1316076	TC4K1316076
5/8	5/8	2 1/4	5	3	.0600	4K1316076C	—
5/8	5/8	3	5 1/4	3	—	4K2316076	TC4K2316076
5/8	5/8	3	5 1/4	3	.0600	4K2316076C	—
3/4	3/4	7/8	3	3	—	4K4319077	TC4K4319077
3/4	3/4	7/8	3	3	.0300	4K4319077B	—
3/4	3/4	7/8	3	3	.0600	4K4319077C	—
3/4	3/4	7/8	3	3	.1200	4K4319077E	—
3/4	3/4	1 1/2	4	3	—	4K0319077	TC4K0319077
3/4	3/4	1 1/2	4	3	.0300	4K0319077B	—
3/4	3/4	1 1/2	4	3	.0600	4K0319077C	—
3/4	3/4	1 1/2	4	3	.1200	4K0319077E	—
3/4	3/4	1 5/8	4	3	—	4K6319067	TC4K6319067
3/4	3/4	2 1/4	5	3	—	4K1319077	TC4K1319077
3/4	3/4	2 1/4	5	3	.0300	4K1319077B	—
3/4	3/4	2 1/4	5	3	.0600	4K1319077C	—
3/4	3/4	3	5 1/4	3	—	4K6319077	TC4K6319077
3/4	3/4	3	5 1/4	3	.0300	4K6319077B	—
3/4	3/4	3	5 1/4	3	.0600	4K6319077C	–
3/4	3/4	4	6 1/4	3	—	4K2319077	TC4K2319077
1	1	1 1/2	4	3	—	4K0325078	TC4K0325078
1	1	1 1/2	4	3	.0300	4K0325078B	—
1	1	1 1/2	4	3	.0600	4K0325078C	—
1	1	1 1/2	4	3	.1200	4K0325078E	—
1	1	2	4 1/2	3	—	4K6325078	TC4K6325078
1	1	2 1/4	5	3	—	4K1325078	TC4K1325078
1	1	2 1/4	5	3	.0300	4K1325078B	—
1	1	2 1/4	5	3	.0600	4K1325078C	—
1	1	3	5 1/2	3	—	4K2325078	TC4K2325078
1	1	3	5 1/2	3	.0300	4K2325078B	—
1	1	3	5 1/2	3	.0600	4K2325078C	—
1	1	4	7	3	—	4K6325088	TC4K6325088

Solid End Mills

X-Feed™ End Mills

HANITA

X-Feed End Mills for High-Feed Milling

Specifically engineered to machine hardened steel up to 67 HRC at high speeds and feeds.

- Unique tool with new 6-flute style for high productivity.
- Necked shanks provide extended reach in deep cavities.
- Long tool life and high-feed rates, up to 0,6mm (.024") per tooth on a 20mm (3/4") tool.
- Machine hardened materials at 2x to 3x the metal removal rate of competitive end mills.
- Six flutes for high productivity.
- Wide range of cutting diameters: down to 6mm (.250") for small and medium pocket work.
- Innovative new geometry maximizes metal removal.
- High metal removal rates lower manufacturing costs.

Recommended Cutting Conditions — Metric
For a radial depth (Ae) of 55% of diameter.

Series 70N7 for steels with hardness >50 HRC

workpiece material	catalog number	cutting diameter D1 (mm)	# of flutes Z	cutting speed Vc (mm/min)	feed per tooth Fz (mm/tooth)	RPM N	feed rate Vf (mm/min)	programming radius Rt (mm)	maximum axial cutting depth (mm)
D2 62 HRC	70N706003MT	6	6	70	0,15	3714	3342	0,58	0,20
	70N708003MT	8	6	70	0,20	2785	3342	0,77	0,27
	70N710004MT	10	6	70	0,25	2228	3342	0,96	0,33
	70N712005MT	12	6	70	0,30	1857	3342	1,15	0,40
	70N716006MT	16	6	70	0,40	1393	3342	1,54	0,54
	70N720007MT	20	6	70	0,50	1114	3342	1,92	0,67
P20 52 HRC	70N706003MT	6	6	120	0,20	6366	7639	0,58	0,20
	70N708003MT	8	6	120	0,25	4775	7162	0,77	0,27
	70N710004MT	10	6	120	0,30	3820	6875	0,96	0,33
	70N712005MT	12	6	120	0,40	3183	7639	1,15	0,40
	70N716006MT	16	6	120	0,50	2387	7162	1,54	0,54
	70N720007MT	20	6	120	0,60	1910	6875	1,92	0,67

Series 70N6 for steels with hardness 40 HRC to 50 HRC

workpiece material	catalog number	cutting diameter D1 (mm)	# of flutes Z	cutting speed Vc (mm/min)	feed per tooth Fz (mm/tooth)	RPM N	feed rate Vf (mm/min)	programming radius Rt (mm)	maximum axial cutting depth (mm)
P20 52 HRC	70N606003MT	6	6	120	0,20	6366	7639	0,62	0,32
	70N608003MT	8	6	120	0,25	4775	7162	0,83	0,42
	70N610004MT	10	6	120	0,30	3820	6875	1,04	0,53
	70N612005MT	12	6	120	0,40	3183	7639	1,24	0,63
	70N616006MT	16	6	120	0,50	2387	7162	1,66	0,84
	70N620007MT	20	6	120	0,60	1910	6875	2,07	1,05
4340 45 HRC	70N606003MT	6	6	160	0,30	8488	15279	0,62	0,32
	70N608003MT	8	6	160	0,40	6366	15279	0,83	0,42
	70N610004MT	10	6	160	0,50	5093	15279	1,04	0,53
	70N612005MT	12	6	160	0,50	4244	12732	1,24	0,63
	70N616006MT	16	6	160	0,60	3183	11459	1,66	0,84
	70N620007MT	20	6	160	0,70	2546	10695	2,07	1,05

Recommended Cutting Conditions — Inch
For a radial depth (Ae) of 55% of diameter.

Series 7FN7 for steels with hardness >50 HRC

workpiece material	catalog number	cutting diameter D1 (inch)	# of flutes Z	cutting speed Vc (sfm)	feed per tooth Fz (inch)	RPM N	feed rate Vf (inch/min)	programming radius Rt (inch)	maximum axial cutting depth (inch)
D2 62 HRC	TM7FN707002	1/4	6	230	.006	3509	130	.024	.0082
	TM7FN708003	5/16	6	230	.008	2807	130	.030	.0103
	TM7FN710004	3/8	6	230	.009	2339	130	.036	.0123
	TM7FN713005	1/2	6	230	.013	1754	130	.048	.0164
	TM7FN716006	5/8	6	230	.016	1404	130	.061	.0205
	TM7FN719007	3/4	6	230	.019	1170	130	.072	.0246
P20 52 HRC	TM7FN707002	1/4	6	395	.008	6015	270	.024	.0082
	TM7FN708003	5/16	6	395	.009	4812	270	.030	.0103
	TM7FN710004	3/8	6	395	.011	4010	270	.036	.0123
	TM7FN713005	1/2	6	395	.015	3008	270	.048	.0164
	TM7FN716006	5/8	6	395	.019	2406	270	.061	.0205
	TM7FN719007	3/4	6	395	.023	2005	270	.072	.0246

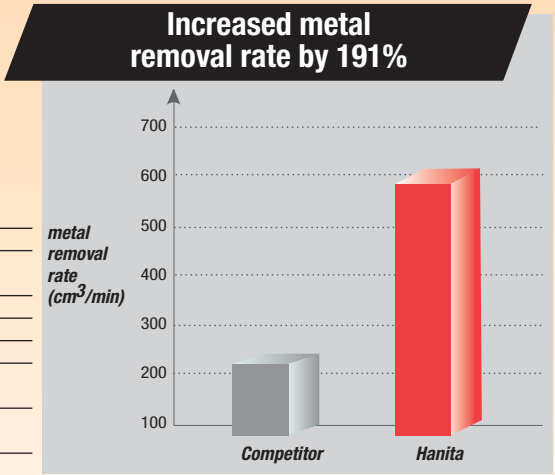
Series 7FN6 for steels with hardness 40 HRC to 50 HRC

workpiece material	catalog number	cutting diameter D1 (inch)	# of flutes Z	cutting speed Vc (sfm)	feed per tooth Fz (inch)	RPM N	feed rate Vf (inch/min)	programming radius Rt (inch)	maximum axial cutting depth (inch)
P20 52 HRC	TM7FN607002	1/4	6	395	.008	6015	270	.027	.0133
	TM7FN608003	5/16	6	395	.009	4812	270	.034	.0166
	TM7FN610004	3/8	6	395	.011	4010	270	.040	.0200
	TM7FN613005	1/2	6	395	.015	3008	270	.054	.0266
	TM7FN616006	5/8	6	395	.019	2406	270	.067	.0333
	TM7FN619007	3/4	6	395	.023	2005	270	.080	.0399
4340 45 HRC	TM7FN607002	1/4	6	525	.013	8020	600	.027	.0133
	TM7FN608003	5/16	6	525	.016	6416	600	.034	.0166
	TM7FN610004	3/8	6	525	.019	5347	600	.040	.0200
	TM7FN613005	1/2	6	525	.025	4010	600	.054	.0266
	TM7FN616006	5/8	6	525	.026	3208	500	.067	.0333
	TM7FN619007	3/4	6	525	.028	2673	450	.080	.0399

Featured Application: Milling a Mold

Operation: Pocket Milling
Customer: Die & Mold Manufacturer
Material: AISI 4340 hardened steel (52 HRC)
Workpiece: Mold
Results:
- 3x better metal removal rate than competitive tool!
- Machined at more than 3x faster feed!

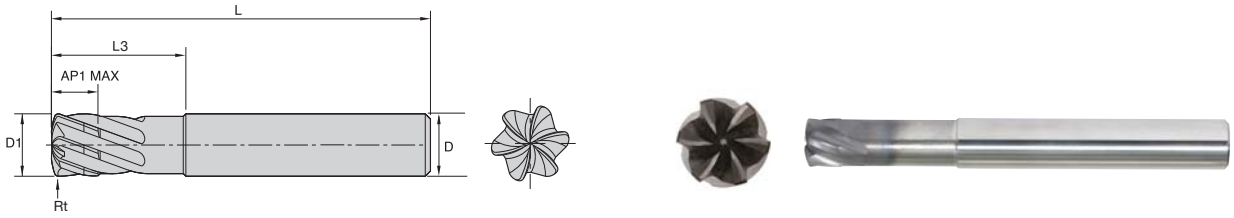
	COMPETITOR	*HANITA*
tool:	*4-flute H/P for die & mold*	*TM7FN613005*
material:	*medium hardened steel (52 HRC)*	*medium hardened steel (52 HRC)*
surface speed:	*120m/min (400 SFM)*	*160m/min (530 SFM)*
feed per tooth:	*0,34mm (.013")*	*0,6mm (.023")*
depth of cut:	*0,8mm (.031")*	*0,6mm (.023")*
table feed:	*4,331mm/min (170 in/min)*	*15,287mm/min (600 in/min)*
metal removal rate:	*22.8 cm³ (1.4 in³)*	*60.5 cm³ (3.7 in³)*



HANITA

X-Feed End Mills

Solid Carbide End Mills — Metric



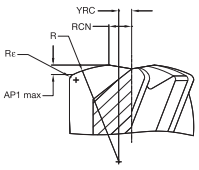
Series 70N7 for steels with hardness >50 HRC

D1	D	AP1 Max	L3	L	Rt	flutes	catalog number
6	6	0,20	18	63	0,58	6	70N706002MT
8	8	0,27	24	76	0,77	6	70N708003MT
10	10	0,33	30	89	0,96	6	70N710004MT
12	12	0,40	36	100	1,15	6	70N712005MT
16	16	0,54	48	110	1,54	6	70N716006MT
20	20	0,67	60	125	1,92	6	70N720007MT

Series 70N6 for steels with hardness 40 HRC to 52 HRC

D1	D	AP1 Max	L3	L	Rt	flutes	catalog number
6	6	0,32	9	57	0,62	6	71N606002MT
6	6	0,32	18	63	0,62	6	70N606002MT
8	8	0,42	12	63	0,83	6	71N608003MT
8	8	0,42	24	76	0,83	6	70N608003MT
10	10	0,53	15	72	1,04	6	71N610004MT
10	10	0,53	30	89	1,04	6	70N610004MT
12	12	0,63	18	83	1,24	6	71N612005MT
12	12	0,63	36	100	1,24	6	70N612005MT
16	16	0,84	48	110	1,66	6	70N616006MT
20	20	1,05	60	125	2,07	6	70N620007MT

Technical Information and Ramping Guide Table — Metric Sizes



Ramping Guide for Circular & Linear Ramping —
Series 70N7 for steels with hardness > 50 HRC — Metric Sizes

catalog number	Geometrical parameters						Circular Interpolation Optimal Range of Circle Diameter for a Single Pass		Linear Ramping Calculated Length per Ramp Angle Ramp Angle				
	D1	Xfm AP1 Max	R	Rε	YRC	RCN	Smallest	Largest	1°	2°	3°	4°	5°
70N706003MT	6	0,20	9	0,375	0,75	1,26	8,52	12,00	32,99	16,49	10,99	8,23	6,58
70N708003MT	8	0,27	12	0,500	1,00	1,68	11,36	16,00	43,98	21,99	14,65	10,98	8,78
70N710004MT	10	0,33	15	0,625	1,25	2,10	14,20	20,00	54,98	27,48	18,31	13,72	10,97
70N712005MT	12	0,40	18	0,750	1,50	2,52	17,04	24,00	65,98	32,98	21,97	16,47	13,16
70N716006MT	16	0,54	24	1,000	2,00	3,36	22,72	32,00	87,97	43,97	29,30	21,96	17,55
70N720007MT	20	0,67	30	1,250	2,50	4,20	28,40	40,00	109,96	54,96	36,62	27,45	21,94
							Recommended % of programmed feed rate to use while ramping.		100%	70%	50%	30%	10%

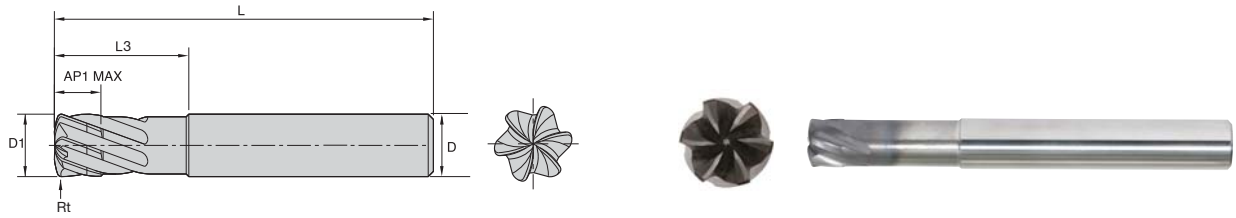
Series 70N6 for steels with hardness 40 HRC to 50 HRC — Metric Sizes

catalog number	Geometrical parameters						Circular Interpolation Optimal Range of Circle Diameter for a Single Pass		Linear Ramping Calculated Length per Ramp Angle Ramp Angle				
	D1	Xfm AP1 Max	R	Rε	YRC	RCN	Smallest	Largest	1°	2°	3°	4°	5°
70N606003MT	6	0,32	6	0,375	0,75	1,32	8,64	12,00	35,58	17,79	11,85	8,88	7,10
70N608003MT	8	0,42	8	0,500	1,00	1,76	11,52	16,00	47,44	23,71	15,80	11,84	9,47
70N610004MT	10	0,53	10	0,625	1,25	2,20	14,40	20,00	59,30	29,64	19,75	14,80	11,83
70N612005MT	12	0,63	12	0,750	1,50	2,64	17,28	24,00	71,17	35,57	23,70	17,76	14,20
70N616006MT	16	0,84	16	1,000	2,00	3,52	23,04	32,00	94,89	47,43	31,60	23,69	18,93
70N620007MT	20	1,05	20	1,250	2,50	4,40	28,80	40,00	118,61	59,29	39,50	29,61	23,66
							Recommended % of programmed feed rate to use while ramping.		100%	70%	50%	30%	10%

HANITA

X-Feed End Mills

Solid Carbide End Mills — Inch



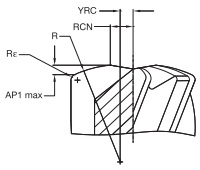
Series 7FN7 for steels with hardness >50 HRC

D1	D	AP1 Max	L3	L	Rt	flutes	catalog number
1/4	1/4	0.0082	.750	2.500	0.024	6	TM7FN707002
5/16	5/16	0.0103	1.000	3.000	0.030	6	TM7FN708003
3/8	3/8	0.0123	1.250	3.500	0.036	6	TM7FN710004
1/2	1/2	0.0164	1.500	4.000	0.048	6	TM7FN713005
5/8	5/8	0.0205	2.000	4.500	0.061	6	TM7FN716006
3/4	3/4	0.0246	2.500	5.000	0.072	6	TM7FN719007

Series 7FN6 for steels with hardness 40 HRC to 52 HRC

D1	D	AP1 Max	L3	L	Rt	flutes	catalog number
1/4	1/4	0.0133	.750	2.500	0.027	6	TM7FN607002
5/16	5/16	0.0166	1.000	3.000	0.034	6	TM7FN608003
3/8	3/8	0.0200	1.250	3.500	0.040	6	TM7FN610004
1/2	1/2	0.0266	1.500	4.000	0.054	6	TM7FN613005
5/8	5/8	0.0333	2.000	4.500	0.067	6	TM7FN616006
3/4	3/4	0.0399	2.500	5.000	0.080	6	TM7FN619007

Technical Information and Ramping Guide Table — Inch Sizes



Ramping Guide for Circular & Linear Ramping —
Series 7FN7 for steels with hardness > 50 HRC — Inch Sizes

catalog number	Geometrical parameters						Circular Interpolation Optimal Range of Circle Diameter for a Single Pass		Linear Ramping Calculated Length per Ramp Angle Ramp Angle				
	D1	Xfm AP1 Max	R	Rε	YRC	RCN	Smallest	Largest	1°	2°	3°	4°	5°
TM7FN707002	1/4	.0082	.375	.0160	.0313	.0550	.360	.500	.470	.235	.157	.117	.094
TM7FN708003	5/16	.0103	.469	.0200	.0391	.0688	.450	.625	.588	.294	.196	.147	.117
TM7FN710004	3/8	.0123	.563	.0240	.0469	.0825	.540	.750	.706	.353	.235	.176	.141
TM7FN713005	1/2	.0164	.750	.0320	.0625	.1100	.720	1.000	.941	.470	.313	.235	.188
TM7FN716006	5/8	.0205	.938	.0400	.0781	.1375	.900	1.250	1.176	.588	.392	.294	.235
TM7FN719007	3/4	.0246	1.125	.0470	.0938	.1650	1.080	1.500	1.411	.705	.470	.352	.282
7FN725007MT	1	.0328	1.500	.0620	.1250	.2200	1.440	2.000	1.882	.941	.627	.470	.375
Recommended % of programmed feed rate to use while ramping.									100%	70%	50%	30%	10%

Series 7FN6 for steels with hardness from 40 HRC to 50 HRC — Inch Sizes

catalog number	Geometrical parameters						Circular Interpolation Optimal Range of Circle Diameter for a Single Pass		Linear Ramping Calculated Length per Ramp Angle Ramp Angle				
	D1	Xfm AP1 Max	R	Rε	YRC	RCN	Smallest	Largest	1°	2°	3°	4°	5°
TM7FN607002	1/4	.0133	.250	.0160	.0313	.0525	.355	.500	.762	.381	.254	.190	.152
TM7FN608003	5/16	.0166	.313	.0200	.0391	.0656	.444	.625	.953	.476	.317	.238	.190
TM7FN610004	3/8	.0200	.375	.0235	.0469	.0788	.533	.750	1.143	.572	.381	.285	.228
TM7FN613005	1/2	.0266	.500	.0320	.0625	.1050	.710	1.000	1.525	.762	.508	.381	.304
TM7FN616006	5/8	.0333	.625	.0400	.0781	.1313	.888	1.250	1.906	.953	.635	.476	.380
TM7FN619007	3/4	.0399	.750	.0470	.0938	.1575	1.065	1.500	2.287	1.143	.762	.571	.456
7FN625007MT	1	.0532	1.000	.0620	.1250	.2100	1.420	2.000	3.049	1.524	1.016	.761	.608
Recommended % of programmed feed rate to use while ramping.									100%	70%	50%	30%	10%

Vision Plus Micro End Mills

High feed rates with extended tooling life!

- Perform at high feed rates while extending tooling life in titanium, cobalt-chrome, stainless steels, and other medical-grade materials.
- Perfect for implant and instrumentation manufacturers.
- A wide range of micro sizes available.
- Square end, ball nose, and extended neck styles for long-reach applications.

Recommended Cutting Parameters — Metric

Series 7N21

Material	Application: Side Milling ap	Side Milling ae	Slotting ap	Vc m/min TiAlN	fZ – feed per tooth in inch, D – diameter in mm (TiAlN): 0,5	0,6	0,8	1	1,5	2	3
Steel ~ 30 HRC	0,05 x D	0,2 x D	0,1 x D	40~80	0,045	0,050	0,007	0,008	0,013	0,018	0,023
Steel 30–40 HRC	0,05 x D	0,2 x D	0,1 x D	40~70	0,037	0,047	0,006	0,007	0,012	0,015	0,020
Steel 40–55 HRC	0,05 x D	0,2 x D	0,02 x D	30~50	0,025	0,029	0,0035	0,0045	0,007	0,009	0,010
Steel 55–60 HRC	0,05 x D	0,2 x D	0,01 x D	15~30	0,017	0,019	0,0025	0,003	0,005	0,0068	0,0082

if D < 1,0mm ap = 0,1D
if D > 1,0mm ap = 0,3D

If HRC ≥40, reduce cutting speed and feed by 20–30%.

Series 7N01

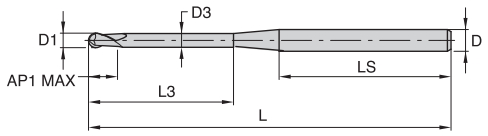
Material	Application: Side Milling ap	Side Milling ae	Slotting ap	Vc m/min TiAlN	fZ – feed per tooth in inch, D – diameter in mm (TiAlN): 0,3	0,4	0,5	0,6	0,8	1	1,5	2	3
Steel ~ 30 HRC	0,05 x D	0,2 x D	~0,1 x D	40~150	0,0075	0,0088	0,010	0,011	0,013	0,015	0,022	0,030	0,032
Steel 30–40 HRC	0,05 x D	0,2 x D	~0,1 x D	40~120	0,0070	0,0080	0,009	0,010	0,012	0,013	0,020	0,025	0,030
Steel 40–55 HRC	0,05 x D	0,2 x D	~0,1 x D	40~100	0,0035	0,0047	0,006	0,007	0,010	0,012	0,015	0,020	0,025
Steel 55–60 HRC	0,05 x D	0,2 x D	~0,1 x D	40~60	0,0020	0,0035	0,005	0,006	0,008	0,010	0,014	0,018	0,022

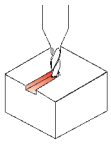
if D < 1,0mm ap = 0,05D
if D > 1,0mm ap = 0,1D

if > 45 HRC ap = 0,05D

Vision Plus Micro End Mills

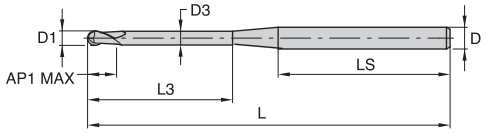
Metric Sizes — Series 7N21 — Vision Plus 2-Flute Ball Nose Micro End Mills for Long-Reach Applications

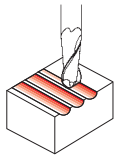




D1	D	AP1 Max	L3	L	TiAlN
0,5	4	1,3	4	63	7N2100501RT
0,6	4	1,3	5	63	7N2100601RT
0,8	4	1,8	6,7	63	7N2100801RT
1,0	4	2	8,4	63	7N2101001RT
1,2	4	2,4	10,1	63	7N2101201RT
1,5	4	2,9	13,6	63	7N2101501RT
2,0	4	3,7	16,8	63	7N2102001RT
2,5	4	4,3	21,2	63	7N2102501RT
3,0	4	5	25,5	63	7N2103001RT

Metric Sizes — Series 7N01 — Vision Plus Ball Nose End Mills





D1	L3	D	D3	AP1 Max	L	TiAlN
0,3	—	6	—	0,3	50	7N0100302MJ
0,4	—	6	—	0,4	50	7N0100402MJ
0,5	1,5	6	0,45	0,5	50	7N0100502MJ
0,6	1,8	6	0,55	0,6	50	7N0100602MJ
0,8	2,4	6	0,75	0,8	50	7N0100802MJ
1,0	2,5	6	0,95	2,5	50	7N0101002MJ
1,2	3,0	6	1,15	1,2	50	7N0101202MJ
1,4	3,5	6	1,35	1,4	50	7N0101402MJ
1,5	3,8	6	1,45	1,5	50	7N0101502MJ
1,6	4,0	6	1,55	1,6	50	7N0101602MJ
1,8	4,5	6	1,75	1,8	50	7N0101802MJ
2,0	5,0	6	1,95	2,0	50	7N0102002MJ
2,5	5,0	6	2,40	2,5	50	7N0102502MJ
3,0	6,0	6	2,85	6,0	50	7N0103002MJ
4,0	6,0	6	3,85	4,0	50	7N0104002MJ
6,0	9,0	6	5,85	6,0	50	7N0106002MJ

Carbide Roughers & Semi Finishers

Hanita provides a wide range of unique sinusoidal profiles and chipbreaker forms to deliver maximum metal removal rates. Far more than just a given pitch size, Hanita profile designs are uniquely formed and fine-tuned to optimize chip form, size, and speed of evacuation generated by a given workpiece material.

Special proprietary carbide substrate materials and in-house high-quality PVD coatings combine with these unique geometries to significantly reduce machining time, with heavier and deeper cuts, fewer passes, and much faster surface speed.

There are many applications when a semi-finished surface is acceptable on a part. For these situations, Hanita offers a range of semi-finishing styles capable of producing extraordinary metal removal rates, while leaving good surface finishes and reducing machining time by hundreds of percents, with fewer tool changes and tool passes.

- Provide maximum metal removal rates in both slotting and profiling operations.
- Available in:
  3-, 4-, and 5-flute styles
  stub, regular, and long lengths
  TiN, TiCN, and TiAlN coatings
  Solid and internal coolant hole styles
- Specific geometries targeted for Aluminum, Steels, Stainless Steels, High-Temperature Alloys, Titanium, Hardened and Ultra-Hard Materials.

Cobalt, PM Roughers, & Semi Finishers

HSSE (M42 Cobalt) and HSS-PM (Powdered Metal)

Known throughout the world as the leader in the field of roughing end mills, Hanita delivers the widest variety of premium cobalt and powdered metal roughing tools available.

The tools are designed with unique sinusoidal profiles and chipbreaker forms to optimize chip evacuation and tool performance and are offered with high-quality PVD coatings to enable the tools to run at high speeds and deliver the longest tool life.

Hanita roughers enable you to save considerable tool costs even over carbide tools. They can also help to avoid severe tool breakage because of their superior toughness. Hanita roughing end mills often outperform indexable style tools due to their ability to take deeper and heavier cuts, significantly reducing machining time and increasing overall productivity.

Available in:

- Coarse, Fine, Extra Fine, and specially designed profiles for specific materials.
- Square end with proper corner chamfers and ball nose styles.
- Stub, regular, long, and extra-long lengths.
- Specific geometries targeted for Aluminum, Steels, Stainless Steels, High-Temperature Alloys, and Titanium

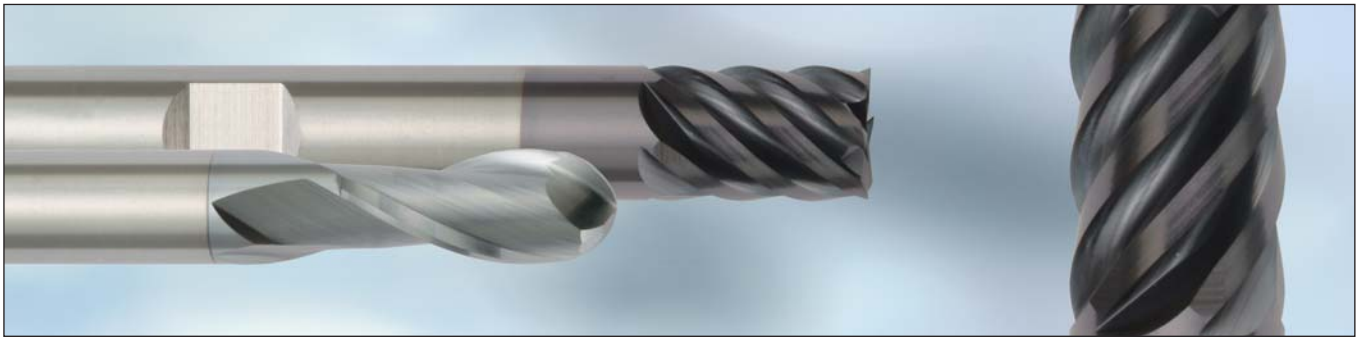
Hanita provides a wide range of high-performance solid end mills and carbide drills.
Contact your Authorized Hanita Distributor for a complete catalog.

Vision Plus™

Designed for optimum performance in machining hardened steels and ultra-hardened materials, Vision Plus carbide end mills utilize special proprietary substrate materials, patented designs, and a truly superb quality coating, combining a high level of hardness with extremely high stability. This enables maximum metal removal rates in materials up to 68 HRC, even in dry conditions, saving in coolant costs and protecting the environment.

- Perfect solutions for Die and Mold applications.
- Reduces machining costs by 50% compared to EDM.
- Excellent in long-reach and Z-axis milling applications.
- Provides outstanding surface finish quality and straightness of deep walls.
- Available in many styles, including radius, ball nose, miniature, rib processing, and roughing style tools.

Carbide Finishers



Hanita's wide range of carbide finishing end mills provides our customers with precisely the right tool for the job at hand. Our standard offering includes many tool styles, from conventional geometries for general machining situations to ultra-high-performance styles for very specific and demanding applications. Whether you need higher metal removal rates, improved surface finishes, fewer passes, or simply longer tool life, Hanita offers an outstanding choice of tools.

Only the finest carbide substrate materials with the proper microstructure are used to ensure appropriate hardness, toughness, and stability. Focused geometries, fully compliant with DIN, JIS, or NAS specifications, deliver superior productivity for the applications they were meant to serve. Enhancing the performance of these tools are our high-quality, in-house PVD coatings, including TiN, TiCN, TiAlN, and AlTiN, making Hanita products the finest and most consistent in the world.

Hanita carbide end mills deliver superior performance, reliably and consistently, from tool to tool.

Available in:

- 2-, 3-, 4-, and 6-flute styles.
- Special designs with higher number of flutes for super finishing applications.
- 30-, 35-, 37-, 40-, 45-, and 60-degree helixes.
- Stub, regular, long, and extra-long lengths.
- TiN, TiCN, TiAlN, and AlTiN coatings.
- Specific geometries targeted for Aluminum, Stainless Steels, High-Temperature Alloys, Titanium, Soft, Hardened and Ultra-Hard Steels.

Hanita provides a wide range of high-performance solid end mills and carbide drills.
Contact your Authorized Hanita Distributor for a complete catalog.

High-Speed Finishers

HSSE (M7, HSS, & M42 Cobalt) and HSS-PM (Powdered Metal)

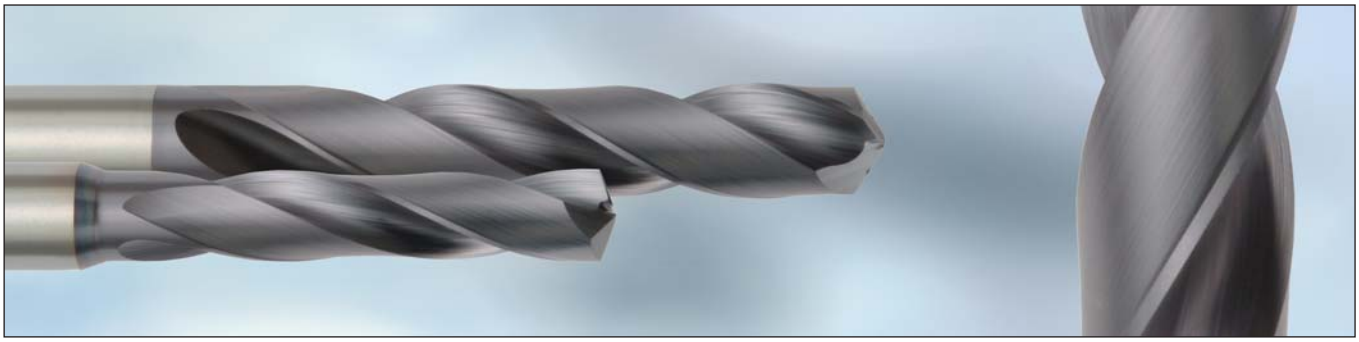
Hanita also offers a full range of end mills made from the highest quality high-speed materials, including M7, M42 Cobalt, and Powdered Metal Steels.

Hanita's HSSE 1 HSS-PM finishing end mills can provide an excellent alternative to carbide in applications involving conventional spindle or slow spindle machines, or when workpieces are held in less than rigid setups. These tools are especially cost effective when large diameter tools are required.

Available in:

- Cutting diameters from 1/16" through 2".
- 2-, 3-, 4-, and 6-flute styles.
- 30-, 35-, 37-, and 45- degree helixes.
- Stub, regular, long, and extra-long lengths.
- TiCN and TiAlN coatings.

Carbide Drills



Hanita carbide drills are the perfect solution for high-performance holemaking. Our unique geometry and point styles provide high throughput, high accuracy, and consistent performance in large variety of materials up to hardened steels with 68 HRC.

- Exceptional tool life, while working at high speeds and feeds.
- High-quality dimensional tolerances and hole-to-hole accuracy.
- Reinforced shank for toughness and strength.
- Easy to regrind.
- Coolant hole drills offered in small diameters, starting at 3mm (1/8").
- Specials, including step drills, are available.

Available in:

- Inch and metric sizes, many ranges in 0,1mm increments.
- Solid and coolant hole style drills.
- 3 x D and 5 x D drilling depth lengths.
- Has point style for Steels.
- HOA point style for Aluminum.

Hanita provides a wide range of high-performance solid end mills and carbide drills.
Contact your Authorized Hanita Distributor for a complete catalog.

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Metalcutting Safety

IMPORTANT SAFETY INSTRUCTIONS

Read before using the tools in this catalog!

Projectile and Fragmentation Hazards

Modern metalcutting operations involve high spindle and cutter speeds, and high temperatures and cutting forces. Hot metal chips may fly off the workpiece during metalcutting. Although cutting tools are designed and manufactured to withstand high cutting forces and temperatures, they can sometimes fragment, particularly if they are subjected to over-stress, severe impact, or other abuse.

To avoid injury:

- Always wear appropriate personal protective equipment, including safety goggles, when operating metalcutting machines or working nearby.
- Always make sure all machine guards are in place.

Breathing and Skin Contact Hazards:

Grinding carbide or other advanced cutting tool materials produces dust or mist containing metallic particles. Breathing this dust or mist — especially over an extended period — can cause temporary or permanent lung disease, or make existing medical conditions worse. Contact with this dust or mist can irritate eyes, skin, and mucous membranes, and may make existing skin conditions worse.

To avoid injury:

- Always wear breathing protection and safety goggles when grinding.
- Provide ventilation control and collect and properly dispose of dust, mist, or sludge from grinding.
- Avoid skin contact with dust or mist.

For more information, read the applicable Material Safety Data Sheet provided by Kennametal and consult General Industry Safety and Health Regulations, Part 1910, Title 29 of the Code of Federal Regulations.

These safety instructions are general guidelines. Many variables affect machining operations — it is impossible to cover every specific situation. The technical information included in this catalog and recommendations on machining practices may not apply to your particular operation. For more information, consult Kennametal's Metalcutting Safety booklet, available free from Kennametal at 724.539.5747, or fax 724.539.5439. For specific product safety and environmental questions, contact our Corporate Environmental Health and Safety Office at 724.539.5066 or fax 724.539.5372.

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