DURA-MILL®

CUTTING TOOL EXCELLENCE

Product Catalog 2018

WHISPERKUT, HIGH PERFORMANCE AND GENERAL PURPOSE SOLID CARBIDE END MILLS

DURAMILL.COM

TABLE OF CONTENTS

WHISPERKUT SERIES
VARIABLE HELIX

WhisperKut SERIES

FLUTES	MATERIAL APPLICATION	COATING(S)	DESCRIPTION	AVAILABLE END TYPE(S)	PAGE
3	Aluminum	Uncoated		Square, Corner Radius, Ball	8
3	Aluminum	ZrN		Square, Corner Radius, Ball	9
3	Aluminum	Uncoated	Extended Reach	Square, Corner Radius, Ball	10
3	Aluminum	ZrN	Extended Reach	Square, Corner Radius, Ball	11
Technical Guide: 3 Flute for Aluminum End Mills					12
3	Steel	AlTiN		Square, Corner Radius, Ball	13
3	Steel	AlTiN	Metric	Corner Radius	14
3	Steel	AlTiN	Extended Reach	Corner Radius, Ball	15
4	Steel	AlTiN		Square, Corner Radius	16
5	Steel	AlTiN		Square, Corner Radius	17
5	Steel	AlTiN	Metric	Corner Radius	18
5	Steel	AlTiN	Extended Reach	Corner Radius	19-20
GEN2 Series Introduction					22-23
4	All Purpose	AlTiN	GEN2 AP	Square, Corner Radius, Ball	24-25
5	Steel	AlTiN	GEN2	Square, Corner Radius	26-27
5	Steel	AlCrN / Ti	GEN2	Square, Corner Radius	28-29
Titanium Series Introduction					30
6	Titanium	AlCrN / Ti	GEN2 Ext. Reach	Square, Corner Radius, Ball	31-32
7	Steel	AlTiN	GEN2	Square, Corner Radius	34
7	Steel	AlCrN / Ti	GEN2	Square, Corner Radius	35
Speed & Feed Guide: WhisperKut Series					36-37

HIGH PERFORMANCE SERIES

HIGH PERFORMANCE SERIES
NON-VARIABLE HELIX

GENERAL PURPOSE SERIES

GENERAL PURPOSE SERIES
30 DEGREE HELIX

ABOUT DURA-MILL

A family owned business now in its second generation, Dura-Mill takes pride in its responsive customer service, technical support and, of course, product innovation and performance. Located in a state-of-the-art manufacturing facility in the heart of New York's "Tech Valley", Dura-Mill provides optimal value and performance in cutting tools for end mill applications for a wide range of custom applications.

WhisperKut® SERIES

Our innovative new WhisperKut®, and WhisperKut® GEN2 series establish a new benchmark for end mill performance and durability, resulting in cost savings to our customers. Meeting our customer requirements with complete satisfaction is our primary goal.

Dura-Mill offers a wide selection of precision ground high-performance and general purpose end mills to cover a broad range of metal cutting application. Meeting our customer requirements is our primary goal.

HIGH PERFORMANCE SERIES

GENERAL PURPOSE SERIES

WE MANUFACTURE SOLUTIONS

Dura-Mill provides a wide range of innovative cutting tool solutions to a wide range of industries. If we don't have the specific cutting tool you need, we can custom build one for you.

AEROSPACE • POWER GENERATION • MEDICAL • MOLD & DIE • MACHINE TOOL • DEFENSE

Dura-Mill offers a wide selection of tool coatings to meet your end milling requirements. These coatings are engineered to provide superior performance in a variety of industries such as Aerospace, Defense, Medical, Oil & Gas, firearm and other industries. Together, with our tool geometries and coatings, Dura-Mill offers its customers products that will provide maximum tool performance with reliable service.

COATING EXAMPLE	DURA-SHIELD NUMBER	COATING TYPE	KEY CHARACTERISTICS	PRIMARY APPLICATION
	DURA SHIELD 1	TiCN	Traditional TiCN coating with high hardness with excellent wear resistance. Redcued friction due to high lubricity.	Ideal for most ferrous and non-ferrous materials where low cutting speeds are used. With higher cutting speeds, use coolant.
	DURA SHIELD 2	AlCrN, Si	**DISCONTINUED** Replaced with DS6 (see below)	
	DURA SHIELD 3	AlTiN	Extremely hard coating with excellent wear and heat resistance. Can be used with or without coolant. A great overall coating.	An excellent choice for all ferrous materials including high temp alloys, stainless steels, alloy steels and hardened steels.
	DURA SHIELD 4	ZrN	An excellent coating exhibiting excellent lubricity and wear resistance in gummy materials.	A high performance coating for maching aluminum alloys and other non-ferrous materials.
	DURA SHIELD 5 NON-STOCK STANDARD	TiB2	An ultra high hardness coating for superior abrasion resistance. Provides excellent protection against BUE.	An excellent choice for aluminum alloys up to 9% silicon content. Also effective in the machining of titanium alloys.
	DURA SHIELD 6	AlCrN/Ti	Our latest generation of AlCrN coating with the addition of Ti providing a broader range of applications than DS2.	A premium coating for high temp and titanium alloys, stainless steels, alloy and hardened tool steels. For high speed milling applications.

WHY WHISPERKUT?

TWO UNIQUE DESIGN INNOVATIONS

Asymmetrical Variable Helix Design

Not to be confused with other variable helix end mill designs, WhisperKut's helix angles are independent from tooth to tooth. No two flutes share a common helix angle, allowing more tooth engagement over the work piece for greater stability. Independent lab testing of this design feature compared to end mills with a symmetrical design were found to be more effective in eliminating harmful harmonics.

Variable Flute Spacing

Each flute is unequally spaced around the circumference of the end mill, creating an out-of-phase cutting action which greatly reduces the constant harmonics typically produced with conventional end mills. Other end mills that are constructed with balanced or symmetrical geometry will often resonate at certain operating speeds causing chatter which can damage the tool and work piece.

WHISPERKUT®

Outperforms, Outlasts and Outcuts the Competition

BENEFITS

- Reduced Chatter and Harmonics
- Longer Tool Life
- Increased Productivity
- Improved Surface Finish
- Reduced Machine Vibration
- Greater Stable Depths of Cut
- Reduced Cutting Forces
- Rough and Finish with Same Tool

Fewer Passes = Time Saved!

Shane Mullins was using a ½" index-able end mill to slot 17-4PH (Rc35) stainless steel for a helical rotor. There were 15 slots 27" long and it took nine passes to rough it and three passes to finish it. He then tried a ½" 3 flute WhisperKut® end mill by Dura-Mill. "The WhisperKut end mill took me down to three passes per slot, and the total machining time saved was 10 hours per part."

Shane Mullins, Machinist
Great Lakes Industrial Knife Co., Akron, OH

Dedication To Our Customers

"Dura-Mill's products perform – they help lower my clients' cost of manufacturing and improve performance, so I can confidently represent their products. They have been a great company to deal with, they are truly concerned that our needs and our customer's needs are met. We've established a relationship with Dura-Mill over several years and I can tell you they are a quality company that strives to produce a world-class product and continually improves their products. They are truly a pleasure to work with."

Rod Burdge, Director of Sales
BlackHawk Industrial, Kent, WA

WhisperKut® CUTTING the BOUNDARIES

3 FLUTE FOR ALUMINUM

Square End, Corner Radius & Ball End

Material Application: NON-FERROUS MATERIALS

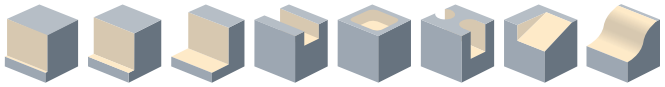
Coating: Uncoated

- Versatile design allowing for both heavy profile and slotting applications
- Advanced cutter geometry with wiper flats for improved floor finish
- Uncoated finish
- Offered in square, multiple radii and ball end design

Standard Features

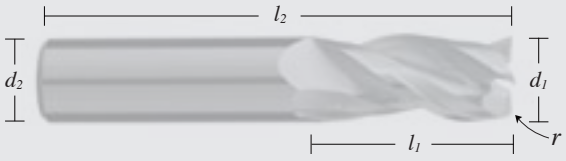
Optional

Preferred Milling Applications



* Standard Weldon Flats available at no charge

Cutting Dia. d_1	Shank Dia. d_2	LOC l_1	OAL l_2	Square End	Corner Radius r .015	.030	.060	.090	.125	.190	.250	Ball End
1/8	1/8	3/8	2	22980	22981							
	1/8	1/2	2	22990	22991							
3/16	3/16	9/16	2	23000	23001							23008
1/4	1/4	3/8	2	23020	23021	23022	23023					
	1/4	3/4	2-1/2	23030	23031	23032	23033					23038
	1/4	1	3	23040	23041	23042	23043					23048
3/8	3/8	1/2	2	23050	23051	23052	23053	23054	23055			
	3/8	1	2-1/2	23060	23061	23062	23063	23064	23065			23068
	3/8	1-1/2	3-1/2	23070	23071	23072	23073	23074	23075			23078
1/2	1/2	5/8	2-1/2	23080	23081	23082	23083	23084	23085			
	1/2	1-1/4	3	23100	23101	23102	23103	23104	23105			23108
	1/2	1-5/8	4	23110	23111	23112	23113	23114	23115			23118
	1/2	2	4	23120	23121	23122	23123	23124	23125			
5/8	5/8	1-5/8	4	23140		23142	23143	23144	23145			23148
3/4	3/4	1	3	23180		23182	23183	23184	23185	23186	23187	
	3/4	1-5/8	4	23190		23192	23193	23194	23195	23196	23197	23198
	3/4	2-1/4	5	23200		23202	23203	23204	23205	23206	23207	23208
1	1	1-1/4	4	23220		23222	23223	23224	23225	23226	23227	
	1	2	5	23230		23232	23233	23234	23235	23236	23237	23238
	1	3-1/4	6	23250		23252	23253	23254	23255	23256	23257	



TOLERANCES $d_1 = {}^{+.000}_{-.002}$ | $d_2 = {}^{-.0001}_{-.0004}$ | $r = {}^{+.001}_{-.001}$

Each coating batch is inspected and documented to ensure proper coating adhesion and thickness

NON-FERROUS MATERIALS Material Application

ZrN Coating

3 FLUTE FOR ALUMINUM

Square End, Corner Radius & Ball End

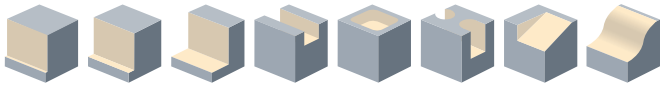
- Versatile design allowing for both heavy profile and slotting applications
- Advanced cutter geometry with wiper flats for improved floor finish
- ZrN Coated
- Offered in square, multiple radii and ball end design
- DS5 (TiB2) coating available upon request

DURA SHIELD 4 ZrN

Standard Features

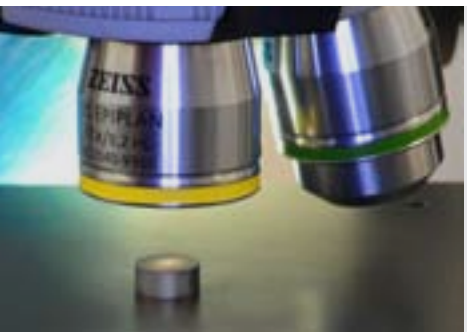
Optional

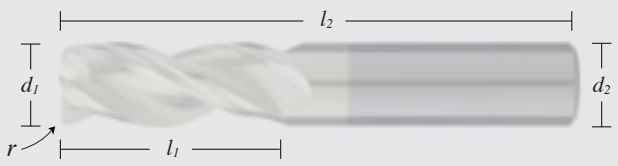
Preferred Milling Applications



* Standard Weldon Flats available at no charge

Cutting Dia. d_1	Shank Dia. d_2	LOC l_1	OAL l_2	Square End	Corner Radius r .015	.030	.060	.090	.125	.190	.250	Ball End
1/8	1/8	3/8	2	23980	23981							
	1/8	1/2	2	23990	23991							
3/16	3/16	9/16	2	24000	24001							24008
1/4	1/4	3/8	2	24020	24021	24022	24023					
	1/4	3/4	2-1/2	24030	24031	24032	24033					24038
	1/4	1	3	24040	24041	24042	24043					24048
3/8	3/8	1/2	2	24050	24051	24052	24053	24054	24055			
	3/8	1	2-1/2	24060	24061	24062	24063	24064	24065			24068
	3/8	1-1/2	3-1/2	24070	24071	24072	24073	24074	24075			24078
1/2	1/2	5/8	2-1/2	24080	24081	24082	24083	24084	24085			
	1/2	1-1/4	3	24100	24101	24102	24103	24104	24105			24108
	1/2	1-5/8	4	24110	24111	24112	24113	24114	24115			24118
	1/2	2	4	24120	24121	24122	24123	24124	24125			
5/8	5/8	1-5/8	4	24140		24142	24143	24144	24145			24148
3/4	3/4	1	3	24180		24182	24183	24184	24185	24186	24187	
	3/4	1-5/8	4	24190		24192	24193	24194	24195	24196	24197	24198
	3/4	2-1/4	5	24200		24202	24203	24204	24205	24206	24207	24208
1	1	1-1/4	4	24220		24222	24223	24224	24225	24226	24227	
	1	2	5	24230		24232	24233	24234	24235	24236	24237	24238
	1	3-1/4	6	24250		24252	24253	24254	24255	24256	24257	





TOLERANCES $d_1 = {}^{+.000}_{-.002}$ | $d_2 = {}^{-.0001}_{-.0004}$ | $r = {}^{+.001}_{-.001}$

DURA-MILL CUTTING TOOL EXCELLENCE

3 FLUTE FOR ALUMINUM
EXTENDED REACH
Square End, Corner Radius & Ball End

Material Application: NON-FERROUS MATERIALS

Coating: Uncoated

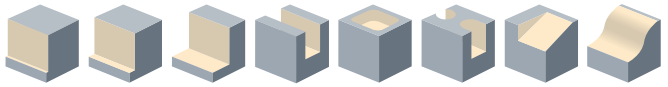
UNCOATED

- Versatile design allowing for both heavy profile and slotting applications
- Advanced cutter geometry with wiper flats for improved floor finish
- Uncoated finish
- Offered in square, multiple radii and ball end design
- Neck relief design for deep pocket milling applications

Standard Features

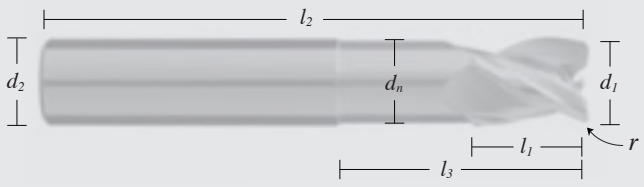
Optional

Preferred Milling Applications



* Standard Weldon Flats available at no charge

Cutting Dia. d_1	Shank Dia. d_2	LOC l_1	OAL l_2	Neck Dia. d_n	LBS l_3	Square End	Corner Radius r .015	.030	.060	.090	.125	.190	.250	Ball End
3/16	3/16	1/4	2	.175	9/16	23270	23271							23278
1/4	1/4	3/8	2-1/2	.237	3/4	23290	23291	23292	23293					23298
	1/4	3/8	3	.237	1-1/8	23300	23301	23302	23303					23308
3/8	3/8	1/2	3	.356	1-1/8	23320	23321	23322	23323	23324	23325			23328
	3/8	1/2	4	.356	2-1/8	23330	23331	23332	23333	23334	23335			23338
1/2	1/2	5/8	3	.476	1-3/8	23350	23351	23352	23353	23354	23355			23358
	1/2	5/8	4	.476	2-1/4	23360	23361	23362	23363	23364	23365			23368
	1/2	5/8	5	.476	3-3/8	23370	23371	23372	23373	23374	23375			23378
	1/2	5/8	6	.476	4-1/4	23380	23381	23382	23383	23384	23385			23388
5/8	5/8	3/4	4	.596	1-5/8	23390		23392	23393	23394	23395			23398
3/4	3/4	1	4	.716	2	23420		23422	23423	23424	23425	23426	23427	23428
	3/4	1	6	.716	3-3/8	23440		23442	23443	23444	23445	23446	23447	23448
1	1	1-1/4	6	.956	3-3/8	23460		23462	23463	23464	23465	23466	23467	23468
	1	1-1/4	7	.956	4-3/8	23470		23472	23473	23474	23475	23476	23477	23478



TOLERANCES $d_1 = {}^{+.000}_{-.002}$ | $d_2 = {}^{-.0001}_{-.0004}$ | $r = {}^{+.001}_{-.001}$

NON-FERROUS MATERIALS Material Application

ZrN Coating

3 FLUTE FOR ALUMINUM
EXTENDED REACH
Square End, Corner Radius & Ball End

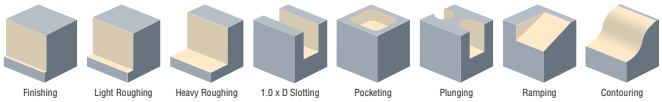
- Versatile design allowing for both heavy profile and slotting applications
- Advanced cutter geometry with wiper flats for improved floor finish
- ZrN Coated
- Offered in square, multiple radii and ball end design
- Neck relief design for deep pocket milling applications
- DS5 (TiB2) coating available upon request

DURA SHIELD 4
ZrN

Standard Features

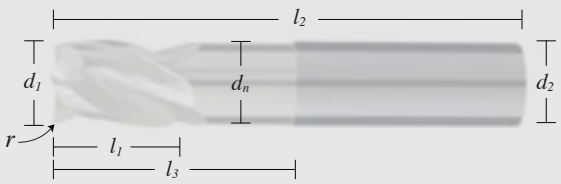
Optional

Preferred Milling Applications



* Standard Weldon Flats available at no charge

Cutting Dia. d_1	Shank Dia. d_2	LOC l_1	OAL l_2	Neck Dia. d_n	LBS l_3	Square End	Corner Radius r .015	.030	.060	.090	.125	.190	.250	Ball End
3/16	3/16	1/4	2	.175	9/16	24270	24271							24278
1/4	1/4	3/8	2-1/2	.237	3/4	24290	24291	24292	24293					24298
	1/4	3/8	3	.237	1-1/8	24300	24301	24302	24303					24308
3/8	3/8	1/2	3	.356	1-1/8	24320	24321	24322	24323	24324	24325			24328
	3/8	1/2	4	.356	2-1/8	24330	24331	24332	24333	24334	24335			24338
1/2	1/2	5/8	3	.476	1-3/8	24350	24351	24352	24353	24354	24355			24358
	1/2	5/8	4	.476	2-1/4	24360	24361	24362	24363	24364	24365			24368
	1/2	5/8	5	.476	3-3/8	24370	24371	24372	24373	24374	24375			24378
	1/2	5/8	6	.476	4-1/4	24380	24381	24382	24383	24384	24385			24388
5/8	5/8	3/4	4	.596	1-5/8	24390		24392	24393	24394	24395			24398
3/4	3/4	1	4	.716	2	24420		24422	24423	24424	24425	24426	24427	24428
	3/4	1	6	.716	3-3/8	24440		24442	24443	24444	24445	24446	24447	24448
1	1	1-1/4	6	.956	3-3/8	24460		24462	24463	24464	24465	24466	24467	24468
	1	1-1/4	7	.956	4-3/8	24470		24472	24473	24474	24475	24476	24477	24478



TOLERANCES $d_1 = {}^{+.000}_{-.002}$ | $d_2 = {}^{-.0001}_{-.0004}$ | $r = {}^{+.001}_{-.001}$

Dura-Mill now offers alternative coating choices for those seeking optimal performance for the most demanding applications.

TECHNICAL GUIDE

3 Flute For Aluminum Series

RECOMMENDED STARTING SPEEDS AND FEEDS

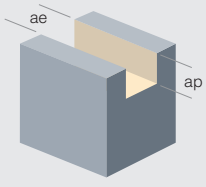
AISI	Material Group	SFM Low - High	Application Cut Type	(FPT) Feed per Tooth 1/8	3/16	1/4	3/8	1/2	5/8	3/4	1
ALUMINUM (Wrought Alloy) 6061, 7075, 1000, 2014-76, 2011-T3, 2024-T4, A2	N1	1500 - 2500	S*	.0009 - .0012	.0014 - .0018	.0018 - .0024	.0026 - .0036	.0035 - .0047	.004 - .0059	.0053 - .0071	.007 - .0095
			HR	.0012 - .0016	.0018 - .0023	.0023 - .0032	.0035 - .0047	.0047 - .0063	.0058 - .0079	.007 - .0095	.0094 - .0127
			LR	.0015 - .002	.0023 - .0035	.0029 - .004	.0044 - .0059	.0058 - .0079	.0073 - .0099	.0088 - .0119	.0117 - .0158
			F**	.0015 - .002	.003 - .004	.005 - .006	.007 - .010	.012 - .014	.014 - .016	.015 - .017	.016 - .018
ALUMINUM (Cast Alloy) Silcon <12% A Series - G Series	N2	700 -1100	S*	.0007 - .001	.001 - .0014	.0014 - .0019	.0022 - .0029	.0029 - .0039	.0036 - .0049	.0043 - .0058	.0057 - .0078
			HR	.001 - .0013	.0014 - .0018	.0019 - .0026	.0029 - .0039	.0038 - .0052	.0048 - .0065	.0057 - .0078	.0077 - .0104
			LR	.0011 - .0014	.0018 - .0023	.0021 - .0029	.0032 - .0043	.0043 - .0058	.0053 - .0072	.0064 - .0086	.0085 - .0115
			F**	.0012 - .0017	.0025 - .0034	.0042 - .0051	.0059 - .0085	.0102 - .0119	.0119 - .0136	.0127 - .0144	.0136 - .0153

GENERAL NOTES

1. When recommended SFM/RPM cannot be achieved, use the maximum machine RPM and the suggested FPT per the table
2. * When slotting 1 x D deep, use 70% of maximum machine RPM
3. Flood coolant recommended for all applications
4. Reduce SFM values by 40% when using uncoated tools
5. ** Standard finishing feed rates may require adjustments.
6. When using extended neck relief tools, it may require a reduction of ADOC and RDOC values based upon your specific part and fixture.

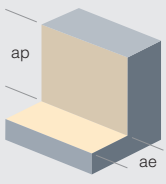
APPLICATION CUT TYPE

Slotting (S) *



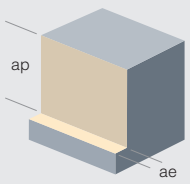
Axial DOC (ap) = up to 1 x D
Radial DOC (ae) = 1 x D

Heavy Roughing (HR)



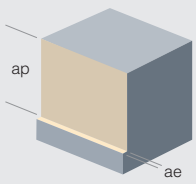
Axial DOC (ap) = up to 1.25 x D
Radial DOC (ae) = 0.5 x D

Light Roughing (LR)



Axial DOC (ap) = LOC
Radial DOC (ae) = 0.25 x D

Finishing (F) **



Axial DOC (ap) = LOC
Radial DOC (ae) = 3% to 5% of Dia.

LOC = Length of Cut

STEEL | STAINLESS STEEL | CAST IRON | HI-TEMP ALLOYS | HARDENED STEEL — Material Application

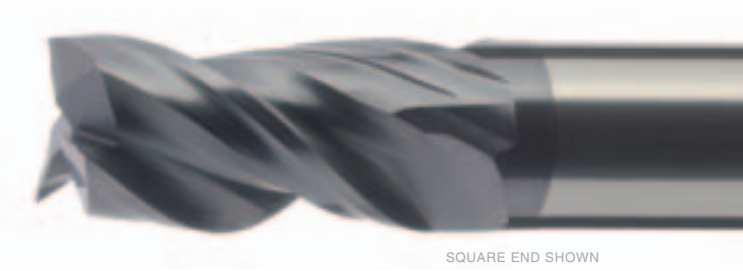
AlTiN — Coating

3 FLUTE FOR STEEL

Square End, Corner Radius & Ball End

- Ideal design for heavy profile and slotting operations
- Eccentric relief for superior edge strength
- Offered in square, corner radius and ball end design

DURA SHIELD 3 AlTiN

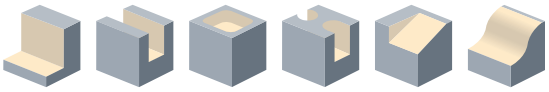


SQUARE END SHOWN

Standard Features

Optional

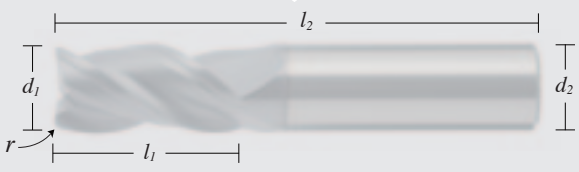
Preferred Milling Applications



* Standard Weldon Flats available at no charge

Cutting Dia. d_1	Shank Dia. d_2	LOC l_1	OAL l_2	Square End	Corner Radius r .010-.015	.015-.020	.025-.030	.030-.035	Ball End
1/8	1/8	1/4	1-1/2	20038	20000				
	1/8	3/8	1-1/2	20039	20001				20102
5/32	3/16	7/16	2	20041	20003				20104
3/16	3/16	5/16	1-1/2	20042	20004				
	3/16	7/16	2	20043	20005				20106
7/32	1/4	7/16	2-1/2	20045		20007			20108
1/4	1/4	3/8	2	20046		20008			
	1/4	5/8	2-1/2	20047		20009			20110
9/32	5/16	5/8	2-1/2			20012			20112
5/16	5/16	1/2	2	20052		20013			
	5/16	3/4	2-1/2	20053		20014			20114
3/8	3/8	1/2	2	20055		20016			
	3/8	1	2-1/2	20056		20017			20116
7/16	7/16	1	2-3/4	20060		20021			20118
1/2	1/2	5/8	2-1/2	20061			20022		
	1/2	1	3	20062			20023		20120
	1/2	1-1/4	3	20063			20024		
5/8	5/8	3/4	3	20065				20026	
	5/8	1-1/4	3-1/2	20066				20027	
3/4	3/4	7/8	3	20068				20029	
	3/4	1-1/2	4	20069				20030	
1	1	1-1/2	4					20034	

Metric sizes on next page ▸



TOLERANCES $d_1 = {}^{+.000}_{-.002}$ | $d_2 = {}^{-.0001}_{-.0004}$

3 FLUTE FOR STEEL

Metric Corner Radius

Material Application: STEEL | STAINLESS STEEL | CAST IRON | HI-TEMP ALLOYS | HARDENED STEEL

Coating: AlTiN

DURA SHIELD 3

AlTiN

- Ideal design for heavy profile and slotting operations
- Eccentric relief for superior edge strength

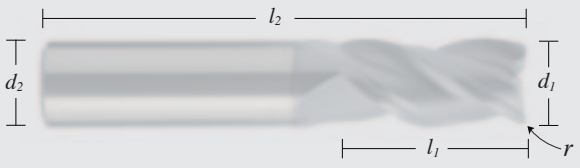
Standard Features

Optional

Preferred Milling Applications

* Standard Weldon Flats available at no charge

Cutting Dia. d_1	Shank Dia. d_2	LOC l_1	OAL l_2	Corner Radius r .25-.38mm	.38-.51mm	.64-.76mm	.76-.89mm
3mm	6mm	8mm	58mm	20315			
4mm	6mm	11mm	58mm	20317			
5mm	6mm	13mm	58mm	20319			
6mm	6mm	13mm	58mm		20321		
8mm	8mm	19mm	63mm		20323		
10mm	10mm	22mm	72mm		20325		
12mm	12mm	26mm	83mm			20327	
14mm	14mm	26mm	83mm			20329	
16mm	16mm	32mm	92mm				20331
18mm	18mm	32mm	92mm				20333
20mm	20mm	38mm	100mm				20335



TOLERANCES | d_1 = +.000 mm / -.050 mm | d_2 = -.0025 mm / -.010 mm

◂ Imperial sizes on previous page

WhisperKut® means improved surface finish and extended tool life

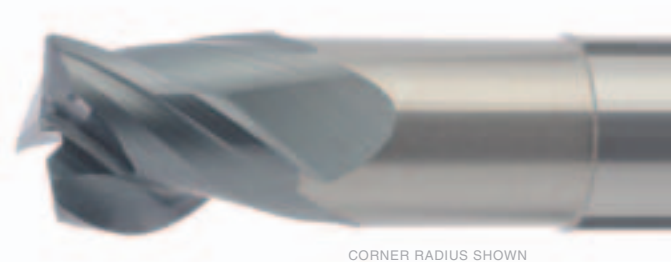
STEEL | STAINLESS STEEL | CAST IRON | HI-TEMP ALLOYS | HARDENED STEEL — Material Application

AlTiN — Coating

3 FLUTE FOR STEEL
EXTENDED REACH
Corner Radius & Ball End

- Ideal design for heavy profile and slotting operations
- Eccentric relief for superior edge strength
- Extended reach for increased rigidity - available with neck relief for deep pocket milling applications

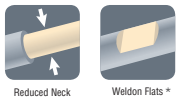
DURA SHIELD 3
AlTiN


CORNER RADIUS SHOWN

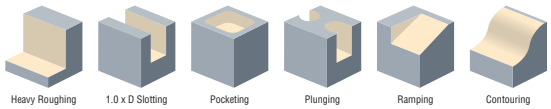
Standard Features


Corner Radius | Ball End | Center Cutting | Variable Index | Variable Helix

Optional


Reduced Neck | Weldon Flats *

Preferred Milling Applications


Heavy Roughing | 1.0 x D Slotting | Pocketing | Plunging | Ramping | Contouring

* Standard Weldon Flats available at no charge

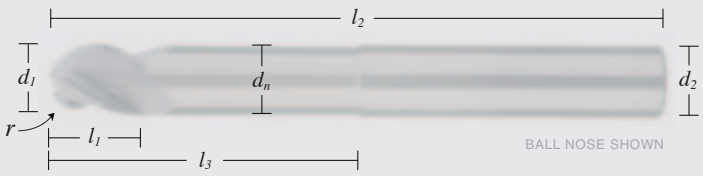
CORNER RADIUS

Cutting Dia. d_1	Shank Dia. d_2	LOC l_1	OAL l_2	Corner Radius r	Without Neck Relief	With Neck Relief	Neck Dia. d_n	LBS Range l_3
1/4	1/4	3/8	4	.015-.020	20075	20088	.235	3/4 to 2-1/8
3/8	3/8	1/2	4	.015-.020	20077	20090	.355	7/8 to 2-1/8
			6	.015-.020	20078	20091	.355	7/8 to 3-3/8
1/2	1/2	5/8	4	.025-.030	20080	20093	.470	1 to 2-1/8
			6	.025-.030	20081	20094	.470	1 to 4
5/8	5/8	3/4	5	.030-.035	20082	20095	.590	3/4 to 2-1/8
			6	.030-.035	20083	20096	.590	1-1/8 to 4
3/4	3/4	7/8	5	.030-.035	20084	20097	.715	1-1/4 to 3
			6	.030-.035	20085	20098	.715	1-1/4 to 4
1	1	1-1/4	5	.030-.035	20086	20099	.960	1-1/2 to 3
			6	.030-.035	20087	20100	.960	1-1/2 to 4

BALL END

Cutting Dia. d_1	Shank Dia. d_2	LOC l_1	OAL l_2	Without Neck Relief	With Neck Relief	Neck Dia. d_n	LBS Range l_3
1/4	1/4	3/8	4	20125	20135	.235	3/4 to 2-1/8
3/8	3/8	1/2	6	20128	20138	.355	7/8 to 3-3/8
1/2	1/2	5/8	6	20130	20140	.470	1 to 4

Customers must supply Length Below Shank (LBS) dimensions



BALL NOSE SHOWN

TOLERANCES $d_1 = {}^{+.000}_{-.002}$ | $d_2 = {}^{-.0001}_{-.0004}$

4 FLUTE FOR STEEL

Square End & Corner Radius

Material Application: STEEL | STAINLESS STEEL | CAST IRON | HI-TEMP ALLOYS | HARDENED STEEL

Coating: AlTiN

CORNER RADIUS SHOWN

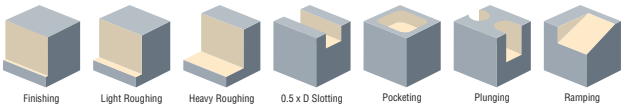
DURA SHIELD 3 AlTiN

- Universal design permits moderate to heavy profile and slotting operations
- Extensive offering of specific corner radii
- 2 teeth to center for better plunging & ramping applications

Standard Features

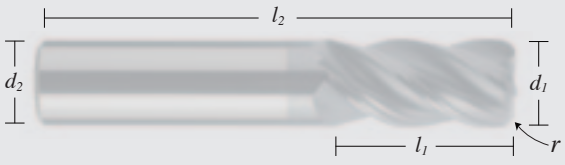
Optional

Preferred Milling Applications



* Standard Weldon Flats available at no charge

Cutting Dia. d_1	Shank Dia. d_2	LOC l_1	OAL l_2	Square End	Corner Radius r .015	.030	.060	.090	.125
1/8	1/8	1/4	1 1/2	20352	20150				
	1/8	3/8	1 1/2	20353	20153				
5/32	3/16	7/16	2	20379	20156	20157			
3/16	3/16	5/16	1 1/2	20354	20159	20161			
	3/16	7/16	2	20355	20162	20164			
7/32	1/4	7/16	2 1/2	20380	20165	20166			
1/4	1/4	3/8	2	20356	20167	20168	20169		
	1/4	5/8	2 1/2	20357	20170	20171	20172		
9/32	5/16	5/8	2 1/2	20381	20173	20384			
5/16	5/16	1/2	2	20358	20174	20175			
	5/16	3/4	2 1/2	20359	20176	20177			
11/32	3/8	13/16	2 1/2	20382	20178	20182			
3/8	3/8	1/2	2	20360	20179	20180	20181		
	3/8	1	2 1/2	20361	20183	20184	20185		
13/32	7/16	15/16	2 3/4	20383	20192	20193			
7/16	7/16	1	2 3/4	20363	20195	20196			
1/2	1/2	5/8	2 1/2	20364	20198	20199	20200	20201	20202
	1/2	1	3	20365	20203	20204	20205	20206	20207
	1/2	1 1/4	3	20366	20208	20209	20210	20211	20212
5/8	5/8	3/4	3	20367		20218	20219	20220	20221
	5/8	1 1/4	3 1/2	20368		20222	20223	20224	20225
3/4	3/4	7/8	3	20369		20230	20231	20232	20233
	3/4	1 1/2	4	20370		20236	20237	20238	20239
1	1	1 1/2	4	20372		20241	20242	20243	20244



TOLERANCES $d_1 = {}^{+.000}_{-.002}$ | $d_2 = {}^{-.0001}_{-.0004}$ | $r = {}^{+.000}_{-.002}$

STEEL | STAINLESS STEEL | CAST IRON | HI-TEMP ALLOYS | HARDENED STEEL — Material Application

AlTiN — Coating

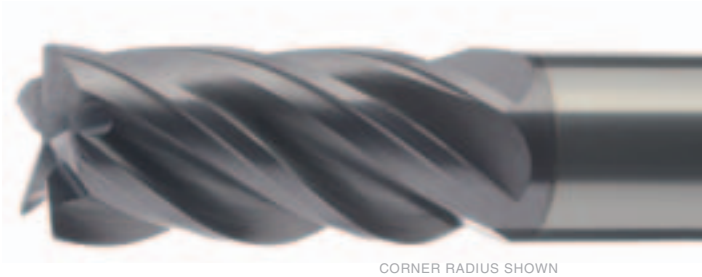
5 FLUTE FOR STEEL

Square End & Corner Radius

- 20% gain in feed rate over 4 flute tools
- Eccentric relief for superior edge strength
- Ideal design for light roughing and finishing applications

DURA SHIELD 3

AlTiN

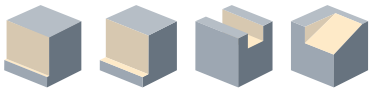


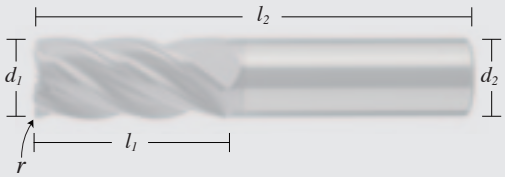
CORNER RADIUS SHOWN

Standard Features

Optional

Preferred Milling Applications





TOLERANCES $d_1 = {}^{+.000}_{-.002}$ | $d_2 = {}^{-.0001}_{-.0004}$ | $r = {}^{+.000}_{-.002}$

* Standard Weldon Flats available at no charge

Cutting Dia. d_1	Shank Dia. d_2	LOC l_1	OAL l_2	Square End	Corner Radius r .015	.030
1/4	1/4	3/8	2	20285	20250	
	1/4	5/8	2-1/2	20286	20251	
	1/4	3/4	2-1/2	20287	20252	
	1/4	1-1/4	3		20253	
	1/4	5/8	4		20254	
5/16	5/16	3/4	2-1/2	20290	20256	
	5/16	1	3	20291	20257	
3/8	3/8	1/2	2	20292	20258	
	3/8	1	2-1/2	20293	20260	
	3/8	1-1/4	3		20261	
	3/8	7/8	4		20262	
7/16	7/16	1	2-3/4	20297	20264	
1/2	1/2	5/8	2-1/2	20298		20265
	1/2	1	3	20299		20266
	1/2	1-1/4	3	20300		20267
	1/2	1-5/8	4			20268
	1/2	2	4			20269
	1/2	1	6			20270
5/8	5/8	3/4	3	20303		20271
	5/8	1-1/4	3-1/2	20304		20272
	5/8	2-1/4	5			20273
	5/8	1-1/4	6			20274
3/4	3/4	7/8	3	20305		20275
	3/4	1-5/8	4	20306		20276
	3/4	2-1/4	5	20307		20278
	3/4	1-1/2	6			20279
1	1	1-1/2	4	20309		20280
	1	2	4-1/2			20282
	1	2-1/2	5			20281

Each product goes through an extensive inspection process on our fully automated Zoller CNC measuring machine.

Metric sizes on next page ▸

5 FLUTE FOR STEEL

Metric Corner Radius

Material Application: STEEL | STAINLESS STEEL | CAST IRON | HI-TEMP ALLOYS | HARDENED STEEL

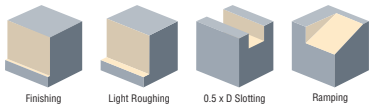
Coating: AlTiN

DURA SHIELD 3

AlTiN

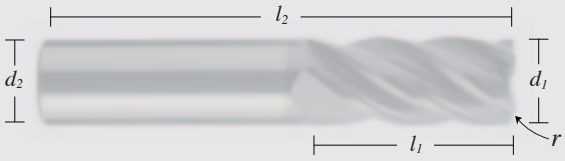
- 20% gain in feed rate over 4 flute tools
- Eccentric relief for superior edge strength
- Ideal design for light roughing and finishing applications

Standard Features	Optional	Preferred Milling Applications



* Standard Weldon Flats available at no charge

Cutting Dia. d_1	Shank Dia. d_2	LOC l_1	OAL l_2	Corner Radius r .38-.51mm	.64-.76mm	.76-.89mm
6mm	6mm	13mm	58mm	20337		
8mm	8mm	19mm	63mm	20339		
10mm	10mm	22mm	72mm	20341		
12mm	12mm	26mm	83mm		20343	
14mm	14mm	26mm	83mm		20345	
16mm	16mm	32mm	92mm			20347
18mm	18mm	32mm	92mm			20349
20mm	20mm	38mm	100mm			20351



TOLERANCES | d_1 = +.000 mm -.050 mm | d_2 = -.0025 mm -.010 mm

◂ Imperial sizes on previous page

WhisperKut® outperforms, outlasts and outcuts the competition

STEEL | STAINLESS STEEL | CAST IRON | HI-TEMP ALLOYS | HARDENED STEEL — Material Application

AlTiN — Coating

5 FLUTE FOR STEEL
EXTENDED REACH
Corner Radius

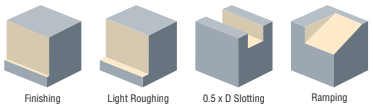
- 20% gain in feed rate over 4 flute tools
- Eccentric relief for superior edge strength
- Ideal design for light roughing and finishing applications
- Extended reach for increased rigidity - available with neck relief for deep pocket milling applications

DURA SHIELD 3
AlTiN

Standard Features

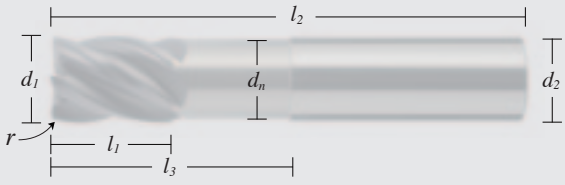
Optional

Preferred Milling Applications



* Standard Weldon Flats available at no charge

Cutting Dia. d_1	Shank Dia. d_2	LOC l_1	OAL l_2	Corner Radius r	Without Neck Relief	With Neck Relief	Neck Dia. d_n	LBS l_3
1/4	1/4	3/8	3	.020	61350			
	1/4	3/8	3	.020		31350	.237	3/4
	1/4	3/8	4	.020	61351			
	1/4	3/8	4	.020		31351	.237	1-1/8
	1/4	3/8	4	.020		31352	.237	2-1/8
3/8	3/8	1/2	4	.020	61353			
	3/8	1/2	4	.020		31353	.356	1-1/8
	3/8	1/2	4	.020		31354	.356	2-1/8
	3/8	1/2	6	.020	61355			
	3/8	1/2	6	.020		31355	.356	3-1/8
	3/8	1/2	6	.020		31356	.356	4-1/8
1/2	1/2	5/8	4	.030	61357			
	1/2	5/8	4	.030		31357	.475	1-1/2
	1/2	5/8	4	.030		31358	.475	2-1/4
	1/2	5/8	6	.030	61359			
	1/2	5/8	6	.030		31359	.475	3-3/8
	1/2	5/8	6	.030		31360	.475	4-1/8



TOLERANCES $d_1 = {}^{+.000}_{-.002}$ | $d_2 = {}^{-.0001}_{-.0004}$ | $r = {}^{+.000}_{-.002}$

Additional sizes on next page ▸

5 FLUTE FOR STEEL
EXTENDED REACH
Corner Radius

Material Application: STEEL | STAINLESS STEEL | CAST IRON | HI-TEMP ALLOYS | HARDENED STEEL

Coating: AlTiN

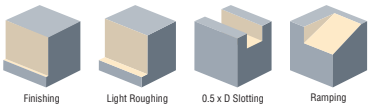
DURA SHIELD 3
AlTiN

- 20% gain in feed rate over 4 flute tools
- Eccentric relief for superior edge strength
- Ideal design for light roughing and finishing applications
- Extended reach for increased rigidity - available with neck relief for deep pocket milling applications

Standard Features

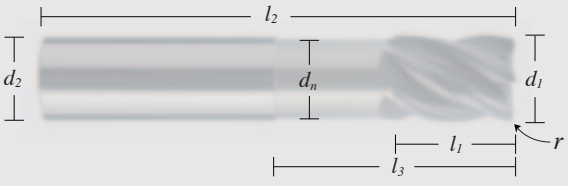
Optional

Preferred Milling Applications



* Standard Weldon Flats available at no charge

Cutting Dia. d_1	Shank Dia. d_2	LOC l_1	OAL l_2	Corner Radius r	Without Neck Relief	With Neck Relief	Neck Dia. d_n	LBS l_3
5/8	5/8	3/4	4	.030	61361			
	5/8	3/4	4	.030		31361	.593	1-5/8
	5/8	3/4	6	.030	61362			
	5/8	3/4	6	.030		31362	.593	2-3/8
	5/8	3/4	6	.030		31363	.593	3-3/8
	5/8	3/4	6	.030		31364	.593	4-3/8
3/4	3/4	1	4	.030	61365			
	3/4	1	4	.030		31365	.712	2
	3/4	1	6	.030	61366			
	3/4	1	6	.030		31366	.712	2-1/2
	3/4	1	6	.030		31367	.712	3-3/8
	3/4	1	6	.030		31368	.712	4-1/8
1	1	1-1/4	4	.030	61369			
	1	1-1/4	4	.030		31369	.950	2-1/4
	1	1-1/4	6	.030	61370			
	1	1-1/4	6	.030		31370	.950	2-5/8
	1	1-1/4	6	.030		31371	.950	3-3/8
	1	1-1/4	6	.030		31372	.950	4-1/8

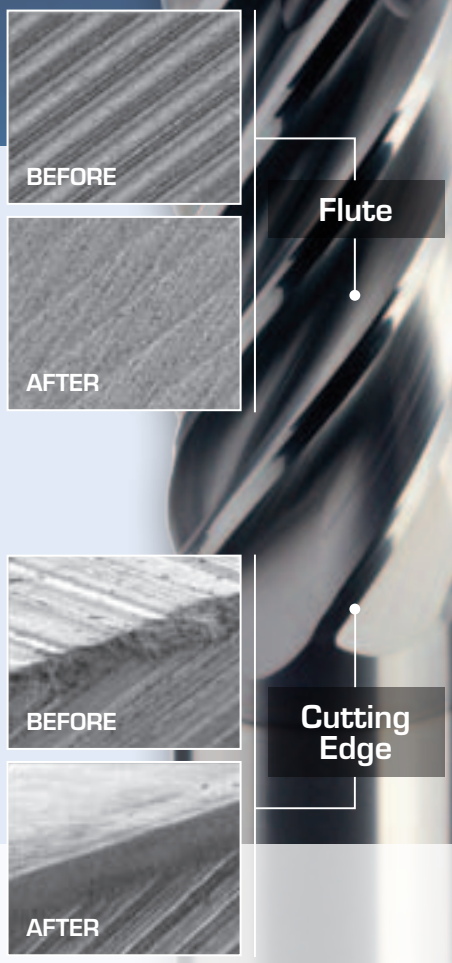


TOLERANCES $d_1 = {}^{+.000}_{-.002}$ | $d_2 = {}^{-.0001}_{-.0004}$ | $r = {}^{+.000}_{-.002}$

◂ Additional sizes on previous page

ON SITE RESEARCH & DEVELOPMENT CENTER

WhisperKut® GEN2



SAME WHISPERKUT® TECHNOLOGY BUT WITH A NEW TWIST

MICRO EDGE

Our WhisperKut GEN2 Series end mills are based on the same patented technology of our popular WhisperKut end mills but with the addition of a controlled micro edge process.

Additionally, GEN2 end mills are produced from a premium sub micro grain carbide with improved toughness offering superior performance in all types of materials and applications.

Dura-Mill's Micro Edge process enhances edge stability and minimizes the tendency of premature edge chipping resulting in consistently superior tool performance.

BENEFITS

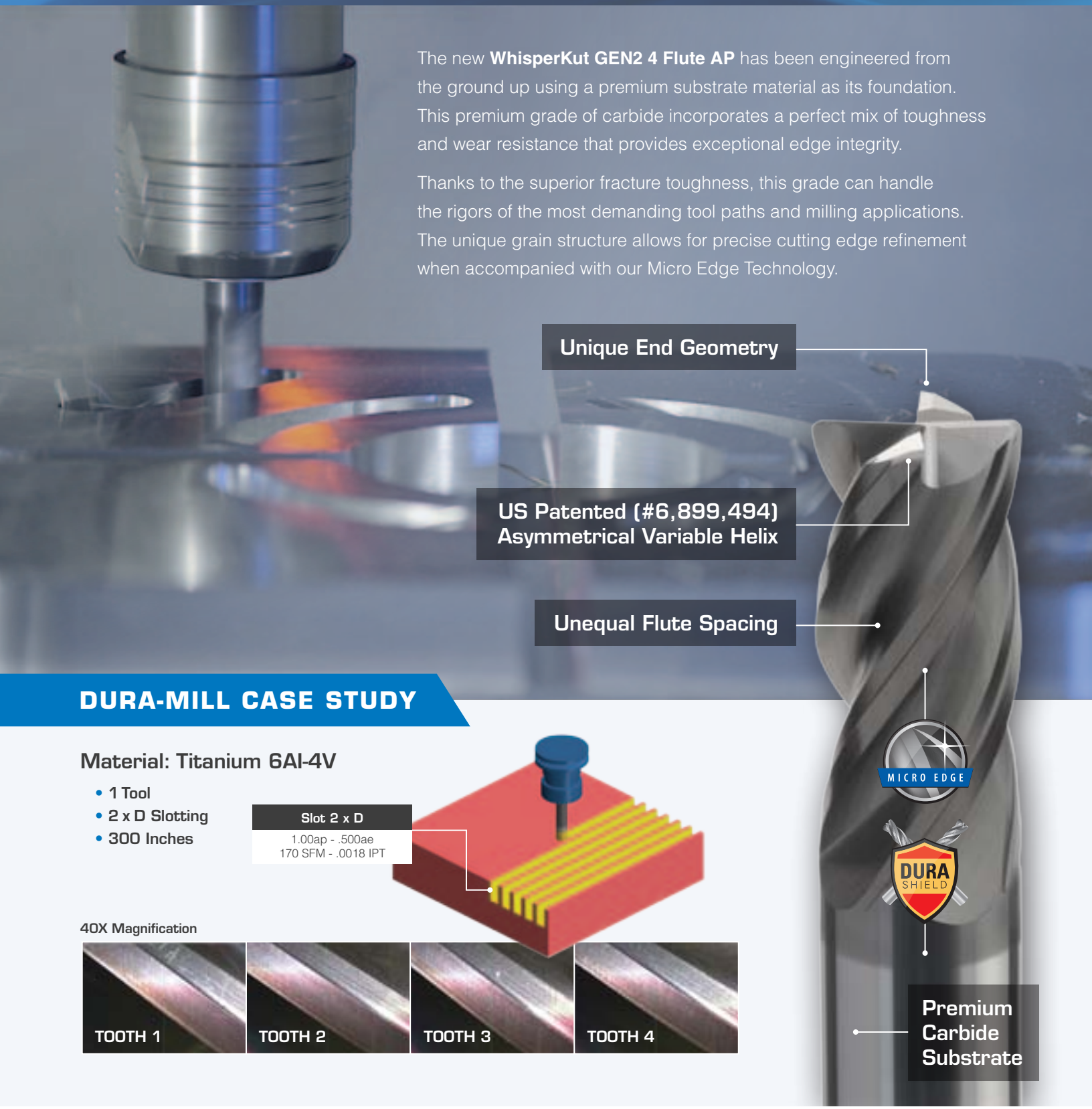
- **Up to 100% tool life improvement**
- **Stronger and smoother cutting edges**
- **Improved surface foundation for better adhesion of PVD coating**
- **Leaves work piece surface exceptionally smooth**
- **Provides predictable tool life**
- **Homogenous cutting surface prevents premature notch wear**

All GEN2 end mills undergo a micro-polish process to enhance chip flow while reducing surface friction

GEN2 4 FLUTE AP

The new **WhisperKut GEN2 4 Flute AP** has been engineered from the ground up using a premium substrate material as its foundation. This premium grade of carbide incorporates a perfect mix of toughness and wear resistance that provides exceptional edge integrity.

Thanks to the superior fracture toughness, this grade can handle the rigors of the most demanding tool paths and milling applications. The unique grain structure allows for precise cutting edge refinement when accompanied with our Micro Edge Technology.



DURA-MILL CASE STUDY

Material: Titanium 6Al-4V

- 1 Tool
- 2 x D Slotting
- 300 Inches

Slot 2 x D

1.00ap - .500ae
170 SFM - .0018 IPT

40X Magnification

4 FLUTE AP

Square End, Corner Radius & Ball End

Material Application: STEEL | STAINLESS STEEL | CAST IRON | HI-TEMP ALLOYS | HARDENED STEEL

Coating: AlTiN

CORNER RADIUS SHOWN

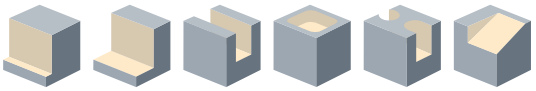
DURA SHIELD 3 AlTiN

- US Patented (#6,899,494) asymmetrical variable helix
- Premium grade carbide substrate
- Unique end geometry and unequal flute spacing
- GEN2 Micro Edge technology
- 90° plunging and drilling
- Helical plunging and pocketing
- 15°–45° ramping

Standard Features

Optional

Preferred Milling Applications



* Standard Weldon Flats available at no charge

Cutting Dia. d_1	Shank Dia. d_2	LOC l_1	OAL l_2	Square End	Corner Radius r .015	.030	.060	.090	.125	.190	.250	Ball End
1/8	1/8	1/4	1-1/2	36000	36002							36009
	1/8	1/2	2	36010	36012							36019
3/16	3/16	5/16	2	36020	36022							36029
	3/16	5/8	2	36030	36032							36039
1/4	1/4	3/8	2	36040	36042	36043	36044					36049
	1/4	5/8	2-1/2	36050	36052	36053	36054					36059
	1/4	1	3	36060	36062	36063	36064					36069
	1/4	1-1/4	3	36070	36072	36073	36074					36079
5/16	5/16	1/2	2	36080	36082	36083	36084					36089
	5/16	3/4	2-1/2	36090	36092	36093	36094					36099
	5/16	1-1/4	3	36100	36102	36103	36104					36109
3/8	3/8	1/2	2	36110	36112	36113	36114	36115	36116			36119
	3/8	1	2-1/2	36120	36122	36123	36124	36125	36126			36129
	3/8	1-1/4	3	36130	36132	36133	36134	36135	36136			36139
1/2	1/2	5/8	2-1/2	36180	36182	36183	36184	36185	36186			36189
	1/2	1	3	36190	36192	36193	36194	36195	36196			36199
	1/2	1-1/4	3	36200	36202	36203	36204	36205	36206			36209
	1/2	1-5/8	4	36210		36213	36214	36215	36216			36219
	1/2	2	4	36220		36223	36224	36225	36226			36229
5/8	5/8	3/4	3	36240		36243	36244	36245	36246			36249
	5/8	1-1/4	3-1/2	36250		36253	36254	36255	36256			36259
	5/8	1-5/8	4	36260		36263	36264	36265	36266			36269
	5/8	2-1/4	5	36270		36273	36274	36275	36276			36279
3/4	3/4	1	3	36320		36323	36324	36325	36326	36327	36328	36329
	3/4	1-5/8	4	36330		36333	36334	36335	36336	36337	36338	36339
	3/4	2-1/4	5	36340		36343	36344	36345	36346	36347	36348	36349
	3/4	3-1/4	6	36350		36353	36354	36355	36356	36357	36358	36359
1	1	1-1/2	4	36370		36373	36374	36375	36376	36377	36378	36379
	1	2	4-1/2	36380		36383	36384	36385	36386	36387	36388	36389
	1	2-1/2	5	36390		36393	36394	36395	36396	36397	36398	36399
	1	3-1/4	6	36400		36403	36404	36405	36406	36407	36408	36409

FUTURE AVAILABILITY
Contact our Customer Service Dept.

RAMPING

AISI Material	Material Hardness	Max Ramp Angle	Max Ramp Depth	SFM	IPT Recommended Feed Per Tooth 1/8"	1/4"	3/8"	1/2"	5/8"	3/4"	1"
P1 - P6	< 175 BHN	45°	1 x D	600 - 750	.0003 - .0005	.0005 - .0008	.0012 - .0015	.0016 - .0019	.0017 - 0.002	.0017 - .0022	.0025 - .003
	28 - 34 HRc	45°	1 x D	350 - 500	.0003 - .0005	.0005 - .0007	.0008 - .0013	.0013 - .0018	.0015 - .002	.0017 - .0023	.0023 - .0028
	34 - 42 HRc	30°	1 x D	250 - 350	.0002 - .0004	.0003 - .0005	.0006 - .0009	.001 - .0015	.0013 - .0018	.0015 - .002	.002 - .0025
	42 - 48 HRc	15°	1 x D	175 - 250	.0002 - .0003	.0003 - .0004	.0004 - .0007	.0008 - .0013	.001 - .0015	.0012 - .0017	.0017 - .0022
M1 - M2	< 28 HRc	10°	1 x D	150 - 200	.0002 - .0004	.0003 - .0005	.0008 - .001	.001 - .0013	.0012 - .0015	.0013 - .0017	.0018 - .0023
	> 28 HRc	5°	0.5 x D	100 - 150	.0002 - .0004	.0003 - .0005	.0008 - .001	.001 - .0013	.0012 - .0015	.0013 - .0017	.0018 - .0023
S4	< 48 HRc	10°	0.5 x D	100 - 150	.0002 - .0004	.0003 - .0005	.0006 - .0009	.0009 - .0012	.001 - .0013	.0012 - .0015	.0017 - .002

DRILLING

AISI Material	Material Hardness	Drilling Depth	SFM	IPT Recommended Feed Per Tooth 1/8"	1/4"	3/8"	1/2"	5/8"	3/4"	1"
P1 - P6	up to 32 HRc	2 x D	400 - 550	.0003 - .0005	.0006 - .0009	.0012 - .0015	.0015 - .002	.0017 - .0022	.002 -.0025	.0027 - .0032
	32 - 48 HRc	1 x D	175 - 300	.0002 - .0003	.0002 - .0004	.0006 - .0009	.001 - .0013	.0012 - .0015	.0013 - .0017	.0018 - .0022

HELICAL PLUNGING

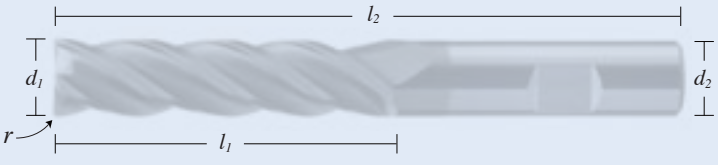
AISI Material	Material Hardness	Helix Radius	Plunge Angle	SFM	IPT Recommended Feed Per Tooth 1/8"	1/4"	3/8"	1/2"	5/8"	3/4"	1"
P1 - P6	< 175 BHN										
	28 - 34 HRc										
	34 - 42 HRc										
	42 - 48 HRc										
M1	< 28 HRc										
M2	> 28 HRc										
M3	< 28 HRc										
K1	< BNH										
K2	< BNH										
S1											
S2											
S3											
S4											
H2	48 - 55 HRc										

Contact our Technical Service Dept.
for recommended cutting parameters

NOT RECOMMENDED

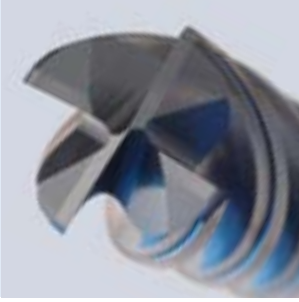
TOOL PROVISIONS

1. When using **longer length tools** in ramping or drilling operations, you will be required to reduce SFM and IPT values by 20-35%. Long length of cut tools are more prone to breakage when used in these operations.
2. **Square end tools** should only be used in light roughing (LR) and finishing (F) operations. In addition, square end tools have a slight dub ground on the end face for corner protection and will not provide a true 90° corner.
3. **Corner radius tools** with .060 C.R. and above should not be used in ramp, slot or drill operations.



TOLERANCES | $d_1 = {}^{+.000}_{-.002}$ | $d_2 = {}^{-.0001}_{-.0004}$ | $r = {}^{+.000}_{-.002}$

GEN2



5 FLUTE FOR STEEL

Square End & Corner Radius

Material Application: STEEL | STAINLESS STEEL | CAST IRON | HI-TEMP ALLOYS | HARDENED STEEL

Coating: AlTiN

DURA SHIELD 3

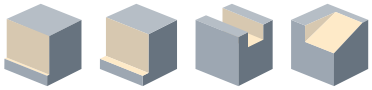
AlTiN

- Enhanced version of our standard WhisperKut
- Dura Shield 3 (AlTiN) coating that covers a broad range of material applications.
- Extremely versitile design for moderate roughing and finishing applications
- Extensive offering of corner radii

Standard Features

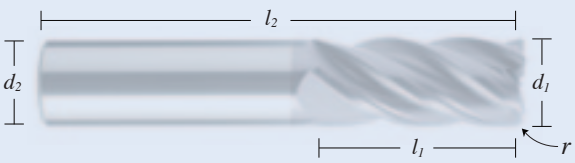
Optional

Preferred Milling Applications



* Standard Weldon Flats available at no charge

Cutting Dia. d_1	Shank Dia. d_2	LOC l_1	OAL l_2	Square End	Corner Radius r .015	.030	.060	.090	.125	.190	.250
1/8	1/8	3/8	1-1/2	37000	37001	37002					
3/16	3/16	5/8	2	37010	37011	37012					
1/4	1/4	3/8	2	37020	37021	37022	37023				
	1/4	5/8	2-1/2	37030	37031	37032	37033				
	1/4	3/4	2-1/2	37040	37041	37042	37043				
	1/4	1-1/4	3	37050	37051	37052	37053				
	1/4	5/8	4		37061						
5/16	5/16	3/4	2-1/2	37070	37071	37072	37073				
	5/16	1	3	37080	37081	37082	37083				
3/8	3/8	1/2	2	37090	37091	37092	37093	37094			
	3/8	1	2-1/2	37100	37101	37102	37103	37104			
	3/8	1-1/4	3	37110	37111	37112	37113	37114			
	3/8	1-1/2	3-1/2	37120	37121	37122	37123	37124			
	3/8	7/8	4		37131						
7/16	7/16	1	2-3/4	37140	37141	37142	37143	37144			
1/2	1/2	5/8	2-1/2	37150	37151	37152	37153	37154	37155		
	1/2	1	3	37160	37161	37162	37163	37164	37165		
	1/2	1-1/4	3	37170	37171	37172	37173	37174	37175		
	1/2	1-5/8	4	37180	37181	37182	37183	37184	37185		
	1/2	2	4	37190	37191	37192	37193	37194	37195		
	1/2	1	6			37202					



TOLERANCES | $d_1 = {}^{+.000}_{-.002}$ | $d_2 = {}^{-.0001}_{-.0004}$ | $r = {}^{+.000}_{-.002}$

GEN2

Cutting Dia. d_1	Shank Dia. d_2	LOC l_1	OAL l_2	Square End	Corner Radius r .015	.030	.060	.090	.125	.190	.250
5/8	5/8	3/4	3	37210		37212	37213	37214	37215		
	5/8	1-1/4	3-1/2	37220		37222	37223	37224	37225		
	5/8	1-5/8	4	37350		37352	37353	37354	37355		
	5/8	2-1/4	5	37230		37232	37233	37234	37235		
	5/8	1-1/4	6			37242					
3/4	3/4	7/8	3	37250		37252	37253	37254	37255	37256	37257
	3/4	1-5/8	4	37260		37262	37263	37264	37265	37266	37267
	3/4	2-1/4	5	37270		37272	37273	37274	37275	37276	37277
	3/4	3-1/4	6	37280		37282	37283	37284	37285	37286	37287
	3/4	1-1/2	6			37292					
1	1	1-1/2	4	37300		37302	37303	37304	37305	37306	37307
	1	2	4-1/2	37310		37312	37313	37314	37315	37316	37317
	1	2-1/2	5	37330		37332	37333	37334	37335	37336	37337
	1	3-1/4	6	37340		37342	37343	37344	37345	37346	37347

Our products are precision ground on the latest state-of-the-art CNC equipment.

5 FLUTE FOR STEEL

Square End & Corner Radius

Material Application: STEEL | STAINLESS STEEL | CAST IRON | HI-TEMP ALLOYS | HARDENED STEEL

Coating: AlCrN / Ti

CORNER RADIUS SHOWN

DURA SHIELD 6

AlCrN / Ti

- Enhanced version of our standard WhisperKut
- Dura Shield 6 coating for special applications on difficult to machine materials
- Extremely versitile design for moderate roughing and finishing applications
- Extensive offering of corner radii

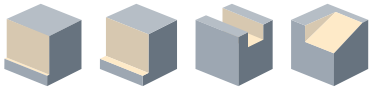
Standard Features

Square End | Corner Radius | Center Cutting | Variable Index | Variable Helix

Optional

Weldon Flats *

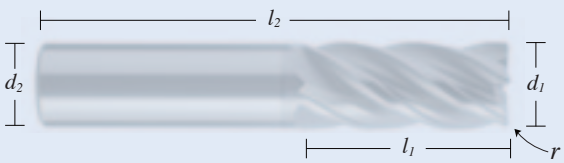
Preferred Milling Applications



Finishing | Light Roughing | 0.5 x D Slotting | Ramping

* Standard Weldon Flats available at no charge

Cutting Dia. d_1	Shank Dia. d_2	LOC l_1	OAL l_2	Square End	Corner Radius r .015	.030	.060	.090	.125	.190	.250
1/8	1/8	3/8	1-1/2	34999	35000	35315					
3/16	3/16	5/8	2	35001	35002	35316					
1/4	1/4	3/8	2	35004	35005	35317	35318				
	1/4	5/8	2-1/2	35006	35007	35319	35320				
	1/4	3/4	2-1/2	35008	35009	35321	35322				
	1/4	1-1/4	3	35010	35011	35323	35324				
	1/4	5/8	4		35019						
5/16	5/16	3/4	2-1/2	35012	35013	35327	35328				
	5/16	1	3	35014	35015	35329	35330				
3/8	3/8	1/2	2	35016	35017	35331	35332	35333			
	3/8	1	2-1/2	35020	35021	35334	35335	35336			
	3/8	1-1/4	3	35337	35338	35339	35340	35341			
	3/8	1-1/2	3-1/2	35342	35343	35344	35345	35346			
	3/8	7/8	4		35348						
7/16	7/16	1	2-3/4	35022	35023	35352	35353	35354			
1/2	1/2	5/8	2-1/2	35024	35026	35028	35355	35356	35357		
	1/2	1	3	35036	35038	35040	35358	35359	35360		
	1/2	1-1/4	3	35048	35050	35052	35361	35362	35364		
	1/2	1-5/8	4	35053	35054	35055	35365	35366	35367		
	1/2	2	4	35056	35057	35062	35368	35369	35370		
	1/2	1	6			35061					



TOLERANCES | $d_1 = {}^{+.000}_{-.002}$ | $d_2 = {}^{-.0001}_{-.0004}$ | $r = {}^{+.000}_{-.002}$

GEN2

Cutting Dia. d_1	Shank Dia. d_2	LOC l_1	OAL l_2	Square End	Corner Radius r .015	.030	.060	.090	.125	.190	.250
5/8	5/8	3/4	3	35058		35063	35374	35375	35376		
	5/8	1-1/4	3-1/2	35106		35108	35377	35378	35379		
	5/8	1-5/8	4	35217		35219	35442	35443	35444		
	5/8	2-1/4	5	35110		35111	35386	35387	35388		
	5/8	1-1/4	6			35113					
3/4	3/4	7/8	3	35116		35118	35392	35393	35394	35395	35396
	3/4	1-5/8	4	35135		35132	35397	35398	35399	35400	35401
	3/4	2-1/4	5	35144		35146	35402	35403	35404	35405	35406
	3/4	3-1/4	6	35158		35160	35412	35413	35414	35415	35416
	3/4	1-1/2	6			35163					
1	1	1-1/2	4	35172		35174	35422	35423	35424	35425	35426
	1	2	4-1/2	35186		35188	35427	35428	35429	35430	35431
	1	2-1/2	5	35200		35202	35432	35433	35434	35435	35436
	1	3-1/4	6	35214		35216	35437	35438	35439	35440	35441

DURA SHIELD

Learn more about all our Dura Shield coatings on page 5

TITANIUM SERIES

A cutting tool developed specifically for the milling of Titanium and other hi-temp alloys.

Extended tool life and performance over other leading brands.

WhisperKut GEN2 FEATURES

- 6 Flute - Industry Leading Asymmetrical Variable Helix
- Micro Edge™ Precise Cutting Edge Refinement Process (MICRO EDGE)
- DURA SHIELD® DS6 Tool Coating (DURA SHIELD 6)
- Premium Carbide Substrate

DURA-MILL CASE STUDY

Trochoidal Slot Milling Strategy

Material:
- Titanium 6Al-4V

End Mill Parameters:
- 400 SFM / 3056 RPM
- .005 IPT / 92 IPM
- .045 Radial Step
- .900 Axial Step

Test Data:
- 8 slots (total) were completed
- 64 minutes (total) machine time
- 238 cubic inches of material removed

Test Cutter Example:
- WhisperKut 6 Flute GEN2 Carbide End Mill
- 1/2" diameter x 1-1/4" length of cut x 3" overall w/.030 corner radius and DS6 Tool Coating (EDP# 38172)

HI-TEMP ALLOYS Material Application

AlCrN / Ti Coating

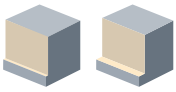
6 FLUTE FOR TITANIUM

Square End, Corner Radius & Ball End

Standard Features

Optional

Preferred Milling Applications



* Standard Weldon Flats available at no charge

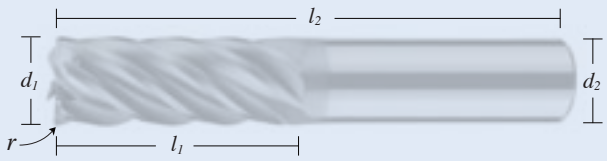
DURA SHIELD 6

AlCrN / Ti

Cutting Dia. d_1	Shank Dia. d_2	LOC l_1	OAL l_2	Square End	Corner Radius r .015	.030	.060	.090	.120 *	.190	.250	Ball End
1/4	1/4	3/8	2	38020	38021	38022	38023					
	1/4	3/4	2-1/2	38040	38041	38042	38043					
	1/4	1-1/4	3	38060	38061	38062	38063					
5/16	5/16	3/4	2-1/2	38070	38071	38072						
	5/16	1	3	38080	38081	38082						
3/8	3/8	1/2	2	38090	38091	38092	38093	38094				
	3/8	1	2-1/2	38100	38101	38102	38103	38104				38520
	3/8	1-1/2	3-1/2	38120	38121	38122	38123	38124				
1/2	1/2	5/8	2-1/2	38150	38151	38152	38153	38154	38155			
	1/2	1	3	38160	38161	38162	38163	38164	38165			
	1/2	1-1/4	3	38170	38171	38172	38173	38174	38175			38590
	1/2	2	4	38190	38191	38192	38193	38194	38195			
5/8	5/8	1-1/4	3-1/2	38220		38222	38223	38224	38225			
	5/8	1-5/8	4	38230		38232	38233	38234	38235			38640
3/4	3/4	1	3	38260		38262	38263	38264	38265	38266	38267	
	3/4	1-5/8	4	38270		38272	38273	38274	38275	38276	38277	38690
	3/4	2-1/4	5	38280		38282	38283	38284	38285	38286	38287	
1	1	2	4-1/2	38320		38322	38323	38324	38325	38326	38327	38740
	1	2-1/2	5	38340		38342	38343		38345		38347	

NEW ITEMS AVAILABILE Q1 2018 Contact our Customer Service Dept.

GEN2



TOLERANCES $d_1 = {}^{+.000}_{-.002}$ | $d_2 = {}^{-.0001}_{-.0004}$ | $r = {}^{+.000}_{-.002}$

*** NOTE:** Tolerance on **.120 radius** is: $r = {}^{+.002}_{-.000}$

6 FLUTE FOR TITANIUM
EXTENDED REACH
Corner Radius & Ball End

HI-TEMP ALLOYS Material Application

AlCrN / Ti Coating

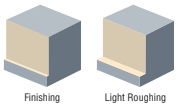
DURA SHIELD 6

AlCrN / Ti

Standard Features

Optional

Preferred Milling Applications



* Standard Weldon Flats available at no charge

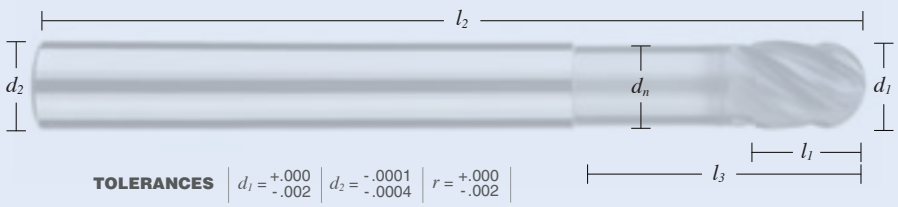
Ball End

Cutting Dia. d_1	Shank Dia. d_2	LOC l_1	OAL l_2	Without Neck Relief	With Neck Relief	Neck Dia. d_n	LBS Range l_3
3/8	3/8	1/2	4	38550	38551	.355	7/8 to 2-1/8
1/2	1/2	5/8	6	38620	38621	.470	1 to 3-3/8
5/8	5/8	3/4	6	38670	38671	.590	1 to 3-3/8
3/4	3/4	1	6	38720	38721	.715	1-1/4 to 3-3/8
1	1	1-1/2	6	38770	38771	.950	1-3/4 to 3-3/8

Customers must supply Length Below Shank (LBS) dimensions

Corner Radius

Cutting Dia. d_1	Shank Dia. d_2	LOC l_1	OAL l_2	Corner Radius r	Without Neck Relief	With Neck Relief	Neck Dia. d_n	LBS Range l_3
3/8	3/8	1/2	4	.015	39131	39531	.355	7/8 to 2-1/8
1/2	1/2	5/8	4	.030	39202	39602	.470	1 to 2-1/8
5/8	5/8	3/4	4	.030	39242	39642	.590	1 to 2-1/4
3/4	3/4	1	6	.030	39292	39692	.715	1-1/4 to 3-3/8
1	1	1-1/2	6	.030	39352	39752	.950	1-3/4 to 3-3/8



TOLERANCES $d_1 = {}^{+.000}_{-.002}$ | $d_2 = {}^{-.0001}_{-.0004}$ | $r = {}^{+.000}_{-.002}$

GEN2

DURA-MILL PRODUCTS ARE PROUDLY MANUFACTURED IN THE UNITED STATES OF AMERICA

7 FLUTE FOR STEEL

Square End & Corner Radius

Material Application: STEEL | STAINLESS STEEL | CAST IRON | HI-TEMP ALLOYS | HARDENED STEEL

Coatings: AlTiN

DURA SHIELD 3

AlTiN

- 7-Flute design for high feed milling applications
- Dura Shield 3 coating that covers a broad range of material applications
- 40% gain in feed rate over 5 flute tools
- Extensive offering of corner radii

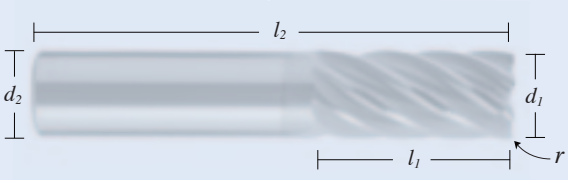
Standard Features

Optional

Preferred Milling Applications

* Standard Weldon Flats available at no charge

Cutting Dia. d_1	Shank Dia. d_2	LOC l_1	OAL l_2	Square End	Corner Radius r .015	.030	.060	.090	.125	.190	.250
3/8	3/8	1/2	2	32000	32001	32002	32003				
	3/8	1	2-1/2	32010	32011	32012	32013				
	3/8	1-1/4	3	32020	32021	32022	32023				
1/2	1/2	5/8	2-1/2	32070	32071	32072	32073	32074	32075		
	1/2	1	3	32080	32081	32082	32083	32084	32085		
	1/2	1-1/4	3	32090	32091	32092	32093	32094	32095		
	1/2	2	4	32110	32111	32112	32113				
5/8	5/8	3/4	3	32120		32122	32123				
	5/8	1-1/4	3-1/2	32130		32132	32133				
	5/8	1-5/8	4	32140		32142	32143				
3/4	3/4	1-5/8	4	32170		32172	32173	32174	32175	32176	
	3/4	2-1/4	5	32180		32182	32183	32184	32185	32186	
1	1	2	4-1/2	32220		32222	32223	32224	32225	32226	32227
	1	2-1/2	5	32240		32242	32243	32244	32245	32246	32247



TOLERANCES | $d_1 = {}^{+.000}_{-.002}$ | $d_2 = {}^{-.0001}_{-.0004}$ | $r = {}^{+.000}_{-.002}$

GEN2

STEEL | STAINLESS STEEL | CAST IRON | HI-TEMP ALLOYS | HARDENED STEEL — Material Application

AlCrN / Ti — Coating

7 FLUTE FOR STEEL

Square End & Corner Radius

- 7-Flute design for high feed milling applications
- Dura Shield 6 coating for special applications on difficult materials
- 40% gain in feed rate over 5 flute tools
- Extensive offering of corner radii

DURA SHIELD 6

AlCrN / Ti

CORNER RADIUS SHOWN

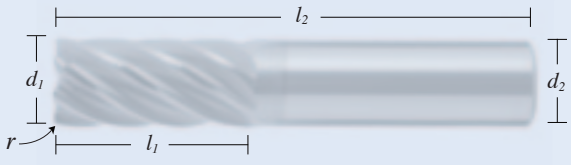
Standard Features

Optional

Preferred Milling Applications

* Standard Weldon Flats available at no charge

Cutting Dia. d_1	Shank Dia. d_2	LOC l_1	OAL l_2	Square End	Corner Radius r .015	.030	.060	.090	.125	.190	.250
3/8	3/8	1/2	2	30528	30529	30530	30531				
	3/8	1	2-1/2	30533	30534	30535	30536				
	3/8	1-1/4	3	30538	30539	30540	30541				
1/2	1/2	5/8	2-1/2	30558	30559	30560	30561	30562	30563		
	1/2	1	3	30564	30565	30566	30567	30568	30569		
	1/2	1-1/4	3	30570	30571	30572	30573	30574	30575		
	1/2	2	4	30582	30583	30584	30585				
5/8	5/8	3/4	3	30590		30592	30593				
	5/8	1-1/4	3-1/2	30599		30600	30601				
	5/8	1-5/8	4	30670		30672	30673				
3/4	3/4	1-5/8	4	30621		30622	30623	30624	30625	30626	
	3/4	2-1/4	5	30628		30629	30630	30631	30632	30633	
1	1	2	4-1/2	30656		30657	30658	30659	30660	30661	30662
	1	2-1/2	5	30663		30664	30665	30666	30667	30668	30669



TOLERANCES $d_1 = {}^{+.000}_{-.002}$ | $d_2 = {}^{-.0001}_{-.0004}$ | $r = {}^{+.000}_{-.002}$

SUGGESTED SPEED & FEED RATES

3, 4 & 5 Flute for Steel and all GEN2 End Mills

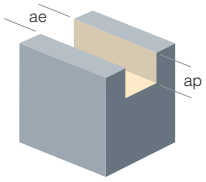
AISI Standard	Material Group	Material Hardness	Cut Type	Cutting Speed SFM	Recommended Feed Per Tooth								
					1/8" .125	3/16" .188	1/4" .250	5/16" .313	3/8" .375	1/2" .500	5/8" .625	3/4" .750	1" 1.000
Free Machining & Low Carbon Steels 1008, 1010, 1018, 1020, 1025, 1118, 12L13, 12L14, 1215, 1330	P1	≤ 175 BHN	S	450	0.0006	0.0011	0.0014	0.0018	0.0022	0.0028	0.0031	0.0034	0.0040
			HR	560	0.0009	0.0014	0.0018	0.0023	0.0027	0.0035	0.0039	0.0043	0.0050
			LR	730	0.0011	0.0017	0.0022	0.0028	0.0032	0.0042	0.0047	0.0052	0.0060
			F	925	0.0020	0.0032	0.0041	0.0052	0.0061	0.0080	0.0089	0.0098	0.0114
Medium & High Carbon Steels 1030, 1040, 1050, 1080, 1525, 1541, 1551, 1572, 1140, 1151	P2		S	425	0.0006	0.0011	0.0014	0.0018	0.0022	0.0028	0.0031	0.0034	0.0040
			HR	530	0.0009	0.0014	0.0018	0.0023	0.0027	0.0035	0.0039	0.0043	0.0050
			LR	690	0.0011	0.0017	0.0022	0.0028	0.0032	0.0042	0.0047	0.0052	0.0060
			F	875	0.0020	0.0032	0.0041	0.0052	0.0061	0.0080	0.0089	0.0098	0.0114
Easy to machine Alloy Steels & Tool Steels 4130, 4140, 4150, 4320, 4340, 5120, 5140, 6150, 8620, A Series, D Series, H Series, L2, M Series, O Series, S Series, T Series, P Series, & W Series	P3	≤ 35 HRc	S	340	0.0005	0.0009	0.0012	0.0016	0.0018	0.0023	0.0027	0.0030	0.0037
			HR	425	0.0007	0.0011	0.0015	0.0020	0.0023	0.0029	0.0034	0.0038	0.0046
			LR	550	0.0008	0.0013	0.0018	0.0024	0.0028	0.0035	0.0041	0.0046	0.0055
			F	700	0.0016	0.0025	0.0034	0.0045	0.0052	0.0066	0.0077	0.0086	0.0105
Difficult to machine Alloy Steels & Tool Steels 4130, 4140, 4150, 4320, 4340, 5120, 5140, 6150, 8620, A Series, D Series, H Series, L2, M Series, O Series, S Series, T Series, P Series, & W Series	P4	35 HRc to 48 HRc	S	255	0.0005	0.0008	0.0011	0.0014	0.0016	0.0020	0.0024	0.0026	0.0031
			HR	320	0.0006	0.0010	0.0014	0.0018	0.0020	0.0026	0.0030	0.0033	0.0039
			LR	415	0.0007	0.0012	0.0017	0.0022	0.0024	0.0031	0.0036	0.0040	0.0047
			F	530	0.0014	0.0023	0.0032	0.0041	0.0045	0.0059	0.0068	0.0075	0.0089
Ferritic, martensitic & PH Stainless Steels 410, 416, 416F, 420F, 15-5 PH, 17-4 PH, 13-8 PH	P5	≤ 35 HRc	S	240	0.0005	0.0007	0.0010	0.0013	0.0014	0.0018	0.0022	0.0024	0.0029
			HR	300	0.0006	0.0009	0.0012	0.0016	0.0018	0.0023	0.0027	0.0030	0.0036
			LR	390	0.0007	0.0011	0.0014	0.0019	0.0022	0.0028	0.0032	0.0036	0.0043
			F	495	0.0014	0.0020	0.0027	0.0036	0.0041	0.0052	0.0061	0.0068	0.0082
Ferritic, martensitic & PH Stainless Steels 410, 416, 416F, 420F, 15-5 PH, 17-4 PH, 13-8 PH	P6	> 35 HRc	S	180	0.0004	0.0006	0.0008	0.0010	0.0012	0.0015	0.0018	0.0019	0.0022
			HR	225	0.0005	0.0008	0.0010	0.0013	0.0015	0.0019	0.0022	0.0024	0.0028
			LR	295	0.0006	0.0010	0.0012	0.0016	0.0018	0.0023	0.0026	0.0029	0.0034
			F	370	0.0011	0.0018	0.0023	0.0030	0.0034	0.0043	0.0050	0.0055	0.0064
Easy to machine Austenitic Stainless Steels 200, 201, 202, 219, 301, 302, 303, 304, 304L, 305	M1	≤ 28 HRc	S	260	0.0006	0.0009	0.0012	0.0016	0.0018	0.0023	0.0027	0.0030	0.0037
			HR	325	0.0007	0.0011	0.0015	0.0020	0.0023	0.0029	0.0034	0.0038	0.0046
			LR	420	0.0008	0.0013	0.0018	0.0024	0.0028	0.0035	0.0041	0.0046	0.0055
			F	535	0.0016	0.0025	0.0034	0.0045	0.0052	0.0066	0.0077	0.0086	0.0105
More Difficult Austenitic Stainless Steels 310, 314, 316, 316L, 317, 321, 347, 384, XM1. XM5, XM7, XM21	M2	≥ 28 HRc	S	190	0.0005	0.0007	0.0010	0.0013	0.0014	0.0018	0.0022	0.0024	0.0029
			HR	235	0.0006	0.0009	0.0012	0.0016	0.0018	0.0023	0.0027	0.0030	0.0036
			LR	305	0.0007	0.0011	0.0014	0.0019	0.0022	0.0028	0.0032	0.0036	0.0043
			F	390	0.0014	0.0020	0.0027	0.0036	0.0041	0.0052	0.0061	0.0068	0.0082
Austenitic Stainless Steel - Duplex 2205, 2507	M3	≤ 28 HRc	S	180	0.0004	0.0006	0.0008	0.0010	0.0012	0.0015	0.0018	0.0019	0.0022
			HR	225	0.0005	0.0008	0.0010	0.0013	0.0015	0.0019	0.0022	0.0024	0.0028
			LR	295	0.0006	0.0010	0.0012	0.0016	0.0018	0.0023	0.0026	0.0029	0.0034
			F	370	0.0011	0.0018	0.0023	0.0030	0.0034	0.0043	0.0050	0.0055	0.0064
Grey Cast Iron Class 20,25,30,35,40,45,50,55,60. G3000, G3500	K1	≤ 250 BHN	S	330	0.0007	0.0011	0.0014	0.0018	0.0022	0.0028	0.0031	0.0034	0.0040
			HR	415	0.0009	0.0014	0.0018	0.0023	0.0027	0.0035	0.0039	0.0043	0.0050
			LR	540	0.0011	0.0017	0.0022	0.0028	0.0032	0.0042	0.0047	0.0052	0.0060
			F	685	0.0020	0.0032	0.0041	0.0052	0.0061	0.0080	0.0089	0.0098	0.0114
Ductile & Malleable Cast Iron 60-40-18, 65-45-12, D4018, D4512, D5506, 32510, 35108, M3210, M4504, M5503, 250, 300, 350, 400, 450	K2	≤ 250 BHN	S	295	0.0005	0.0009	0.0012	0.0016	0.0018	0.0023	0.0027	0.0030	0.0037
			HR	370	0.0006	0.0010	0.0014	0.0018	0.0020	0.0026	0.0030	0.0035	0.0042
			LR	480	0.0007	0.0012	0.0017	0.0022	0.0024	0.0031	0.0036	0.0042	0.0050
			F	610	0.0014	0.0023	0.0032	0.0041	0.0045	0.0059	0.0068	0.0080	0.0095

S = Slotting / HR = Heavy Roughing / LR = Light Roughing / F = Finishing

AISI Standard	Material Group	Material Hardness	Cut Type	Cutting Speed SFM	Recommended Feed Per Tooth								
					1/8" .125	3/16" .188	1/4" .250	5/16" .313	3/8" .375	1/2" .500	5/8" .625	3/4" .750	1" 1.000
Iron-Based Heat Resistant Alloys A-286, Discaloy, Incoloy 801, N-155, 16-25-6, A-297, A-351, A-608	S1		S	120	0.0003	0.0004	0.0006	0.0007	0.0010	0.0012	0.0016	0.0020	0.0024
			HR	150	0.0004	0.0005	0.0007	0.0009	0.0012	0.0015	0.0020	0.0025	0.0030
			LR	195	0.0005	0.0006	0.0008	0.0011	0.0014	0.0018	0.0024	0.0030	0.0036
			F	245	0.0009	0.0011	0.0016	0.0020	0.0027	0.0034	0.0045	0.0057	0.0068
Cobalt-Based Heat Resistant Alloys Stellite, AiResist 213, Haynes 25 (L605), Haynes 188	S2		S	100	0.0003	0.0004	0.0006	0.0007	0.0010	0.0012	0.0016	0.0020	0.0024
			HR	125	0.0004	0.0005	0.0007	0.0009	0.0012	0.0015	0.0020	0.0025	0.0030
			LR	165	0.0005	0.0006	0.0008	0.0011	0.0014	0.0018	0.0024	0.0030	0.0036
			F	200	0.0009	0.0011	0.0016	0.0020	0.0027	0.0034	0.0045	0.0057	0.0068
Nickel-Based Heat Resistant Alloys Astroloy, Hastelloy, Inconel, Incoloy 901, Nimonic, Rene 41, Udimet, Waspaloy, Monel	S3		S	80	0.0003	0.0004	0.0006	0.0007	0.0010	0.0012	0.0016	0.0020	0.0024
			HR	100	0.0004	0.0005	0.0007	0.0009	0.0012	0.0015	0.0020	0.0025	0.0030
			LR	130	0.0005	0.0006	0.0008	0.0011	0.0014	0.0018	0.0024	0.0030	0.0036
			F	165	0.0009	0.0011	0.0016	0.0020	0.0027	0.0034	0.0045	0.0057	0.0068
Titanium Alloys 6Al-4V	S4		S	170	0.0004	0.0006	0.0009	0.0011	0.0014	0.0018	0.0020	0.0024	0.0028
			HR	215	0.0005	0.0008	0.0011	0.0014	0.0017	0.0022	0.0025	0.0030	0.0035
			LR	280	0.0006	0.0010	0.0013	0.0017	0.0020	0.0026	0.0030	0.0036	0.0042
			F	355	0.0011	0.0018	0.0025	0.0032	0.0039	0.0050	0.0057	0.0068	0.0080
Hardened Steels D2,D3,H10, 11, 13, Alloy Steels: 4140, 4150, 4320, 4340,P20, 21	H2	48HRc to 55HRc	S	160	0.0001	0.0002	0.0003	0.0005	0.0008	0.0010	0.0014	0.0016	0.0020
			HR	200	0.0002	0.0003	0.0004	0.0006	0.0010	0.0012	0.0017	0.0020	0.0025
			LR	260	0.0002	0.0004	0.0005	0.0007	0.0012	0.0014	0.0020	0.0024	0.0030
			F	330	0.0005	0.0007	0.0009	0.0014	0.0023	0.0027	0.0039	0.0045	0.0057

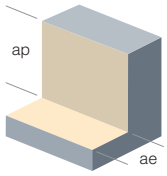
RECOMMENDED APPLICATION TYPES

Slotting (S)



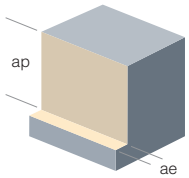
Axial DOC (ap) = up to 0.5 x D
Radial DOC (ae) = 1 x D

Heavy Roughing (HR)



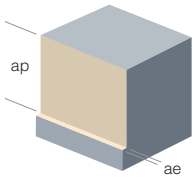
Axial DOC (ap) = 1.25 x D
Radial DOC (ae) = 0.5 x D

Light Roughing (LR)



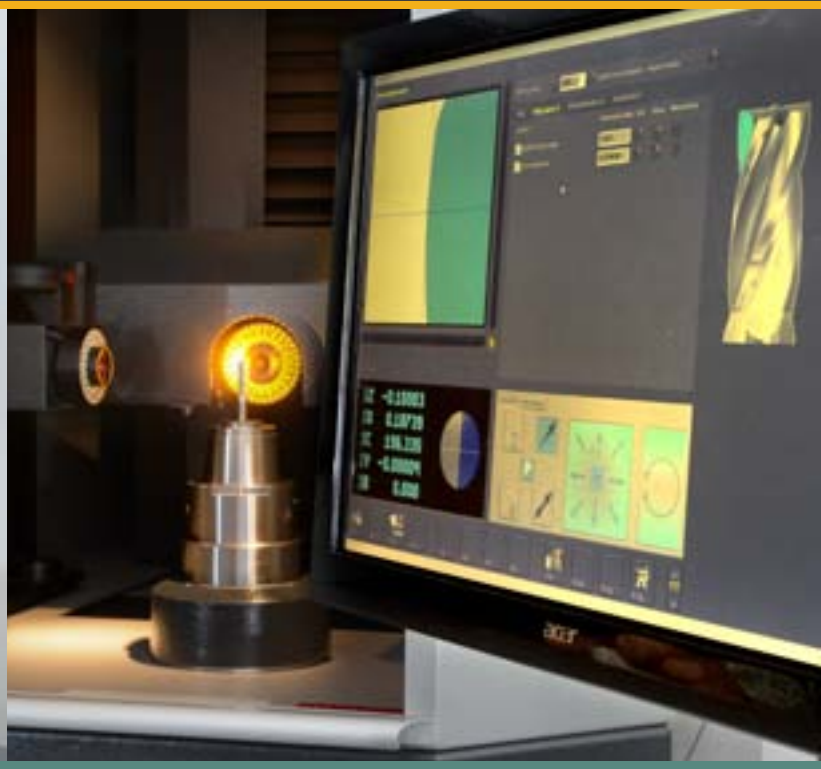
Axial DOC (ap) = 1.25 x D
Radial DOC (ae) = 0.2 x D

Finishing (F)



Axial DOC (ap) = up to 2 x D
Radial DOC (ae) = 0.05 x D

- When exceeding recommended axial DOC for both Heavy Roughing (HR) and Light Roughing (LR) applications, the following adjustments to feed rates should be considered. Axial DOC 2xD = Reduce IPT by 50%. Axial DOC 3xD = Reduce IPT by 75%. Cutting Speed (SFM) remains unchanged.
- When exceeding recommended Axial DOC on Finishing (F) applications, reduce the recommended IPT by 20%. Cutting Speed (SFM) remains unchanged.
- For Ramping Operations, a ramp angle of 3-5° is recommended. Feed rate (IPT) remains unchanged.
- Seven (7) flute end mills should be used for Finishing (F) applicatons only.
- When using extended reach tools, reduce the recommended feed rates by 20%.



DURA-MILL USES STATE-OF-THE-ART TECHNOLOGY IN ALL ASPECTS OF MANUFACTURING AND QUALITY CONTROL TO ENSURE THE HIGHEST LEVEL OF CONSISTENCY

HIGH PERFORMANCE SERIES

Our High Performance Series End Mills incorporate:

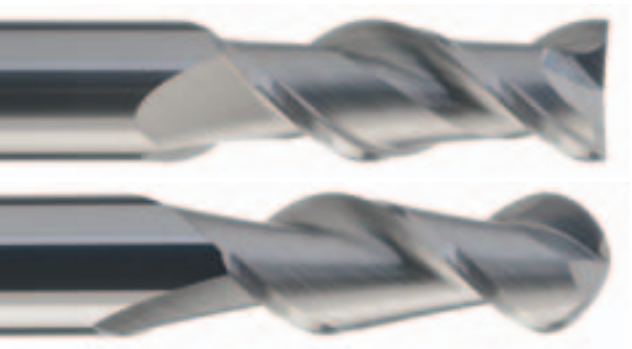
- **Advanced Cutter Geometries**
  Engineered for ferrous and non-ferrous materials.
- **Appropriate Helix Angles and Rake Angles**
  Allows for higher feed rates and extended tool life over a standard 30° helix end mill.
- **Non-Variable Helix Configuration**
  Allows us to obtain longer cut lengths without crowding the flute spacing over a variable helix type tool.
- **Full Range of Milling Configurations**
  Square end, corner radius and ball-end.
- **Un-coated, TiCN and AlTiN Coatings**

2 FLUTE FOR ALUMINUM

Square End & Ball End

Material Application: NON-FERROUS MATERIALS

Coatings: TiCN | Uncoated

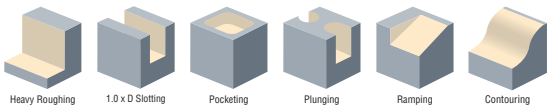


- Maximum chip removal
- 45º helix angle
- O.D. cylindrical land for superb finish
- Offered in square end and ball end designs

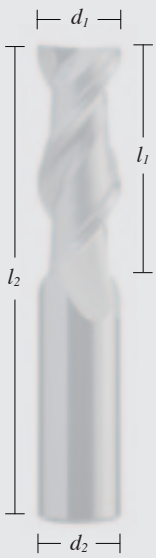
Standard Features

Optional

Preferred Milling Applications



Cutting Dia. d_1	Shank Dia. d_2	LOC l_1	OAL l_2	Uncoated	DS1 (TiCN)	Ball End Uncoated	Ball End DS1
1/8”	1/8”	1/4”	1-1/2”	82496	98325		
	1/8”	3/8”	1-1/2”	82499	98301		
3/16”	3/16”	5/16”	2”	82497	98326		
	3/16”	9/16”	2”	82501	98302		
1/4”	1/4”	3/8”	2-1/2”	82498	98327	81315	98335
	1/4”	3/4”	2-1/2”	82503	98303	81316	98336
	1/4”	1-1/2”	4”	82502	98304		
5/16”	5/16”	7/16”	2-1/2”	82500	98328	81317	98337
	5/16”	13/16”	2-1/2”	82505	98305	81318	98338
	5/16”	1-1/2”	4”	82504	98306		
3/8”	3/8”	1/2”	2-1/2”	82506	98329	81319	98339
	3/8”	1”	2-1/2”	82507	98307	81320	98340
	3/8”	1-1/2”	4”	82508	98308		
7/16”	7/16”	9/16”	2-3/4”	82509	98330	81321	98341
	7/16”	1”	2-3/4”	82510	98309	81322	98342
1/2”	1/2”	3/4”	3”	82511	98331	81323	98343
	1/2”	1-1/4”	3”	82512	98310	81324	98344
	1/2”	2”	4”	82514	98311		
	1/2”	3-1/8”	6”	82515	98312		
5/8”	5/8”	7/8”	3-1/2”	82513	98332	81325	98345
	5/8”	1-5/8”	3-1/2”	82516	98313	81326	98346
	5/8”	2-1/2”	5”	82517	98314		
	5/8”	3-3/4”	6”	82526	98315		
3/4”	3/4”	1”	4”	82518	98333	81327	98347
	3/4”	1-5/8”	4”	82519	98316	81328	98348
	3/4”	2-1/2”	5”	82520	98317		
	3/4”	3-3/4”	6”	82521	98319		
1”	1”	1-1/2”	4”	82522	98334	81329	98349
	1”	2”	5”	82523	98320	81330	98350
	1”	3-1/4”	6”	82524	98321		
	1”	4-1/8”	7”	82525	98322		



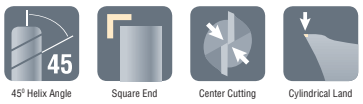
TOLERANCES $d_1 = {}^{+.000}_{-.002}$ | $d_2 = {}^{-.0001}_{-.0004}$

NON-FERROUS MATERIALS Material Application

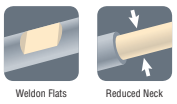
Uncoated Coating

2 FLUTE FOR ALUMINUM
EXTENDED REACH
Square End, With & Without Neck Relief

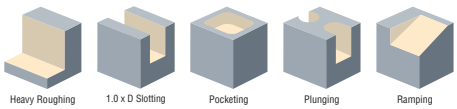
Standard Features



Optional

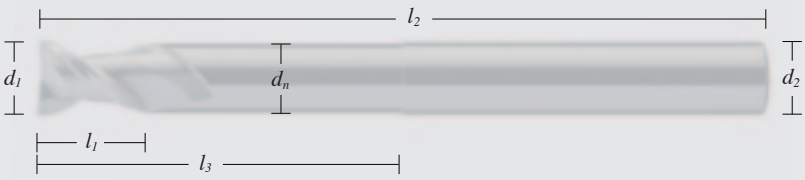


Preferred Milling Applications



- **Extended reach design with neck relief option**
- **Deep pocket roughing and slotting applications**
- **Minimal deflection**
- **45⁰ helix angle**

Cutting Dia. d_1	Shank Dia. d_2	LOC l_1	OAL l_2	Without Neck Relief	With Neck Relief	Neck Dia. d_n	LBS l_3
1/4”	1/4”	3/8”	4”	81300	81307	.235	3/4” to 2-1/8”
5/16”	5/16”	7/16”	4”	81301	81308	.297	7/8” to 2-1/8”
3/8”	3/8”	1/2”	6”	81302	81309	.355	7/8” to 3-3/8”
1/2”	1/2”	3/4”	6”	81303	81310	.470	1” to 3-3/8”
5/8”	5/8”	7/8”	6”	81304	81311	.590	1-1/8” to 3-3/8”
3/4”	3/4”	1”	6”	81305	81312	.715	1-1/4” to 3-3/8”
1”	1”	1-1/4”	6”	81306	81313	.960	1-1/2” to 3-3/8”



TOLERANCES $d_1 = {}^{+.000}_{-.002}$ | $d_2 = {}^{-.0001}_{-.0004}$

Customers must supply Length Below Shank (LBS) dimensions

3 FLUTE FOR ALUMINUM

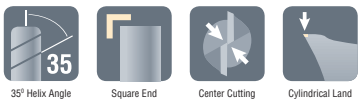
Square End

Material Application: NON-FERROUS MATERIALS

Coatings: TiCN | Uncoated

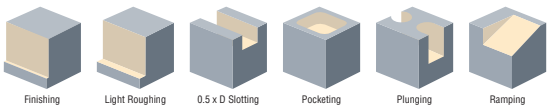
- Offered in stub, standard, medium, long, and extra long lengths
- Suitable for light roughing and finishing applications
- 35° helix angle
- O.D. cylindrical land for superb finish

Standard Features



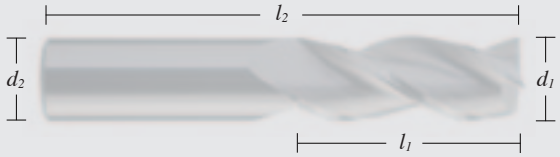
Optional

Preferred Milling Applications



Cutting Dia. d_1	Shank Dia. d_2	LOC l_1	OAL l_2	Uncoated	DS1 (TiCN)
1/8”	1/8”	1/4”	2”	82185	98378
	1/8”	3/8”	2”	82186	98379
	1/8”	1/2”	2-1/2”	82187	98380
3/16”	3/16”	5/16”	2-1/2”	82188	98381
	3/16”	9/16”	2-1/2”	82189	98397
1/4”	1/4”	3/8”	2-1/2”	82177	98351
	1/4”	1/2”	2-1/2”	82190	98398
	1/4”	3/4”	2-1/2”	82155	98352
	1/4”	1”	3”	82191	98399
	1/4”	1-1/4”	3”	82156	98353
5/16”	5/16”	7/16”	2-1/2”	82178	98354
	5/16”	5/8”	2-1/2”	82157	98355
	5/16”	1”	3”	82192	98400
	5/16”	1-1/4”	3”	82158	98356
	5/16”	2-1/8”	4”	82193	98401
3/8”	3/8”	1/2”	3”	82179	98357
	3/8”	1”	3”	82159	98358
	3/8”	1-1/4”	3-1/2”	82194	98387
	3/8”	1-1/2”	4”	82160	98359
	3/8”	2”	4”	82195	98388
	3/8”	2-1/2”	5”	82196	98389
7/16”	7/16”	9/16”	2-1/2”	82180	98360
	7/16”	1”	2-3/4”	82162	98361

Cutting Dia. d_1	Shank Dia. d_2	LOC l_1	OAL l_2	Uncoated	DS1 (TiCN)
1/2”	1/2”	3/4”	3”	82181	98362
	1/2”	1”	3”	82197	98390
	1/2”	1-1/4”	3”	82164	98363
	1/2”	1-5/8”	4”	82198	98391
	1/2”	2”	4”	82165	98364
	1/2”	2-1/2”	5”	82166	98365
	1/2”	3-1/8”	6”	82199	98392
5/8”	5/8”	7/8”	3-1/2”	82182	98366
	5/8”	1-5/8”	3-1/2”	82167	98367
	5/8”	2-1/8”	4”	82200	98393
	5/8”	2-1/2”	5”	82168	98368
	5/8”	3-1/4”	6”	82169	98369
	5/8”	3-3/4”	6”	82201	98394
3/4”	3/4”	1”	4”	82183	98370
	3/4”	1-5/8”	4”	82170	98371
	3/4”	2-1/4”	5”	82202	98395
	3/4”	3-1/4”	6”	82171	98372
	3/4”	4”	6-1/2”	82172	98373
1”	1”	1-1/2”	4”	82184	98374
	1”	2-1/4”	5”	82174	98375
	1”	2-5/8”	6”	82203	98396
	1”	3-1/4”	6”	82175	98376
	1”	4-1/4”	7”	82176	98377



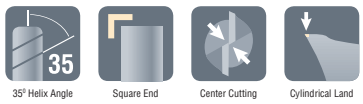
TOLERANCES | $d_1 = {}^{+.000}_{-.002}$ | $d_2 = {}^{-.0001}_{-.0004}$

NON-FERROUS MATERIALS Material Application

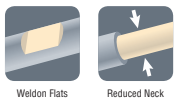
Uncoated Coating

3 FLUTE FOR ALUMINUM
EXTENDED REACH
Square End, With & Without Neck Relief

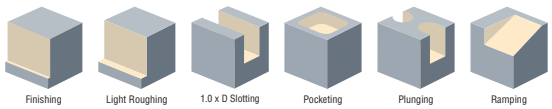
Standard Features



Optional



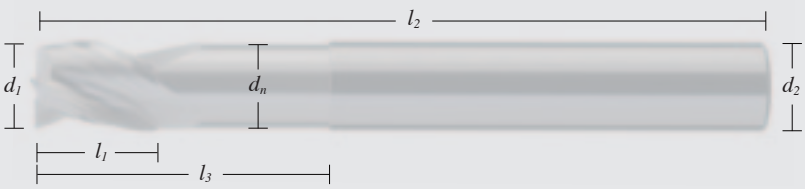
Preferred Milling Applications



- **Extended reach design with neck relief option**
- **Deep pocket milling applications**
- **Minimal deflection**
- **35° helix angle**

Customers must supply Length Below Shank (LBS) dimensions

Cutting Dia. d_1	Shank Dia. d_2	LOC l_1	OAL l_2	Without Neck Relief	With Neck Relief	Neck Dia. d_n	LBS l_3
1/4”	1/4”	3/8”	4”	81332	81342	.235	3/4” to 2-1/8”
5/16”	5/16”	7/16”	4”	81333	81343	.297	7/8” to 2-1/8”
3/8”	3/8”	1/2”	6”	81334	81344	.355	7/8” to 3-3/8”
1/2”	1/2”	3/4”	6”	81335	81338	.470	1” to 3-3/8”
5/8”	5/8”	7/8”	6”	81331	81341	.590	1-1/8” to 3-3/8”
3/4”	3/4”	1”	6”	81336	81339	.715	1-1/4” to 3-3/8”
1”	1”	1-1/2”	6”	81337	81340	.960	1-1/2” to 3-3/8”



TOLERANCES $d_1 = {}^{+.000}_{-.002}$ | $d_2 = {}^{-.0001}_{-.0004}$

3 FLUTE FOR ALUMINUM

Rougher With Corner Radius

Material Application: NON-FERROUS MATERIALS

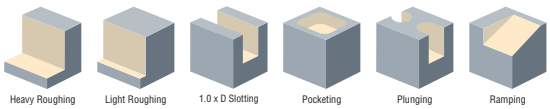
Coatings: TiCN | Uncoated

- Exceptional chip breaker design
- High feed capable
- Heavy roughing applications
- 35° helix angle

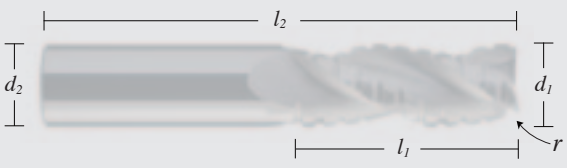
Standard Features

Optional

Preferred Milling Applications



Cutting Dia. d_1	Shank Dia. d_2	LOC l_1	OAL l_2	Corner Radius r	Uncoated	DS1 (TiCN)
1/4”	1/4”	3/8”	2”	.015 - .020	82127	98227
	1/4”	3/4”	2-1/2”		82130	98230
	1/4”	1-1/4”	3”		82131	98231
5/16”	5/16”	7/16”	2”		82128	98228
	5/16”	7/8”	2-1/2”		82132	98232
	5/16”	1-1/4”	3”		82133	98233
3/8”	3/8”	1/2”	2”		82129	98229
	3/8”	1”	2-1/2”		82134	98234
	3/8”	1-1/2”	3”		82135	98235
7/16”	7/16”	9/16”	2-1/2”		82136	98236
	7/16”	1”	2-3/4”		82137	98237
1/2”	1/2”	3/4”	2-1/2”	.030 - .035	82138	98238
	1/2”	1-1/4”	3”		82139	98239
	1/2”	2”	4”		82140	98240
5/8”	5/8”	7/8”	3”		82141	98241
	5/8”	1-5/8”	3-1/2”		82142	98242
	5/8”	2-1/4”	5”		82143	98243
3/4”	3/4”	1”	3”		82144	98244
	3/4”	1-5/8”	4”		82145	98245
	3/4”	2-1/4”	5”		82146	98246
1”	1”	1-1/2”	4”		82148	98248
	1”	2-1/4”	5”		82149	98249
	1”	3”	6”		82150	98250



TOLERANCES | $d_1 = {}^{+.000}_{-.005}$ | $d_2 = {}^{-.0001}_{-.0004}$

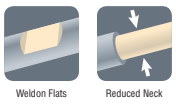
NON-FERROUS MATERIALS Material Application

Uncoated Coating

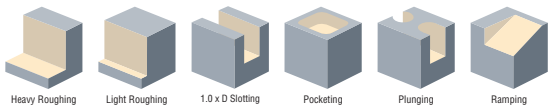
3 FLUTE FOR ALUMINUM
EXTENDED REACH
Rougher With Corner Radius, With & Without Neck Relief

Standard Features

Optional



Preferred Milling Applications

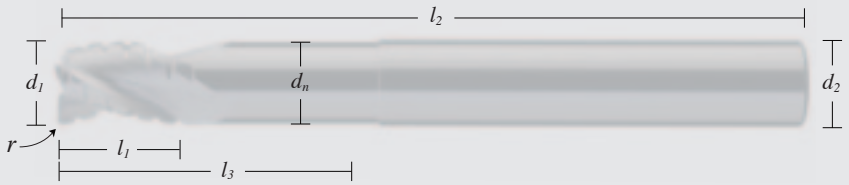


Weldon Flats available at no charge

- **Extended reach design with neck relief option**
- **Deep pocket milling applications**
- **Minimal deflection**
- **35° helix angle**

Customers must supply Length Below Shank (LBS) dimensions

Cutting Dia. d_1	Shank Dia. d_2	LOC l_1	OAL l_2	Corner Radius r	Without Neck Relief	With Neck Relief	Neck Dia. d_n	LBS l_3
1/4"	1/4"	3/8"	4"	.015 - .020	81358	81366	.235	3/4" to 2-1/8"
5/16"	5/16"	7/16"	4"		81359	81367	.297	7/8" to 2-1/8"
3/8"	3/8"	1/2"	6"		81360	81368	.355	7/8" to 3-3/8"
1/2"	1/2"	3/4"	6"	.030 - .035	81361	81369	.470	1" to 3-3/8"
5/8"	5/8"	7/8"	6"		81362	81370	.590	1-1/8" to 3-3/8"
3/4"	3/4"	1"	6"		81363	81371	.715	1-1/4" to 3-3/8"
1"	1"	1-1/2"	6"		81364	81372	.960	2" to 3-3/8"
1-1/4"	1-1/4"	1-1/2"	10"		81365	81373	1.175	2" to 3-3/8"



TOLERANCES $d_1 = {}^{+.000}_{-.005}$ | $d_2 = {}^{-.0001}_{-.0004}$

3 FLUTE FOR STEEL

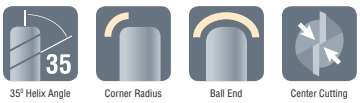
Corner Radius & Ball End

Material Application: STEEL | STAINLESS STEEL | CAST IRON | HI-TEMP ALLOYS | HARDENED STEEL

Coatings: TiCN | AlTiN | Uncoated

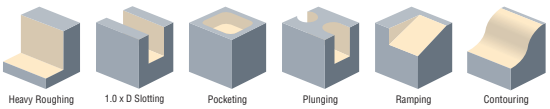
- Heaving roughing and slotting applications
- 35⁰ helix angle
- Offered in corner radius and ball end designs

Standard Features

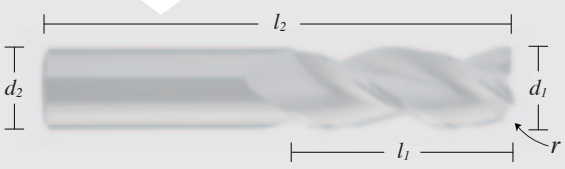


Optional

Preferred Milling Applications



Cutting Dia. d_1	Shank Dia. d_2	LOC l_1	OAL l_2	Corner Radius r	Uncoated	DS1 (TiCN)	DS3 (AlTiN)	Ball End Uncoated	Ball End DS1	Ball End DS3
1/8”	1/8”	1/4”	1-1/2”	.008 - .010	82600	91600	93600	82730	91730	93730
	1/8”	1/2”	1-1/2”		82601	91601	93601	82731	91731	93731
5/32”	3/16”	5/16”	2”		82602	91602	93602			
	3/16”	9/16”	2”		82616	91616	93616			
3/16”	3/16”	5/16”	2”		82603	91603	93603	82732	91732	93732
	3/16”	9/16”	2”		82604	91604	93604	82733	91733	93733
7/32”	1/4”	3/8”	2”	.015 - .020	82605	91605	93605			
	1/4”	3/4”	2-1/2”		82619	91619	93619			
1/4”	1/4”	3/8”	2”		82606	91606	93606	82734	91734	93734
	1/4”	3/4”	2-1/2”		82607	91607	93607	82735	91735	93735
9/32”	5/16”	7/16”	2”		82608	91608	93608			
	5/16”	13/16”	2-1/2”		82622	91622	93622			
5/16”	5/16”	7/16”	2”		82609	91609	93609	82736	91736	93736
	5/16”	13/16”	2-1/2”		82610	91610	93610	82737	91737	93737
11/32”	3/8”	1/2”	2”		82611	91611	93611			
	3/8”	7/8”	2-1/2”		82625	91625	93625			
3/8”	3/8”	1/2”	2”		82612	91612	93612	82738	91738	93738
	3/8”	1”	2-1/2”		82613	91613	93613	82739	91739	93739
7/16”	7/16”	9/16”	2-1/2”		82614	91614	93614	82740	91740	93740
	7/16”	1”	2-3/4”		82615	91615	93615	82741	91741	93741
1/2”	1/2”	3/4”	2-1/2”	.030 - .035	82617	91617	93617	82742	91742	93742
	1/2”	1-1/4”	3”		82618	91618	93618	82743	91743	93743
5/8”	5/8”	7/8”	3”		82620	91620	93620	82744	91744	93744
	5/8”	1-5/8”	3-1/2”		82621	91621	93621	82745	91745	93745
3/4”	3/4”	1”	3”		82623	91623	93623	82746	91746	93746
	3/4”	1-5/8”	4”		82624	91624	93624	82747	91747	93747
1”	1”	1-1/4”	3”		82626	91626	93626	84748	91748	93748
	1”	2”	4”		82627	91627	93627	82749	91749	93749



TOLERANCES $d_1 = {}^{+.000}_{-.002}$ | $d_2 = {}^{-.0001}_{-.0004}$

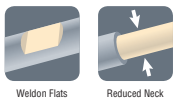
STEEL | STAINLESS STEEL | CAST IRON | HI-TEMP ALLOYS | HARDENED STEEL — Material Application

Uncoated — Coating

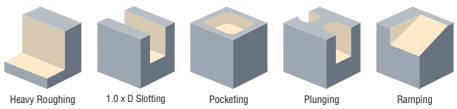
3 FLUTE FOR STEEL
EXTENDED REACH
Corner Radius, With & Without Neck Relief

Standard Features

Optional



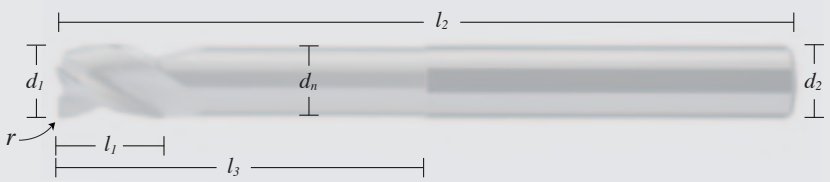
Preferred Milling Applications



- **Deep pocket roughing and slotting applications**
- **35° helix angle**
- **Extended reach design with neck relief option**
- **Minimal deflection**

Customers must supply Length Below Shank (LBS) dimensions

Cutting Dia. d_1	Shank Dia. d_2	LOC l_1	OAL l_2	Corner Radius r	Without Neck Relief	With Neck Relief	Neck Dia. d_n	LBS l_3
1/4"	1/4"	3/8"	4"	.015 - .020	82700	82750	.235	3/4" to 2-1/8"
5/16"	5/16"	7/16"	4"		82701	82751	.297	7/8" to 2-1/8"
3/8"	3/8"	1/2"	6"		82702	82752	.355	7/8" to 3-3/8"
7/16	7/16"	9/16"	6"		82703	82753	.412	1" to 3-3/8"
1/2"	1/2"	3/4"	6"	.030 - .035	82704	82754	.470	1" to 3-3/8"
5/8"	5/8"	7/8"	6"		82705	82755	.590	1-1/8" to 3-3/8"
3/4"	3/4"	1"	6"		82706	82756	.715	1-1/4" to 3-3/8"
1"	1"	1-1/4"	6"		82707	82757	.960	1-1/2" to 3-3/8"



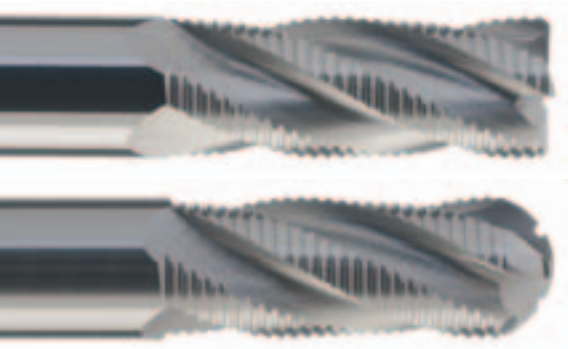
TOLERANCES $d_1 = {}^{+.000}_{-.002}$ | $d_2 = {}^{-.0001}_{-.0004}$

4 FLUTE FOR STEEL

Rougher With Corner Chamfer & Ball End

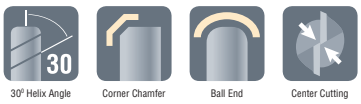
Material Application: STEEL | STAINLESS STEEL | CAST IRON | HI-TEMP ALLOYS | HARDENED STEEL

Coatings: TiCN | AlTiN | Uncoated



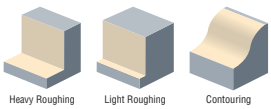
- 'Medium pitch' form relief, chip breakers
- Heavy duty flute construction
- Reduced horsepower requirement
- Heavy profile roughing applications
- Offered in corner chamfer and ball end designs

Standard Features

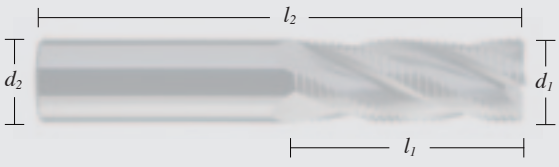


Optional

Preferred Milling Applications

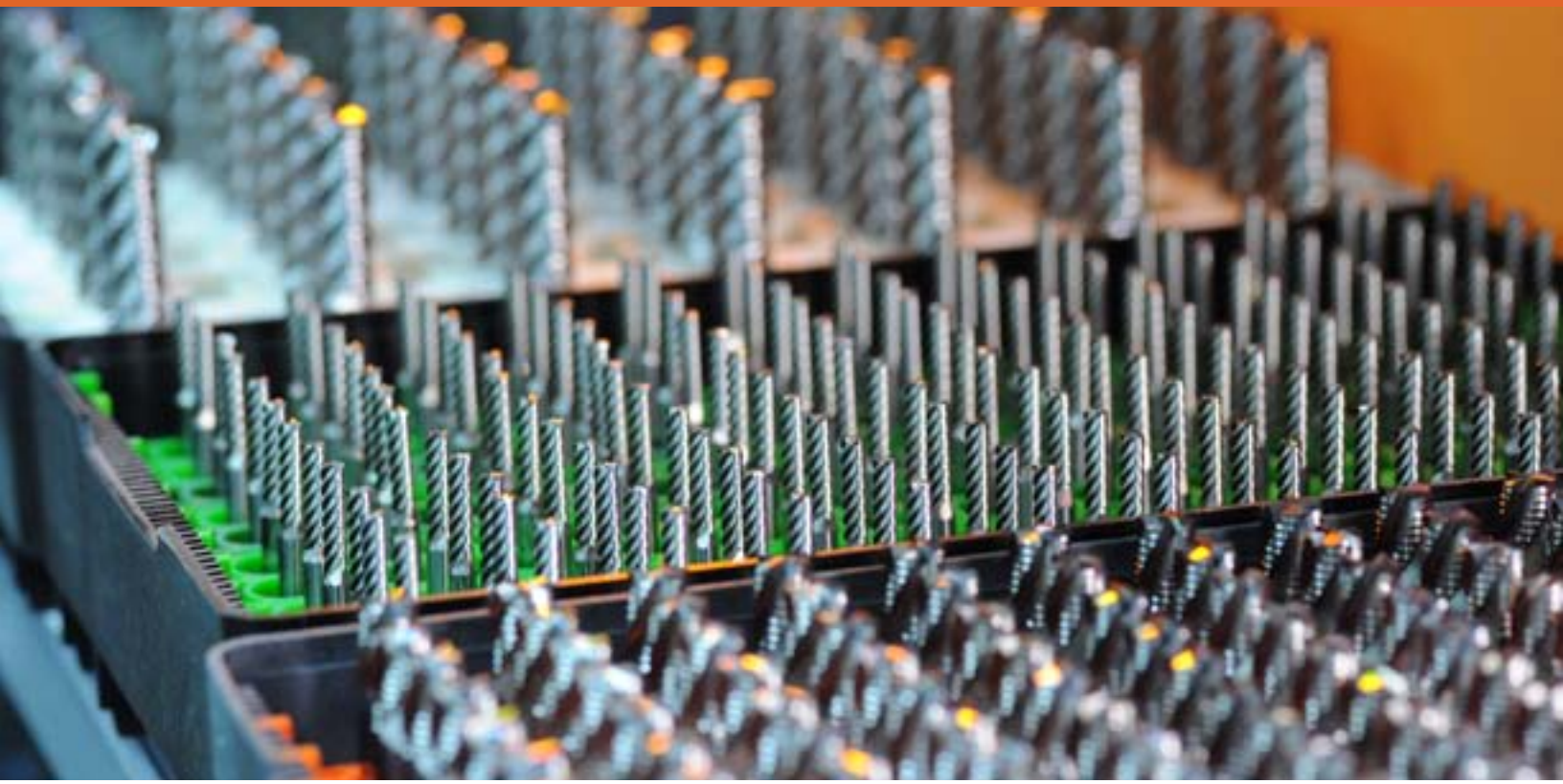


Cutting Dia. d_1	Shank Dia. d_2	LOC l_1	OAL l_2	45° Corner Chamfer	Uncoated	DS1 (TiCN)	DS3 (AlTiN)	Ball End Uncoated	Ball End DS3
	1/4"	3/8"	2"		82382	92750	73750		
1/4"	1/4"	3/4"	2-1/2"		82402	92751	73751	82802	72802
	1/4"	1-1/4"	3"	.010 - .020	98410	98420	98430		
	5/16"	7/16"	2"		82383	92752	73752		
5/16"	5/16"	7/8"	2-1/2"		82403	92753	73753	82803	72803
	5/16"	1-1/4"	3"		98412	98422	98432		
	3/8"	1/2"	2"		82384	92754	73754		
3/8"	3/8"	1"	2-1/2"		82404	92755	73755	82804	72804
	3/8"	1-1/2"	3-1/2"	.015 - .025	98413	98423	98433		
7/16"	7/16"	9/16"	2-1/2"		82385	92756	73756		
	7/16"	1"	2-3/4"		82406	92757	73757	82806	72806
	1/2"	5/8"	2-1/2"		82386	92758	73758		
1/2"	1/2"	1-1/4"	3"	.020 - .030	82407	92759	73759	82807	72807
	1/2"	2"	4"		82387	92766	73766		
	5/8"	3/4"	3"		82408	92760	73760		
5/8"	5/8"	1-5/8"	3-1/2"	.030 - .040	82409	92761	73761	82809	72809
	5/8"	2-1/4"	5"		98414	98424	98434		
	3/4"	7/8"	3"		82410	92762	73762		
3/4"	3/4"	1-5/8"	4"	.035 - .045	82412	92763	73763	82812	72812
	3/4"	2-1/4"	5"		82388	92767	73767		
	1"	1-1/8"	3"		82413	92764	73764		
1"	1"	2"	4"	.040 - .050	82414	92765	73765	82814	72814
	1"	3-1/4"	6"		82389	92768	73768		



TOLERANCES | $d_1 = {}^{+.000}_{-.005}$ | $d_2 = {}^{-.0001}_{-.0004}$

AT DURA-MILL, QUALITY IS AN EVERY DAY, EVERY TOOL COMMITMENT TO OUR CUSTOMERS



5 FLUTE FOR STEEL

Square End

Material Application: STEEL | STAINLESS STEEL | CAST IRON | HI-TEMP ALLOYS | HARDENED STEEL

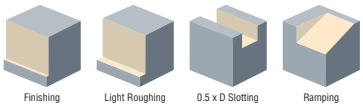
Coatings: TiCN | AlTiN | Uncoated

- Light profile roughing and finishing applications
- 45° helix angle
- Eccentric primary reflief angle
- Harmonic canceling flute design

Standard Features

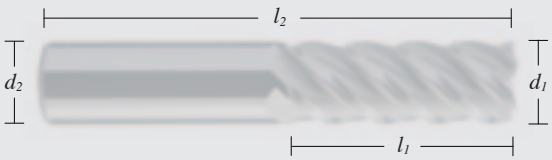
Optional

Preferred Milling Applications



Cutting Dia. d_1	Shank Dia. d_2	LOC l_1	OAL l_2	Uncoated	DS1 (TiCN)	DS3 (AlTiN)
1/8”	1/8”	1/4”	1-1/2”	82660	91660	93660
	1/8”	1/2”	1-1/2”	82661	91661	93661
5/32”	3/16”	5/16”	2”	82662	91662	93662
	3/16”	9/16”	2”	82663	91663	93663
3/16”	3/16”	5/16”	2”	82664	91664	93664
	3/16”	9/16”	2”	82665	91665	93665
7/32”	1/4”	3/8”	2”	82666	91666	93666
	1/4”	3/4”	2-1/2”	82667	91667	93667
1/4”	1/4”	3/8”	2”	82668	91668	93668
	1/4”	3/4”	2-1/2”	82669	91669	93669
	1/4”	1-1/4”	4”	82670	91670	93670
9/32”	5/16”	7/16”	2”	82671	91671	93671
	5/16”	7/8”	2-1/2”	82672	91672	93672
5/16”	5/16”	7/16”	2”	82673	91673	93673
	5/16”	7/8”	2-1/2”	82674	91674	93674
	5/16”	1-1/4”	4”	82675	91675	93675
3/8”	3/8”	1/2”	2”	82676	91676	93676
	3/8”	1”	2-1/2”	82677	91677	93677
	3/8”	1-1/2”	4”	82678	91678	93678

Cutting Dia. d_1	Shank Dia. d_2	LOC l_1	OAL l_2	Uncoated	DS1 (TiCN)	DS3 (AlTiN)
7/16”	7/16”	9/16”	2-1/2”	82679	91679	93679
	7/16”	1”	2-3/4”	82680	91680	93680
1/2”	1/2”	3/4”	2-1/2”	82682	91682	93682
	1/2”	1-1/4”	3”	82683	91683	93683
	1/2”	2”	4”	82684	91684	93684
5/8”	5/8”	7/8”	3”	82685	91685	93685
	5/8”	1-5/8”	3-1/2”	82686	91686	93686
	5/8”	2-1/2”	5”	82687	91687	93687
3/4”	3/4”	1”	3”	82688	91688	93688
	3/4”	1-5/8”	4”	82689	91689	93689
	3/4”	3-1/4”	6”	82690	91690	93690
1”	1”	1-1/4”	3”	82692	91692	93692
	1”	2”	4”	82694	91694	93694
	1”	3-1/4”	6”	82695	91695	93695
1-1/4”	1-1/4”	3-1/4”	6”	82698	91698	93698



TOLERANCES $d_1 = {}^{+.000}_{-.002}$ | $d_2 = {}^{-.0001}_{-.0004}$

STEEL | STAINLESS STEEL | CAST IRON | HI-TEMP ALLOYS | HARDENED STEEL — Material Application

AlTiN — Coating

TO BE DISCONTINUED

5 FLUTE FOR STEEL

Corner Radius

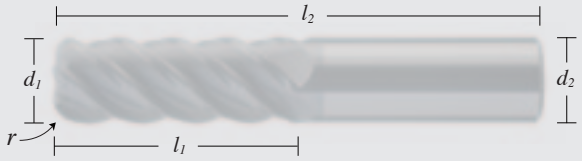
Standard Features	Optional
45° Helix Angle, Corner Radius, Center Cutting	Weldon Flats

Preferred Milling Applications

Finishing, Light Roughing, 0.5 x D Slotting, Ramping

- Light profile roughing and finishing applications
- 45° helix angle
- Eccentric primary reflief angle
- Offered with specified corner radius

Cutting Dia. d_1	Shank Dia. d_2	LOC l_1	OAL l_2	Corner Radius r .015	.030	.060	.090	.125	.190
3/8	3/8”	1/2”	2”	72753	72754	72755			
	3/8”	1”	2-1/2”	72756	72757	72758			
1/2”	1/2”	3/4”	2-1/2”	72759	72760	72761	72762	72763	
	1/2”	1-1/4”	3”	72764	72765	72766	72767	72768	
5/8”	5/8”	7/8”	3”		72770	72771	72772	72773	
	5/8”	1-5/8”	3-1/2”		72775	72776	72777	72778	
3/4”	3/4”	1”	3”		72780	72781	72782	72783	72784
	3/4”	1-5/8”	4”		72785	72786	72787	72788	72789
1”	1”	1-1/4”	3”		72790	72791	72792	72793	72794
	1”	2”	4”		72795	72796	72797	72798	72799



TOLERANCES $d_1 = {}^{+.000}_{-.002}$ | $d_2 = {}^{-.0001}_{-.0004}$ | $r = {}^{+.000}_{-.002}$

TO BE DISCONTINUED
Contact our Customer Service Dept. for special pricing.

6 FLUTE FOR STEEL

Square End

Material Application: STEEL | STAINLESS STEEL | CAST IRON | HI-TEMP ALLOYS | HARDENED STEEL

Coatings: TiCN | AlTiN | Uncoated

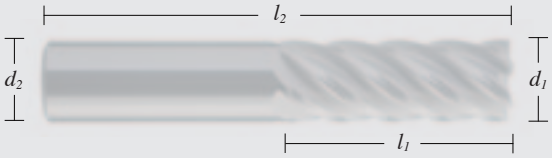
- Light profile finishing applications
- 40⁰ helix angle
- Suitable for high feed machining
- Superior finish

Standard Features

Optional

Preferred Milling Applications

Cutting Dia. d_1	Shank Dia. d_2	LOC l_1	OAL l_2	Uncoated	DS1 (TiCN)	DS3 (AlTiN)
1/4”	1/4”	3/8”	2”	82630	91630	93630
	1/4”	3/4”	2-1/2”	82631	91631	93631
	1/4”	1-1/4”	4”	82632	91632	93632
5/16”	5/16”	7/16”	2”	82633	91633	93633
	5/16”	7/8”	2-1/2”	82634	91634	93634
	5/16”	1-1/4”	4”	82635	91635	93635
3/8”	3/8”	1/2”	2”	82637	91637	93637
	3/8”	1”	2-1/2”	82638	91638	93638
	3/8”	1-1/2”	4”	82639	91639	93639
7/16”	7/16”	9/16”	2-1/2”	82641	91641	93641
	7/16”	1”	2-3/4”	82642	91642	93642
1/2”	1/2”	3/4”	2-1/2”	82643	91643	93643
	1/2”	1-1/4”	3”	82644	91644	93644
	1/2”	2”	4”	82645	91645	93645
5/8”	5/8”	7/8”	3”	82647	91647	93647
	5/8”	1-5/8”	3-1/2”	82648	91648	93648
	5/8”	2-1/2”	5”	82649	91649	93649
3/4”	3/4”	1”	3”	82651	91651	93651
	3/4”	1-5/8”	4”	82652	91652	93652
	3/4”	3-1/4”	6”	82653	91653	93653
1”	1”	1-1/4”	3”	82655	91655	93655
	1”	2”	4”	82656	91656	93656
	1”	3-1/4”	6”	82657	91657	93657
1-1/4”	1-1/4”	3-1/4”	6”	82659	91659	93659

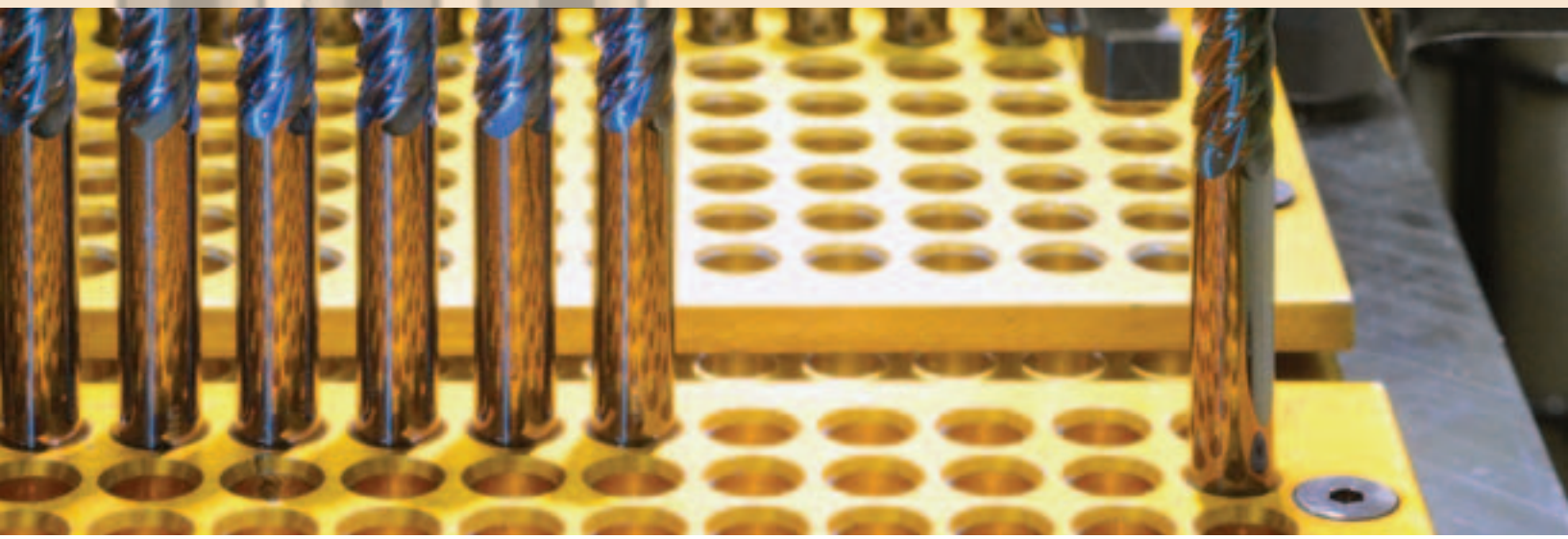


TOLERANCES $d_1 = {}^{+.000}_{-.002}$ | $d_2 = {}^{-.0001}_{-.0004}$

GENERAL PURPOSE SERIES

Our General Purpose Series End Mills offer:

- **Wide Selection of Tools**
  Covers a broad range of milling applications.
- **All Spiral End Mills are 30^{0} Helix**
  Allows for a wider range of material applications.
- **Hard To Find Sizes**
  32nd and 64th diameters can be found in 2 and 4 flute square ends.
- **High Quality Manufacturing**
  Same high standards as found in our WhisperKut and High Performance Series.
- **Competitive Pricing and Impeccable Value**



2 FLUTE FOR STEEL

Square End

Material Application: STEEL | STAINLESS STEEL | CAST IRON

Coatings: TiCN | Uncoated

- General purpose machining of most materials
- Economical cost
- Standard 30° helix angle
- Offered in 'standard', 32nd and 64th sizes

Standard Features

Preferred Milling Applications

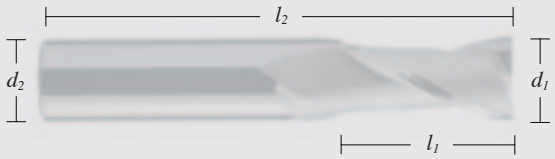
Cutting Dia. d_1	Shank Dia. d_2	LOC l_1	OAL l_2	Uncoated	DS1 (TiCN)
1/32"	1/8"	1/16"	1-1/2"	80035	91130
3/64"	1/8"	3/32"	1-1/2"	80036	91131
1/16"	1/8"	1/8"	1-1/2"	80037	91132
	1/8"	3/16"	1-1/2"	80000	91000
5/64"	1/8"	1/8"	1-1/2"	80133	91133
	1/8"	1/4"	1-1/2"	80001	91031
3/32"	1/8"	3/16"	1-1/2"	80038	91134
	1/8"	3/8"	1-1/2"	80002	91032
7/64"	1/8"	3/16"	1-1/2"	80050	91135
	1/8"	3/8"	1-1/2"	80003	91033
1/8"	1/8"	1/4"	1-1/2"	80039	91136
	1/8"	1/2"	1-1/2"	80004	91034
	1/8"	3/4"	2"	80051	
9/64"	3/16"	9/16"	2"	80005	91035
5/32"	3/16"	5/16"	2"	80040	91137
	3/16"	9/16"	2"	80006	91036
11/64"	3/16"	9/16"	2"	80007	91037
3/16"	3/16"	3/8"	2"	80041	91138
	3/16"	5/8"	2"	80008	91038
	3/16"	3/4"	2-1/2"	80052	
13/64"	1/4"	5/8"	2-1/2"	80009	91039
7/32"	1/4"	7/16"	2"	80042	91139
	1/4"	5/8"	2-1/2"	80010	91040
15/64"	1/4"	3/4"	2-1/2"	80011	91041
1/4"	1/4"	1/2"	2"	80043	91140
	1/4"	3/4"	2-1/2"	80012	91042
	1/4"	1-1/4"	3"	80055	
17/64"	5/16"	7/8"	2-1/2"	80013	91043
9/32"	5/16"	7/8"	2-1/2"	80014	91044
19/64"	5/16"	7/8"	2-1/2"	80015	91045
5/16"	5/16"	1/2"	2"	80044	91141
	5/16"	7/8"	2-1/2"	80016	91046
	5/16"	1-1/4"	3"	80057	
21/64"	3/8"	1"	2-1/2"	80017	91047
11/32"	3/8"	1"	2-1/2"	80018	91048
23/64"	3/8"	1"	2-1/2"	80019	91049

Cutting Dia. d_1	Shank Dia. d_2	LOC l_1	OAL l_2	Uncoated	DS1 (TiCN)
3/8"	3/8"	5/8"	2"	80045	91142
	3/8"	1"	2-1/2"	80020	91050
	3/8"	1-1/4"	3"	80059	
	3/8"	1-3/4"	4"	80060	
25/64"	7/16"	1"	2-3/4"	80021	91051
13/32"	7/16"	1"	2-3/4"	80022	91052
27/64"	7/16"	1"	2-3/4"	80023	91053
7/16"	7/16"	5/8"	2-1/2"	80046	91143
	7/16"	1"	2-3/4"	80024	91054
29/64"	1/2"	1"	3"	80025	91055
15/32"	1/2"	1"	3"	80026	91056
31/64"	1/2"	1"	3"	80027	91057
1/2"	1/2"	3/4"	2-1/2"	80047	91144
	1/2"	1"	3"	80028	91058
	1/2"	2"	4"	80063	
	1/2"	3"	6"	80064	
9/16"	9/16"	1-1/4"	3-1/2"	80029	91059
5/8"	5/8"	7/8"	3"	80048	91145
	5/8"	1-1/4"	3-1/2"	80030	91060
	5/8"	2-1/4"	5"	80065	
	5/8"	3"	6"	80066	
3/4"	3/4"	1"	3"	80049	91146
	3/4"	1-1/2"	4"	80032	91061
	3/4"	2-1/4"	5"	80067	
	3/4"	3"	6"	80068	
7/8"	7/8"	1-1/2"	4"	80033	91062
1"	1"	1-1/2"	4"	80034	91063
	1"	2-1/4"	5"	80069	
	1"	3"	6"	80070	

TOLERANCES

$d_1 = {}^{+.000}_{-.002}$

$d_2 = {}^{-.0001}_{-.0004}$



STEEL | STAINLESS STEEL | CAST IRON — Material Application

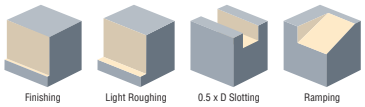
TiCN | AlTiN | Uncoated — Coatings

4 FLUTE FOR STEEL

Square End

Standard Features

Preferred Milling Applications



- General purpose machining of most materials
- Economical cost
- Standard 30° helix angle
- Offered in 'standard', 32nd and 64th sizes

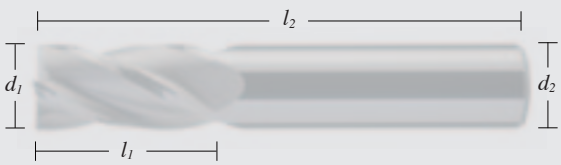
Cutting Dia. d_1	Shank Dia. d_2	LOC l_1	OAL l_2	Uncoated	DS1 (TiCN)	DS3 (AlTiN)
1/32"	1/8"	1/16"	1-1/2"	80535	91535	73535
	1/8"	3/32"	1-1/2"	80498	92674	73120
3/64"	1/8"	3/32"	1-1/2"	80536	91536	73536
	1/8"	9/64"	1-1/2"	80499	92675	73121
1/16"	1/8"	1/8"	1-1/2"	80537	91537	73537
	1/8"	3/16"	1-1/2"	80500	92676	73122
5/64"	1/8"	1/8"	1-1/2"	80550	91550	73550
	1/8"	1/4"	1-1/2"	80501	92677	73123
3/32"	1/8"	3/16"	1-1/2"	80538	91538	73538
	1/8"	3/8"	1-1/2"	80502	92678	73124
7/64"	1/8"	3/16"	1-1/2"	80551	91551	73551
	1/8"	3/8"	1-1/2"	80503	92679	73125
1/8"	1/8"	1/4"	1-1/2"	80539	91539	73539
	1/8"	1/2"	1-1/2"	80504	92680	73126
	1/8"	3/4"	2"	80075		73075
9/64"	3/16"	9/16"	2"	80505	92681	73127
5/32"	3/16"	5/16"	2"	80540	91540	73540
	3/16"	9/16"	2"	80506	92682	73128
11/64"	3/16"	9/16"	2"	80507	92683	73129
3/16"	3/16"	3/8"	2"	80541	91541	73541
	3/16"	5/8"	2"	80508	92684	73130
	3/16"	3/4"	2-1/2"	80077		73077
13/64"	1/4"	5/8"	2-1/2"	80509	92685	73131
7/32"	1/4"	7/16"	2"	80542	91542	73542
	1/4"	5/8"	2-1/2"	80510	92686	73132
15/64"	1/4"	3/4"	2-1/2"	80511	92687	73133
1/4"	1/4"	1/2"	2"	80543	91543	73543
	1/4"	3/4"	2-1/2"	80512	92688	73134
	1/4"	1-1/4"	3"	80079		73079
17/64"	5/16"	7/8"	2-1/2"	80513	92689	73135
9/32"	5/16"	7/8"	2-1/2"	80514	92690	73136
19/64"	5/16"	7/8"	2-1/2"	80515	92691	73137
5/16"	5/16"	1/2"	2"	80544	91544	73544
	5/16"	7/8"	2-1/2"	80516	92692	73138
	5/16"	1-1/4"	3"	80081		73081
21/64"	3/8"	1"	2-1/2"	80517	92693	73139
11/32"	3/8"	1"	2-1/2"	80518	92694	73140

Cutting Dia. d_1	Shank Dia. d_2	LOC l_1	OAL l_2	Uncoated	DS1 (TiCN)	DS3 (AlTiN)
23/64"	3/8"	1"	2-1/2"	80519	92695	73141
3/8"	3/8"	5/8"	2"	80545	91545	73545
	3/8"	1"	2-1/2"	80520	92696	73142
	3/8"	1-1/4"	3"	80083		73083
	3/8"	1-3/4"	4"	80084		73084
25/64"	7/16"	1"	2-3/4"	80521	92697	73143
13/32"	7/16"	1"	2-3/4"	80522	92698	73144
27/64"	7/16"	1"	2-3/4"	80523	92699	73145
7/16"	7/16"	5/8"	2-1/2"	80546	91546	73546
	7/16"	1"	2-3/4"	80524	92700	73146
29/64"	1/2"	1"	3"	80525	92701	73147
15/32"	1/2"	1"	3"	80526	92702	73148
31/64"	1/2"	1"	3"	80527	92703	73149
1/2"	1/2"	3/4"	2-1/2"	80547	91547	73547
	1/2"	1"	3"	80528	92704	73150
	1/2"	2"	4"	80087		73087
	1/2"	3"	6"	80088		73088
9/16"	9/16"	1-1/4"	3-1/2"	80529	92705	73151
5/8"	5/8"	7/8"	3"	80548	91548	73548
	5/8"	1-1/4"	3-1/2"	80530	92706	73152
	5/8"	2-1/4"	5"	80089		73089
	5/8"	3"	6"	80090		73090
3/4"	3/4"	1"	3"	80549	91549	73549
	3/4"	1-1/2"	4"	80532	92707	73153
	3/4"	2-1/4"	5"	80091		73091
	3/4"	3"	6"	80092		73092
7/8"	7/8"	1-1/2"	4"	80533	92708	73154
1"	1"	1-1/2"	4"	80534	92709	73155
	1"	2-1/4"	5"	80093		73093
	1"	3"	6"	80094		73094

TOLERANCES

$d_1 = {}^{+.000}_{-.002}$

$d_2 = {}^{-.0001}_{-.0004}$



DURA-MILL CUTTING TOOL EXCELLENCE

4 FLUTE FOR STEEL

Corner Radius

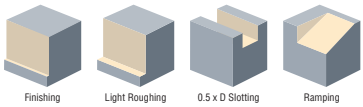
Material Application: STEEL | STAINLESS STEEL | CAST IRON

Coatings: AlTiN | Uncoated

- Extensive 'standardized' corner radius offering
- Offered in Uncoated or AlTiN
- Standard 30° helix angle
- General purpose machining of most materials

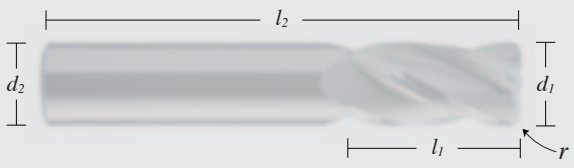
Standard Features

Preferred Milling Applications



Cutting Dia. d_1	Shank Dia. d_2	LOC l_1	OAL l_2	Corner Radius r	Uncoated	DS3 (AlTiN)
1/8"	1/8"	1/2"	1-1/2"	.015	80350	73156
	1/8"	1/2"	1-1/2"	.020	80351	73157
3/16"	3/16"	5/8"	2"	.015	80352	73158
	3/16"	5/8"	2"	.020	80353	73159
	3/16"	5/8"	2"	.030	80354	73160
1/4"	1/4"	3/4"	2-1/2"	.015	80355	73161
	1/4"	3/4"	2-1/2"	.020	80356	73162
	1/4"	3/4"	2-1/2"	.030	80357	73163
	1/4"	3/4"	2-1/2"	.045	80358	73164
5/16"	5/16"	7/8"	2-1/2"	.015	80359	73165
	5/16"	7/8"	2-1/2"	.020	80360	73166
	5/16"	7/8"	2-1/2"	.030	80361	73167
	5/16"	7/8"	2-1/2"	.045	80362	73168
3/8"	3/8"	1"	2-1/2"	.015	80363	73169
	3/8"	1"	2-1/2"	.020	80364	73170
	3/8"	1"	2-1/2"	.030	80365	73171
	3/8"	1"	2-1/2"	.045	80366	73172
	3/8"	1"	2-1/2"	.060	80367	73173
1/2"	1/2"	1"	3"	.015	80368	73174
	1/2"	1"	3"	.020	80369	73175
	1/2"	1"	3"	.030	80370	73176
	1/2"	1"	3"	.045	80371	73177
	1/2"	1"	3"	.060	80372	73178
	1/2"	1"	3"	.090	80373	73179
	1/2"	1"	3"	.125	80374	73180

Cutting Dia. d_1	Shank Dia. d_2	LOC l_1	OAL l_2	Corner Radius r	Uncoated	DS3 (AlTiN)
5/8"	5/8"	1-1/4"	3-1/2"	.015	80375	73181
	5/8"	1-1/4"	3-1/2"	.020	80376	73182
	5/8"	1-1/4"	3-1/2"	.030	80377	73183
	5/8"	1-1/4"	3-1/2"	.045	80378	73184
	5/8"	1-1/4"	3-1/2"	.060	80379	73185
	5/8"	1-1/4"	3-1/2"	.090	80380	73186
3/4"	3/4"	1-1/2"	4"	.015	80381	73187
	3/4"	1-1/2"	4"	.020	80382	73188
	3/4"	1-1/2"	4"	.030	80383	73189
	3/4"	1-1/2"	4"	.045	80384	73190
	3/4"	1-1/2"	4"	.060	80385	73191
	3/4"	1-1/2"	4"	.090	80386	73192
	3/4"	1-1/2"	4"	.125	80387	73193
1"	1"	1-1/2"	4"	.015	80388	73194
	1"	1-1/2"	4"	.020	80389	73195
	1"	1-1/2"	4"	.030	80390	73196
	1"	1-1/2"	4"	.045	80391	73197
	1"	1-1/2"	4"	.060	80392	73198
	1"	1-1/2"	4"	.090	80393	73199
	1"	1-1/2"	4"	.125	80394	73200



TOLERANCES $d_1 = {}^{+.000}_{-.002}$ | $d_2 = {}^{-.0001}_{-.0004}$ | $r = {}^{+.000}_{-.002}$

STEEL | STAINLESS STEEL | CAST IRON | HI-TEMP ALLOYS | HARDENED STEEL | NON-FERROUS MATERIALS — Material Application

TiCN | Uncoated — Coatings

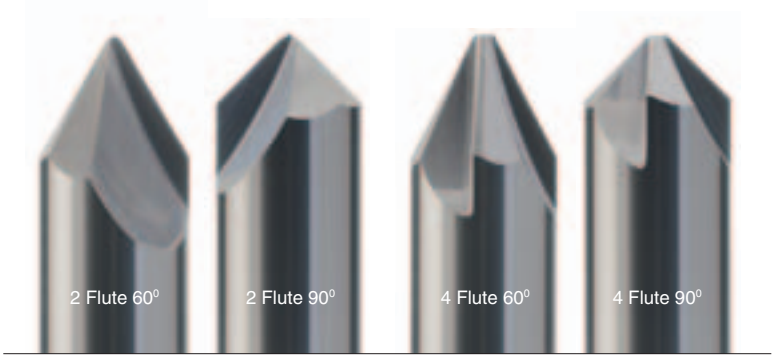
2 / 4 FLUTE FOR ALL MATERIAL GROUPS

Double End Chamfer Series

Standard Features

Preferred Milling Applications

- Economical double end design
- Offered in 2 and 4 flute
- 60° or 90° included angle
- Spot and chamfer applications

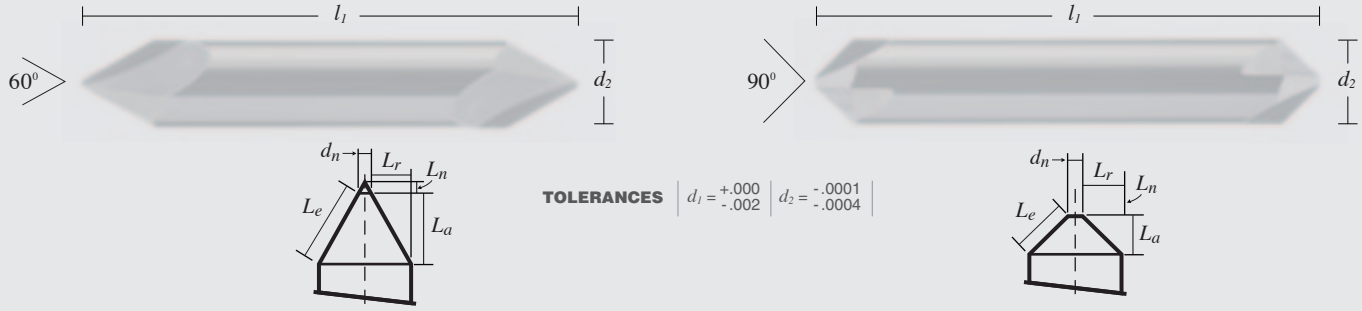


2 FLUTE

	Shank Dia. d_2	OAL l_1	Cutting Edge Lengths L_e	L_r	L_a	Nose Dia. d_n	Nose Length L_n	Uncoated	DS1 (TiCN)
60°	**1/8”**	1-1/2”	0.12	0.06	0.1			80400	91400
	3/16”	2”	0.18	0.09	0.16			80401	91401
	1/4”	2-1/2”	0.2	0.1	0.17	0.05	0.02	80402	91402
	3/8”	2-1/2”	0.31	0.16	0.27	0.06	0.02	80403	91403
	1/2”	3”	0.43	0.21	0.37	0.07	0.02	80404	91404
90°	**1/8”**	1-1/2”	0.09	0.06	0.06			80408	91408
	3/16”	2”	0.13	0.09	0.09			80409	91409
	1/4”	2-1/2”	0.14	0.1	0.1	0.05	0.02	80410	91410
	3/8”	2-1/2”	0.22	0.16	0.16	0.06	0.02	80411	91411
	1/2”	3”	0.3	0.21	0.021	0.07	0.02	80412	91412

4 FLUTE

	Shank Dia. d_2	OAL l_1	Cutting Edge Lengths L_e	L_r	L_a	Nose Dia. d_n	Nose Length L_n	Uncoated	DS1 (TiCN)
60°	**1/4”**	2-1/2”	0.2	0.1	0.17	0.05	0.02	80405	91405
	3/8”	2-1/2”	0.31	0.16	0.27	0.06	0.02	80406	91406
	1/2”	3”	0.43	0.21	0.37	0.07	0.02	80407	91407
90°	**1/4”**	2-1/2”	0.14	0.1	0.1	0.05	0.02	80413	91413
	3/8”	2-1/2”	0.22	0.16	0.16	0.06	0.02	80414	91414
	1/2”	3”	0.3	0.21	0.21	0.07	0.02	80415	91415



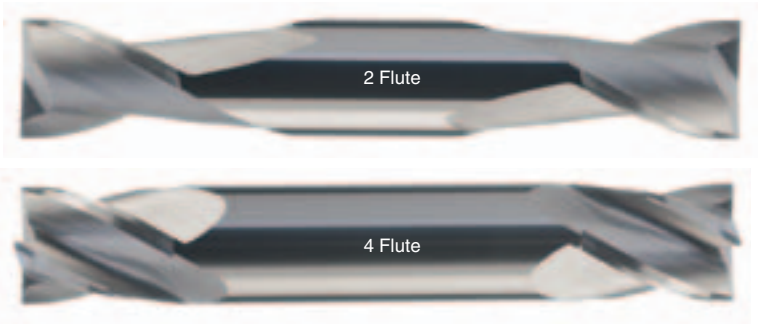
TOLERANCES $d_1 = {}^{+.000}_{-.002}$ | $d_2 = {}^{-.0001}_{-.0004}$

2 / 4 FLUTE FOR STEEL

Double End Square End Series

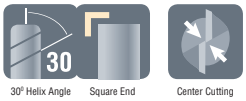
Material Application: STEEL | STAINLESS STEEL | CAST IRON

Coatings: TiCN | AlTiN | Uncoated

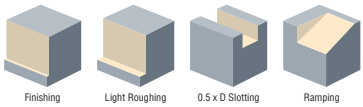


- Economical Cost
- Offered in 2 and 4 flute designs
- Uncoated, DS1 (TiCN) or DS3 (AlTiN) tool coating
- Intermediate sizes

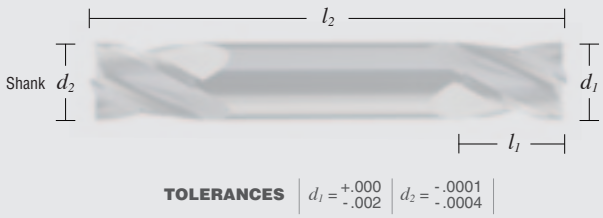
Standard Features



Preferred Milling Applications



Cutting Dia. d_1	Shank Dia. d_2	LOC l_1	OAL l_2	2 Flute Uncoated	2 Flute DS1 (TiCN)	4 Flute Uncoated	4 Flute DS1 (TiCN)	4 Flute DS3 (AlTiN)
1/32”	1/8”	1/16”	1-1/2”	80290	91290	80310	91310	73310
3/64”	1/8”	3/32”	1-1/2”	80291	91291	80311	91311	73311
1/16”	1/8”	1/8”	1-1/2”	80292	91292	80312	91312	73312
5/64”	1/8”	1/8”	1-1/2”	80293	91293	80313	91313	73313
3/32”	1/8”	3/16”	1-1/2”	80294	91294	80314	91314	73314
7/64”	1/8”	3/16”	1-1/2”	80295	91295	80315	91315	73315
1/8”	1/8”	1/4”	1-1/2”	80296	91296	80316	91316	73316
5/32”	3/16”	5/16”	2”	80298	91298	80318	91318	73318
3/16”	3/16”	3/8”	2”	80300	91300	80320	91320	73320
7/32”	1/4”	1/2”	2-1/2”	80302	91302	80322	91322	73322
1/4”	1/4”	1/2”	2-1/2”	80304	91304	80324	91324	73324
5/16”	5/16”	1/2”	2-1/2”	80306	91306	80326	91326	73326
3/8”	3/8”	9/16”	2-1/2”	80307	91307	80327	91327	73327
7/16”	7/16”	9/16”	2-3/4”	80308	91308	80328	91328	73328
1/2”	1/2”	5/8”	3”	80309	91309	80329	91329	73329



TOLERANCES $d_1 = {}^{+.000}_{-.002}$ | $d_2 = {}^{-.0001}_{-.0004}$

STEEL | STAINLESS STEEL | CAST IRON — Material Application

TiCN | AlTiN | Uncoated — Coatings

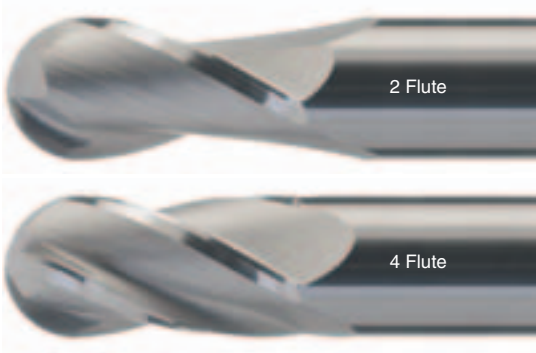
2 / 4 FLUTE FOR STEEL

Ball End Series

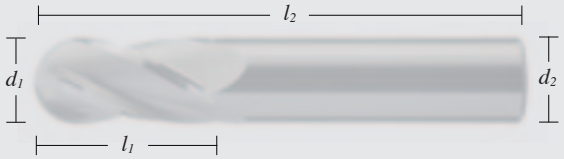
Standard Features

Preferred Milling Applications

- Offered in 2 and 4 flute designs
- Precision ground flute ball radius
- Uncoated, DS1 (TiCN) or DS3 (AlTiN) tool coating
- General purpose 30° helix angle



Cutting Dia. d_1	Shank Dia. d_2	LOC l_1	OAL l_2	2 Flute Uncoated	2 Flute DS1 (TiCN)	4 Flute Uncoated	4 Flute DS1 (TiCN)	4 Flute DS3 (AlTiN)
1/32”	1/8”	1/16”	1-1/2”	80095		80159	91159	73095
3/64”	1/8”	3/32”	1-1/2”	80096		80160	91160	73096
1/16”	1/8”	1/8”	1-1/2”	80097		80161	91161	73097
5/64”	1/8”	1/8”	1-1/2”	80098		80162	91162	73098
3/32”	1/8”	3/16”	1-1/2”	80099		80163	91163	73099
7/64”	1/8”	3/16”	1-1/2”	80100		80164	91164	73100
1/8”	1/8”	1/4”	1-1/2”	80101		80165	91165	73101
	1/8”	1/2”	1-1/2”	80104	91104	80166	91166	73102
3/16”	3/16”	3/8”	2”	80105		80167	91167	73103
	3/16”	5/8”	2”	80108	91108	80169	91168	73104
1/4”	1/4”	1/2”	2”	80109		80172	91169	73105
	1/4”	3/4”	2-1/2”	80112	91112	80173	91170	73106
5/16”	5/16”	7/8”	2-1/2”	80116	91116	80177	91171	73107
3/8”	3/8”	5/8”	2”	80117		80178	91172	73108
	3/8”	1”	2-1/2”	80118	91118	80179	91173	73109
7/16”	7/16”	1”	2-3/4”	80120	91120	80181	91174	73110
1/2”	1/2”	3/4”	2-1/2”	80121		80182	91175	73111
	1/2”	1”	3”	80122	91122	80183	91176	73112
9/16”	9/16”	1-1/4”	3-1/2”	80123	91123	80184	91177	73113
5/8”	5/8”	1-1/4”	3-1/2”	80124	91124	80185	91178	73114
3/4”	3/4”	1-1/2”	4”	80126	91126	80187	91179	73115
1”	1”	1-1/2”	4”	80128	91128	80189	91180	73116



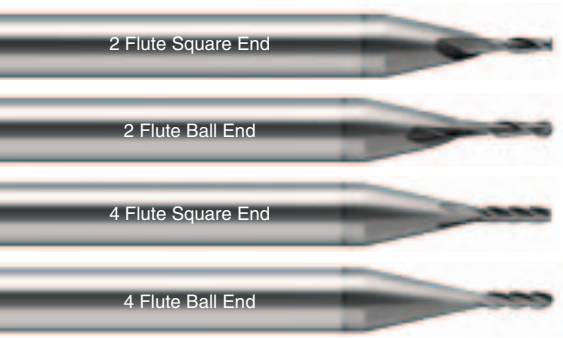
TOLERANCES | $d_1 = {}^{+.000}_{-.002}$ | $d_2 = {}^{-.0001}_{-.0004}$

2 / 4 FLUTE FOR STEEL

Square End & Ball End Micro Series

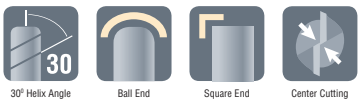
Material Application: STEEL | STAINLESS STEEL | CAST IRON | HI-TEMP ALLOYS | HARDENED STEEL

Coatings: AlTiN



- Precision ground micro geometry
- DS3 (AlTiN) tool coating
- General purpose 30° helix angle
- Offered in standard length of cut (3xD)

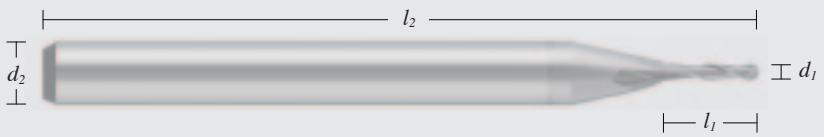
Standard Features



Preferred Milling Applications

Cutting Dia. d_1	Shank Dia. d_2	LOC l_1	OAL l_2	2 Flute Square End	2 Flute Ball End	4 Flute Square End	4 Flute Ball End
.005”	.125”	.015”	1.5”	99000	99200		
.006”	.125”	.018”	1.5”	99001	99201		
.007”	.125”	.021”	1.5”	99002	99202		
.008”	.125”	.024”	1.5”	99003	99203		
.009”	.125”	.027”	1.5”	99004	99204		
.010”	.125”	.030”	1.5”	99005	99205	99505	99705
.011”	.125”	.033”	1.5”	99006	99206	99506	99706
.012”	.125”	.036”	1.5”	99007	99207	99507	99707
.013”	.125”	.039”	1.5”	99008	99208	99508	99708
.014”	.125”	.042”	1.5”	99009	99209	99509	99709
.015”	.125”	.045”	1.5”	99010	99210	99510	99710
.016”	.125”	.048”	1.5”	99011	99211	99511	99711
.017”	.125”	.051”	1.5”	99012	99212	99512	99712
.018”	.125”	.054”	1.5”	99013	99213	99513	99713
.019”	.125”	.057”	1.5”	99014	99214	99514	99714
.020”	.125”	.060”	1.5”	99015	99215	99515	99715
.021”	.125”	.063”	1.5”	99016	99216	99516	99716
.022”	.125”	.066”	1.5”	99017	99217	99517	99717
.023”	.125”	.069”	1.5”	99018	99218	99518	99718
.024”	.125”	.072”	1.5”	99019	99219	99519	99719
.025”	.125”	.075”	1.5”	99020	99220	99520	99720
.026”	.125”	.078”	1.5”	99021	99221	99521	99721
.027”	.125”	.081”	1.5”	99022	99222	99522	99722
.028”	.125”	.084”	1.5”	99023	99223	99523	99723

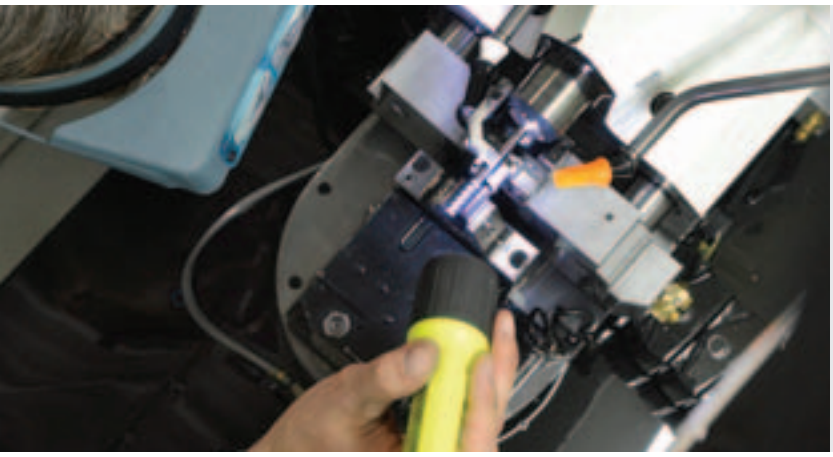
Cutting Dia. d_1	Shank Dia. d_2	LOC l_1	OAL l_2	2 Flute Square End	2 Flute Ball End	4 Flute Square End	4 Flute Ball End
.029”	.125”	.087”	1.5”	99024	99224	99524	99724
.030”	.125”	.090”	1.5”	99025	99225	99525	99725
.031”	.125”	.093”	1.5”	99026	99226	99526	99726
.032”	.125”	.096”	1.5”	99027	99227	99527	99727
.033”	.125”	.099”	1.5”	99028	99228	99528	99728
.034”	.125”	.102”	1.5”	99029	99229	99529	99729
.035”	.125”	.105”	1.5”	99030	99230	99530	99730
.036”	.125”	.108”	1.5”	99031	99231	99531	99731
.037”	.125”	.111”	1.5”	99032	99232	99532	99732
.038”	.125”	.114”	1.5”	99033	99233	99533	99733
.039”	.125”	.117”	1.5”	99034	99234	99534	99734
.040”	.125”	.120”	1.5”	99035	99235	99535	99735
.041”	.125”	.123”	1.5”	99036	99236	99536	99736
.042”	.125”	.126”	1.5”	99037	99237	99537	99737
.043”	.125”	.129”	1.5”	99038	99238	99538	99738
.044”	.125”	.132”	1.5”	99039	99239	99539	99739
.045”	.125”	.135”	1.5”	99040	99240	99540	99740
.046”	.125”	.138”	1.5”	99041	99241	99541	99741
.047”	.125”	.141”	1.5”	99042	99242	99542	99742
.048”	.125”	.144”	1.5”	99043	99243	99543	99743
.049”	.125”	.147”	1.5”	99044	99244	99544	99744
.050”	.125”	.150”	1.5”	99045	99245	99545	99745
.051”	.125”	.153”	1.5”	99046	99246	99546	99746
.052”	.125”	.156”	1.5”	99047	99247	99547	99747



TOLERANCES $d_1 = {}^{+.0005}_{-.0005}$ | $d_2 = {}^{-.0001}_{-.0004}$

Cutting Dia. d_1	Shank Dia. d_2	LOC l_1	OAL l_2	2 Flute Square End	2 Flute Ball End	4 Flute Square End	4 Flute Ball End
.053”	.125”	.159”	1.5”	99048	99248	99548	99748
.054”	.125”	.162”	1.5”	99049	99249	99549	99749
.055”	.125”	.165”	1.5”	99050	99250	99550	99750
.056”	.125”	.168”	1.5”	99051	99251	99551	99751
.057”	.125”	.171”	1.5”	99052	99252	99552	99752
.058”	.125”	.174”	1.5”	99053	99253	99553	99753
.059”	.125”	.177”	1.5”	99054	99254	99554	99754
.060”	.125”	.180”	1.5”	99055	99255	99555	99755
.061”	.125”	.183”	1.5”	99056	99256	99556	99756
.062”	.125”	.186”	1.5”	99057	99257	99557	99757
.063”	.125”	.189”	1.5”	99058	99258	99558	99758
.064”	.125”	.192”	1.5”	99059	99259	99559	99759
.065”	.125”	.195”	1.5”	99060	99260	99560	99760
.066”	.125”	.198”	1.5”	99061	99261	99561	99761
.067”	.125”	.201”	1.5”	99062	99262	99562	99762
.068”	.125”	.204”	1.5”	99063	99263	99563	99763
.069”	.125”	.207”	1.5”	99064	99264	99564	99764
.070”	.125”	.210”	1.5”	99065	99265	99565	99765
.071”	.125”	.213”	1.5”	99066	99266	99566	99766
.072”	.125”	.216”	1.5”	99067	99267	99567	99767
.073”	.125”	.219”	1.5”	99068	99268	99568	99768
.074”	.125”	.222”	1.5”	99069	99269	99569	99769
.075”	.125”	.225”	1.5”	99070	99270	99570	99770
.076”	.125”	.228”	1.5”	99071	99271	99571	99771
.077”	.125”	.231”	1.5”	99072	99272	99572	99772
.078”	.125”	.234”	1.5”	99073	99273	99573	99773
.079”	.125”	.237”	1.5”	99074	99274	99574	99774
.080”	.125”	.240”	1.5”	99075	99275	99575	99775
.081”	.125”	.243”	1.5”	99076	99276	99576	99776
.082”	.125”	.246”	1.5”	99077	99277	99577	99777

Cutting Dia. d_1	Shank Dia. d_2	LOC l_1	OAL l_2	2 Flute Square End	2 Flute Ball End	4 Flute Square End	4 Flute Ball End
.083”	.125”	.249”	1.5”	99078	99278	99578	99778
.084”	.125”	.252”	1.5”	99079	99279	99579	99779
.085”	.125”	.255”	1.5”	99080	99280	99580	99780
.086”	.125”	.258”	1.5”	99081	99281	99581	99781
.087”	.125”	.261”	1.5”	99082	99282	99582	99782
.088”	.125”	.264”	1.5”	99083	99283	99583	99783
.089”	.125”	.267”	1.5”	99084	99284	99584	99784
.090”	.125”	.270”	1.5”	99085	99285	99585	99785
.091”	.125”	.273”	1.5”	99086	99286	99586	99786
.092”	.125”	.276”	1.5”	99087	99287	99587	99787
.093”	.125”	.279”	1.5”	99088	99288	99588	99788
.094”	.125”	.282”	1.5”	99089	99289	99589	99789
.095”	.125”	.285”	1.5”	99090	99290	99590	99790
.096”	.125”	.288”	1.5”	99091	99291	99591	99791
.097”	.125”	.291”	1.5”	99092	99292	99592	99792
.098”	.125”	.294”	1.5”	99093	99293	99593	99793
.099”	.125”	.297”	1.5”	99094	99294	99594	99794
.100”	.125”	.300”	1.5”	99095	99295	99595	99795
.101”	.125”	.303”	1.5”	99096	99296	99596	99796
.102”	.125”	.306”	1.5”	99097	99297	99597	99797
.103”	.125”	.309”	1.5”	99098	99298	99598	99798
.104”	.125”	.312”	1.5”	99099	99299	99599	99799
.105”	.125”	.315”	1.5”	99100	99300	99600	99800
.106”	.125”	.318”	1.5”	99101	99301	99601	99801
.107”	.125”	.321”	1.5”	99102	99302	99602	99802
.108”	.125”	.324”	1.5”	99103	99303	99603	99803
.109”	.125”	.327”	1.5”	99104	99304	99604	99804
.110”	.125”	.330”	1.5”	99105	99305	99605	99805
.115”	.125”	.345”	1.5”	99106	99306	99606	99806
.120”	.125”	.360”	1.5”	99107	99307	99607	99807



SPEED & FEED GUIDE

Micro Series

AISI Standard	Material Group	Material Hardness	Cut Type	Cutting Speed SFM	Recommended Feed Per Tooth							
					.005"-.015"	.016"-.030"	.031"-.045"	.046"-.060"	.061"-.075"	.076"-.090"	.091" .105"	.106" .125"
Free Machining & Low Carbon Steels 1008, 1010, 1018, 1020, 1025, 1118	PP1	< 175 BHN	S	210	0.0004"	0.0004"	0.0005"	0.0005"	0.0006"	0.0006"	0.0007"	0.0007"
			P	420	0.0004"	0.0004"	0.0005"	0.0005"	0.0006"	0.0006"	0.0007"	0.0007"
Medium & High Carbon Steels 1030, 1040, 1050, 1080, 1525, 1541, 1551	P2		S	175	0.0003"	0.0003"	0.0004"	0.0004"	0.0005"	0.0005"	0.0006"	0.0006"
			P	170	0.0003"	0.0003"	0.0004"	0.0004"	0.0005"	0.0005"	0.0006"	0.0006"
Easy to machine Alloy Steels & Tool Steels 4130, 4140, A, D, H, L, M, O, S, T, P and W Series	P3	< 35 HRc	S	175	0.0002"	0.0002"	0.0003"	0.0003"	0.0004"	0.0004"	0.0005"	0.0005"
			P	350	0.0002"	0.0002"	0.0003"	0.0003"	0.0004"	0.0004"	0.0005"	0.0005"
Difficult to machine Alloy Steels & Tool Steels 4130, 4140, A, D, H, L, M, O, S, T, P and W Series	P4	> 35 HRc	S	140	0.0002"	0.0002"	0.0003"	0.0003"	0.0004"	0.0004"	0.0005"	0.0005"
			P	250	0.0002"	0.0002"	0.0003"	0.0003"	0.0004"	0.0004"	0.0005"	0.0005"
Ferritic, Martensitic & PH Stainless Steels 410, 416, 416F, 420F, 15-5 PH, 17-4 PH, 13-8 PH	P5	< 35 HRc	S	125	0.0002"	0.0002"	0.0003"	0.0003"	0.0004"	0.0004"	0.0005"	0.0005"
			P	350	0.0002"	0.0002"	0.0003"	0.0003"	0.0004"	0.0004"	0.0005"	0.0005"
Easy to machine Austenitic Stainless Steels 200, 201, 202, 219, 301, 302, 303, 304, 304L	M1	< 28 HRc	S	140	0.0002"	0.0002"	0.0003"	0.0003"	0.0004"	0.0004"	0.0005"	0.0005"
			P	350	0.0002"	0.0002"	0.0003"	0.0003"	0.0004"	0.0004"	0.0005"	0.0005"
Difficult Austenitic Stainless Steels 310, 314, 316, 316L, 317, 321, 347, 384	M2	> 28 HRc	S	140	0.0002"	0.0002"	0.0003"	0.0003"	0.0004"	0.0004"	0.0005"	0.0005"
			P	350	0.0002"	0.0002"	0.0003"	0.0003"	0.0004"	0.0004"	0.0005"	0.0005"
Grey Cast Iron	K1	< 250 BHN	S	175	0.0004"	0.0004"	0.0005"	0.0005"	0.0008"	0.0008"	0.0010"	0.0010"
			P	550	0.0004"	0.0004"	0.0005"	0.0005"	0.0008"	0.0008"	0.0010"	0.0010"
Ductile & Malleable Cast Iron	K2	< 250 BHN	S	140	0.0004"	0.0004"	0.0005"	0.0005"	0.0006"	0.0006"	0.0007"	0.0007"
			P	350	0.0004"	0.0004"	0.0005"	0.0005"	0.0006"	0.0006"	0.0007"	0.0007"
Iron-Based Heat Resistant Alloys A-286, Discaloy, Incoloy 801	S1		S	115	0.0001"	0.0001"	0.0002"	0.0002"	0.0003"	0.0003"	0.0004"	0.0004"
			P	140	0.0001"	0.0001"	0.0002"	0.0002"	0.0003"	0.0003"	0.0004"	0.0004"
Cobalt-Based Heat Resistant Alloys Stellite, AiResist 213, Haynes 25, 188	S2		S	55	0.0001"	0.0001"	0.0002"	0.0002"	0.0003"	0.0003"	0.0004"	0.0004"
			P	85	0.0001"	0.0001"	0.0002"	0.0002"	0.0003"	0.0003"	0.0004"	0.0004"
Nickel-Based Heat Resistant Alloys Astroloy, Hastelloy, Inconel, Rene 41	S3		S	75	0.0001"	0.0001"	0.0002"	0.0002"	0.0003"	0.0003"	0.0004"	0.0004"
			P	115	0.0001"	0.0001"	0.0002"	0.0002"	0.0003"	0.0003"	0.0004"	0.0004"
Titanium Alloys 6Al-4V	S4		S	175	0.0002"	0.0002"	0.0003"	0.0003"	0.0004"	0.0004"	0.0005"	0.0005"
			P	350	0.0002"	0.0002"	0.0003"	0.0003"	0.0004"	0.0004"	0.0005"	0.0005"

S = Slotting / P = Pocketing

FOR UNCOATED TOOLS

SPEED & FEED GUIDE

For High Performance & General Purpose End Mills

			Feed (Inch / Tooth) End Mill							
NONFERROUS MATERIALS		**Speed SFM**	**1/8"**	**3/16"**	**1/4"**	**3/8"**	**1/2"**	**5/8"**	**3/4"**	**1"**
Aluminum + Aluminum Alloys 6061-T6, 7075-T6		800 - 2000	.001	.002	.002	.003	.004	.005	.006	.007
Copper / Copper Alloys Yellow Brass, High Lead Brass, Red Brass		800 - 1000	.001	.001	.002	.0025	.003	.004	.004	.005
Magnesium DieCast, Extruded		1000 - 1500	.001	.002	.002	.003	.004	.006	.008	.009
Plastic, Acrylics, Phenolics Polysulfone		300 - 600	.001	.002	.003	.004	.006	.008	.010	.015
Carbon, Graphites Carbon Graphites		200 - 400	.003	.004	.006	.008	.010	.012	.015	.020
STEELS		**Speed SFM**	**1/8"**	**3/16"**	**1/4"**	**3/8"**	**1/2"**	**5/8"**	**3/4"**	**1"**
Tool Steels A2, 01, D2, H-13, P20	<32 Rc	230	.0003	.0005	.001	.0015	.002	.003	.0035	.004
	<45 Rc	175	.0003	.0005	.001	.0015	.002	.003	.0035	.004
	>45 Rc	100	.0003	.0005	.001	.0015	.002	.003	.0035	.004
"Chrome-Nickel" Moly Steels 4330, 4340		225	.0003	.0005	.001	.0015	.002	.003	.0035	.004
"Chrome-Nickel" Alloy Steels 4130, 4140, 4150		250	.0003	.0005	.001	.0015	.002	.003	.0035	.004
Carbon Steels 1010, 1018, 1020, 1045		300	.0003	.0005	.001	.0015	.002	.003	.0035	.004
STAINLESS STEEL		**Speed SFM**	**1/8"**	**3/16"**	**1/4"**	**3/8"**	**1/2"**	**5/8"**	**3/4"**	**1"**
Precipitation 13-8 PH, 15-5 PH, 17-4 PH, 304L, 316L		200	.0002	.0003	.0005	.001	.002	.0025	.003	.0035
Austensitic (difficult to machine) 304L, 316L		200	.0002	.0003	.0005	.001	.002	.0025	.003	.0035
Austensitic (easy to machine) 302, 303, 304		250	.0003	.0004	.0005	.001	.002	.0025	.003	.0035
Martensitic 403, 410, 416		250	.0003	.0004	.0005	.001	.002	.0025	.003	.0035
CAST IRON		**Speed SFM**	**1/8"**	**3/16"**	**1/4"**	**3/8"**	**1/2"**	**5/8"**	**3/4"**	**1"**
Ductile Iron Ductile Cast iron		250	.0005	.001	.0015	.002	.002	.003	.0035	.004
Cast Iron Grey Cast Iron		300	.0005	.001	.0015	.002	.002	.003	.0035	.004
HIGH TEMP ALLOYS		**Speed SFM**	**1/8"**	**3/16"**	**1/4"**	**3/8"**	**1/2"**	**5/8"**	**3/4"**	**1"**
Cobalt, Nickel, Iron-Based Alloys Haynes 25, Inconel 625, 718, Hastelloy, Waspalloy, A-286		60	.0002	.0003	.0005	.0008	.0012	.0017	.0022	.0027
Titanium Alloys Commercially Pure, 6AL-4V		180	.00025	.0005	.001	.0015	.002	.0025	.003	.0035

NOTE: The above suggested cutting speeds are for uncoated tools. When using coated tools, please use the following formula for the appropriate speed (SFM). Example: When machining "Carbon Steel" (1010, 1018…) with TiCN coating, use 300 SFM x 1.40 (40% add-on) = 420 SFM. Likewise, when using AlTiN coating, use a 1.5 (50% add-on) multiplier to the recommended uncoated SFM.

TROUBLESHOOTING GUIDE

PROBLEM	CAUSE	SOLUTION
Premature Wear	• Cutting speed is too fast • Hard/Abrasive work-piece material • Speed and/or feed is too light • Helix angle is incorrect for application • Re-cutting chips	• Decrease spindle speed • Use coatings (TiCN, AlTiN) • Increase speed and/or feed • Select tool with appropriate helix angle • Adjust speed & feed, axial and/or radial D.O.C., Increase coolant pressure and/or air to clear chips.
Edge Chipping	• Feed rate too aggressive • Feed rate too aggressive on initial cut • D.O.C. too aggressive • Tool rigidity • Work-piece rigidity • Machine tool rigidity	• Reduce feed rate • Reduce feed rate on initial pass • Decrease axial and/or radial D.O.C. • Change tool holder, hold shank deeper and/or use shorter tool • Re-fixture work-piece and/or improve setup • Check spindle for run-out
Breakage	• Feed rate too aggressive • D.O.C. too aggressive • Excessive tool overhang • Chip packing • Excessive Wear	• Reduce feed rate • Reduce axial and/or radial D.O.C. • Hold shank deeper, use shorter end mill • Adjust speed and/or feed, select end mill with fewer flutes, increase coolant pressure and/or air • Re-grind tool sooner
Chip Packing	• Speed and/or feed too aggressive • Flute gullet too small for chips • Insufficient coolant volume and/or pressure	• Reduce speed and/or feed • Use end mill with less flutes • Increase coolant and/or air pressure, reposition nozzle to point of cut
Chattering	• Speed and/or feed too aggressive • Tool rigidity • Work-piece rigidity • Machine tool rigidity • D.O.C. too aggressive • Wrong tool geometry	• Reduce speed and/or feed • Change tool holder, hold shank deeper and/or use shorter tool • Re-fixture work-piece and/or improve setup • Check spindle for run-out • Reduce axial and/or radial D.O.C. • Use Whisperkut™ Type end mill
Burrs	• Incorrect speed & feed • Helix angle is incorrect for application • Primary cutting edge(s) are dull	• Adjust speed & feed • Change to correct helix angle, use climb milling • Re-grind tool sooner
Poor Finish	• Feed rate too aggressive • Speed is too slow • D.O.C. too aggressive • Excessive wear	• Reduce feed rate • Increase spindle speed (RPM) • Reduce axial and/or radial D.O.C. • Re-grind tool sooner
Poor Dimensional Accuracy	• D.O.C. too aggressive • Tool Rigidity • Machine tool rigidity	• Reduce axial and/or radial D.O.C. • Use tool with more flutes • Check, inspect & repair machine tool, tool holder and fixtures

TERMS & CONDITIONS

PAYMENT TERMS: Our terms are 1% 10, Net 30 days. To qualify for a cash discount, all checks must be dated and postmarked within 10 days of our invoice date. Discounts are for merchandise only and do not apply to shipping or handling charges. Accounts that are past due are subject to credit hold. For additional information on our payment terms, please contact our Accounting Department.

TEST TOOLS: All test tool orders must be ordered through one of our technical staff representatives, and are subject to the terms of our Guaranteed Trial Order (G.T.O.) policy. Dura-Mill will not be responsible for the performance of any test tool without obtaining proper application rec-ommendations. For additional information regarding our G.T.O. test policy, please contact our Technical Sales Department.

BLANKET ORDERS: All blanket orders will have to be reviewed and negotiated prior to approval. The maximum "term" for blanket orders will be determined at the time of the request and must specify monthly release dates. We will not accept orders with "open" release dates. Blanket orders for Specials or Modified Standards are non-cancelable. This includes non-stocked coatings, flats, or any alterations.

RETURNED GOODS: Distributors wishing to return product must first contact our customer service department to obtain a "Return Material Authorization" (RMA) prior to returning any products. Dura-Mill will allow the return of "slow moving inventory" for standard catalog items once a year. Return of products that have been in distributors inventory for more than one (1) year will not be permitted. All standard products must be in resalable condition, and properly packaged in their original containers. Shipping and related (insurance) costs are to be prepaid by the distributor. Distributor will receive a credit for authorized returns at the invoiced prices for the items returned less a twenty (20) percent restocking charge. A credit will be issued only when the tools have been received, inspected and determined to be in resalable condition. When the return is accompanied by a replacement order of equal or greater value, the restocking charge will be waived. Return of products in quantities that are unusually large compared to Dura-Mill's sales of that specific item will not be allowed. Return of test tools must be accompanied with a completed "Tool Performance Report".

SPECIAL TOOLS: Orders for special tools, non-stock standards, or modified tools are non-cancelable and will not be allowed to be returned. A confirming purchase order is required prior to releasing tools to production. In accordance with industry standards for specials, a 10% over or under the quantity ordered will apply unless otherwise stated.

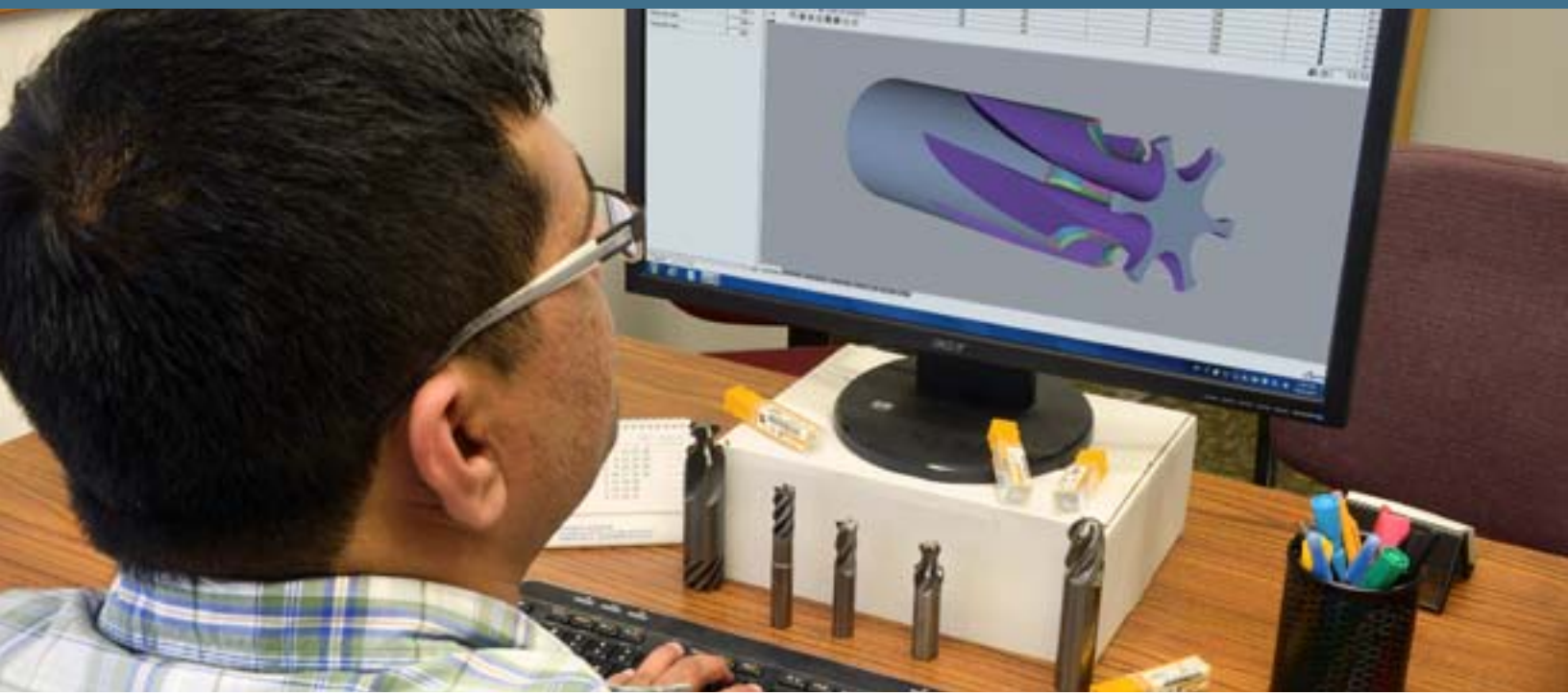
PRODUCT WARRANTY: We guarantee our products will conform to the specifications listed on customer blueprints, orders, and quotation requests. Dimensions specifications, and tolerances not listed will be furnished to the current Dura-Mill manufacturing standards. Our warranty is limited to the repair, replacement, or full credit for any tools that are not within specifications at our option. Dura-Mill will not be responsible for the performance of, nor will we accept for return, any product that has been modified or altered in any way.

FREIGHT TERMS: Our freight terms are F.O.B. Shipping Point. For additional information concerning our shipping policy, please contact our Customer Service staff at 1-800-444-6455.

Special Cutting Tools

WE OFFER DIVERSE SPECIAL CUTTING TOOL MANUFACTURING CAPABILITY.

YOUR DESIGN OR OUR OWN, WE PROVIDE TOP QUALITY SPECIALS FOR ALL YOUR APPLICATION NEEDS.



NOTES

Dedicated to providing innovative cutting tool solutions serving the following industries:

AEROSPACE

DEFENSE

MACHINE TOOL

MEDICAL

MOLD & DIE

POWER GENERATION

Dura-Mill, Inc.
16 Old Stonebreak Road • Malta, NY 12020
(800) 444-6455 or (518) 899-2255
Fax: (518) 899-7869
duramill.com