BULLDOG CUTTING TOOLS

HIGH PERFORMANCE END MILL

126 Jackson St. Red Bud, IL 62278
Toll Free Phone: 1 (844) 441-5624 Fax: (618) 282-2831 sales@bulldogcut.com

PROUDLY MADE IN THE USA

SAFETY PRECAUTIONS

Cutting tools may shatter or break, government regulations require the use of safety glasses and other safety equipment at all times in the vicinity of cutting tool use. Additionally, the grinding of cutting tools produces dust that may be hazardous to your health, ensure that proper ventilation is used at all times.

OUR POLICIES

Bulldog Cutting Tools guarantees against any manufacturers defaults in workmanship or materials.

Terms of payment - 2% 10 days net 30

Minimum order - 50.00

Returns - Full credit will be issued for all unused tools within 30 days of the purchase date. All returns must be accompanied by a company issued Return Merchandise Authorization (RMA) number. ALL CUSTOM CARBIDE ORDERS ARE MADE TO ORDER AND ARE NON RETURNABLE.

RECYCLING

Tungsten carbide is a valuable and limited resource. We ask that you recycle your used carbide to reduce the impact on our environment and ensure the longevity of the tungsten resource.

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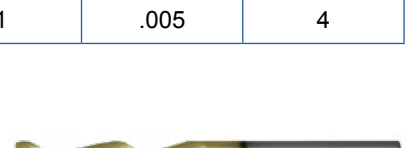
VARIABLE FLUTE FOR ALUMINUM

STANDARD

Variable Flute for Aluminum (VFA)

SOLID FLUTE

Part # 2 Flute	Part # 3 Flute	Tool Dia	LOC	Shank	Corner Rad	OAL
18VARI-ALX2	18VARI-ALX3	1/8	1/2	1/8	.005	1 1/2
316VARI-ALX2	316VARI-ALX3	3/16	5/8	3/16	.005	2
14VARI-ALX2	14VARI-ALX3	1/4	3/4	1/4	.005	2 1/2
516VARI-ALX2	516VARI-ALX3	5/16	3/4	5/16	.005	2 1/2
38VARI-ALX2	38VARI-ALX3	3/8	1	3/8	.005	2 1/2
716VARI-ALX2	716VARI-ALX3	7/16	1	7/16	.005	2 1/2
12VARI-ALX2	12VARI-ALX3	1/2	1 1/4	1/2	.005	3
58VARI-ALX2	58VARI-ALX3	5/8	1 5/8	5/8	.005	3 1/2
34VARI-ALX2	34VARI-ALX3	3/4	1 3/4	3/4	.005	4
1VARI-ALX2	1VARI-ALX3	1	1 3/4	1	.005	4



ROUGHER/FINISHER GEOMETRY (CHIPBREAKER)

Part # 2 Flute	Part # 3 Flute	Tool Dia	LOC	Shank	Corner Rad	OAL
18VARI-ALX2-RF	18VARI-ALX3-RF	1/8	1/2	1/8	.005	1 1/2
316VARI-ALX2-RF	316VARI-ALX3-RF	3/16	5/8	3/16	.005	2
14VARI-ALX2-RF	14VARI-ALX3-RF	1/4	3/4	1/4	.005	2 1/2
516VARI-ALX2-RF	516VARI-ALX3-RF	5/16	3/4	5/16	.005	2 1/2
38VARI-ALX2-RF	38VARI-ALX3-RF	3/8	1	3/8	.005	2 1/2
12VARI-ALX2-RF	12VARI-ALX3-RF	1/2	1 1/4	1/2	.005	3
58VARI-ALX2-RF	58VARI-ALX3-RF	5/8	1 5/8	5/8	.005	3 1/2
34VARI-ALX2-RF	34VARI-ALX3-RF	3/4	1 3/4	3/4	.005	4
1VARI-ALX2-RF	1VARI-ALX3-RF	1	1 3/4	1	.005	4

VARIABLE FLUTE FOR ALUMINUM

STUB

Variable Flute for Aluminum (VFA)

SOLID FLUTE

Part # 3 Flute	Tool Dia	LOC	Shank	Corner Rad	OAL
18VARI-ALX3-STUB	1/8	1/4	1/8	.005	1 1/2
316VARI-ALX3-STUB	3/16	5/16	3/16	.005	2
14VARI-ALX3-STUB	1/4	3/8	1/4	.005	2
516VARI-ALX3-STUB	5/16	3/8	5/16	.005	2
38VARI-ALX3-STUB	3/8	1/2	3/8	.005	2
12VARI-ALX3-STUB	1/2	3/4	1/2	.005	3

VARIABLE FLUTE ENDMILLS FOR ALUMINUM

A unique geometry of variable flutes eliminating vibration and harmonics.
A highly polished flute gullet improves chip evacuation.
A .005 corner radius extends tool life and
Zirconium Nitride (Zrn) coating adds hardness and lubricity.

This design can be used to rough, finish, slot or profile. This geometry allows heavy chip load per tooth for maximum material removal and unmatched performance in aluminum, brass, copper and plastics.

ALL TOOLS ARE MADE FROM PREMIUM AMERICAN CARBIDE BLANKS AND GROUND IN THE USA
EXPERIENCE THE DIFFERENCE IN AMERICAN MADE

VARIABLE FLUTE FOR ALUMINUM

LONG LENGTH

SOLID FLUTE

Part # 2 Flute	Part # 3 Flute	Tool Dia	LOC	Shank	Corner Rad	OAL
14VARI-ALX2-L	14VARI-ALX3-L	1/4	1 1/4	1/4	.005	3
516VARI-ALX2-L	516VARI-ALX3-L	5/16	1 3/8	5/16	.005	3
38VARI-ALX2-L	38VARI-ALX3-L	3/8	1 1/2	3/8	.005	3 1/2
12VARI-ALX2-L	12VARI-ALX3-L	1/2	2	1/2	.005	4
58VARI-ALX2-L	58VARI-ALX3-L	5/8	2 3/8	5/8	.005	5
34VARI-ALX2-L	34VARI-ALX3-L	3/4	2 1/2	3/4	.005	5
1VARI-ALX2-L	1VARI-ALX3-L	1	3	1	.005	6

LONG LENGTH ROUGHER/FINISHER

ROUGHER/FINISHER GEOMETRY (CHIPBREAKER)

Part # 2 Flute	Part # 3 Flute	Tool Dia	LOC	Shank	Corner Rad	OAL
14VARI-ALX2-LRF	14VARI-ALX3-LRF	1/4	1 1/4	1/4	.005	3
516VARI-ALX2-LRF	516VARI-ALX3-LRF	5/16	1 3/8	5/16	.005	3
38VARI-ALX2-LRF	38VARI-ALX3-LRF	3/8	1 1/2	3/8	.005	3 1/2
12VARI-ALX2-LRF	12VARI-ALX3-LRF	1/2	2	1/2	.005	4
58VARI-ALX2-LRF	58VARI-ALX3-LRF	5/8	2 3/8	5/8	.005	5
34VARI-ALX2-LRF	34VARI-ALX3-LRF	3/4	2 1/2	3/4	.005	5
1VARI-ALX2-LRF	1VARI-ALX3-LRF	1	3	1	.005	6

VARIABLE FLUTE FOR ALUMINUM

SQUARE CORNER

SOLID FLUTE

Part # 2 Flute	Part # 3 Flute	Tool Dia	LOC	Shank	OAL
14VARI-ALX2-SQ	14VARI-ALX3-SQ	1/4	3/4	1/4	2 1/2
516VARI-ALX2-SQ	516VARI-ALX3-SQ	5/16	3/4	5/16	2 1/2
38VARI-ALX2-SQ	38VARI-ALX3-SQ	3/8	1	3/8	2 1/2
716VARI-ALX2-SQ	716VARI-ALX3-SQ	7/16	1	7/16	3
12VARI-ALX2-SQ	12VARI-ALX3-SQ	1/2	1 1/4	1/2	3
58VARI-ALX2-SQ	58VARI-ALX3-SQ	5/8	1 5/8	5/8	3 1/2
34VARI-ALX2-SQ	34VARI-ALX3-SQ	3/4	1 3/4	3/4	4
1VARI-ALX2-SQ	1VARI-ALX3-SQ	1	1 3/4	1	4

Tolerance – Diameter: +.000/-.002 Shank: -.0001/-.0003 Made from Submicrograin Carbide

VARIABLE FLUTE FOR ALUMINUM

BALLNOSE

Ideal for machining radius configurations and 3D milling

SOLID FLUTE

Part # 2 Flute	Tool Dia	LOC	Shank	OAL
18VARI-ALX2-BN	1/8	1/2	1/8	1 1/2
316VARI-ALX2-BN	3/16	5/8	3/16	2
14VARI-ALX2-BN	1/4	3/4	1/4	2 1/2
516VARI-ALX2-BN	5/16	3/4	5/16	2 1/2
38VARI-ALX2-BN	3/8	1	3/8	2 1/2
12VARI-ALX2-BN	1/2	1 1/4	1/2	3
58VARI-ALX2-BN	5/8	1 5/8	5/8	3 1/2
34VARI-ALX2-BN	3/4	1 3/4	3/4	4
1VARI-ALX2-BN	1	1 3/4	1	4

BALLNOSE ROUGHER/FINISHER (CHIPBREAKER)

Part # 2 Flute	Tool Dia	LOC	Shank	OAL
18VARI-ALX2-BNRF	1/8	1/2	1/8	1 1/2
316VARI-ALX2-BNRF	3/16	5/8	3/16	2
14VARI-ALX2-BNRF	1/4	3/4	1/4	2 1/2
516VARI-ALX2-BNRF	5/16	3/4	5/16	2 1/2
38VARI-ALX2-BNRF	3/8	1	3/8	2 1/2
12VARI-ALX2-BNRF	1/2	1 1/4	1/2	3
58VARI-ALX2-BNRF	5/8	1 5/8	5/8	3 1/2
34VARI-ALX2-BNRF	3/4	1 3/4	3/4	4
1VARI-ALX2-BNRF	1	1 3/4	1	4

VFA TECHNICAL DATA

VARIABLE FLUTE FOR ALUMINUM SPEEDS AND FEEDS

Slotting = 1 x Tool Diameter Profiling = 1/2 x Tool Diameter

Materials Diameter	Aluminum (1600-2000 SFM)	Copper Alloys (800-1200 SFM)	Brass/Bronze (800-1500 SFM)	Plastics (1200-1600 SFM)
1/4	.003 ipt	.003 ipt	.003 ipt	.006 ipt
5/16	.004 ipt	.004 ipt	.004 ipt	.008 ipt
3/8	.005 ipt	.005 ipt	.005 ipt	.010 ipt
1/2	.006 ipt	.006 ipt	.006 ipt	.012 ipt
5/8	.007 ipt	.007 ipt	.007 ipt	.014 ipt
3/4	.008 ipt	.008 ipt	.008 ipt	.016 ipt
1	.010 ipt	.010 ipt	.010 ipt	.020 ipt

ipt = inches per tooth

Coolant blast is essential.
Tools perform best when balanced.
These approximate numbers are a good starting point.

4 VARIABLE FLUTES FOR STEEL

STANDARD

Variable Flute For Steel (VFS). The heavy duty core construction combined with variable helix variable index design creates a rigid tool that runs virtually chatter free. Tools are center cutting, have .0005 - .0015 edge prep and AlTiN Coated

Part # 4 Flute	Cutter Dia	LOC	Shank	Corner Rad	OAL
18VARI-ST	1/8	3/8	1/8	.010-.015	1 1/2
532VARI-ST	5/32	7/16	3/16	.010-.015	2
316VARI-ST	3/16	7/16	3/16	.010-.015	2
732VARI-ST	7/32	7/16	1/4	.015-.020	2 1/2
14VARI-ST	1/4	5/8	1/4	.015-.020	2 1/2
932VARI-ST	9/32	5/8	5/16	.015-.020	2 1/2
516VARI-ST	5/16	3/4	5/16	.015-.020	2 1/2
38VARI-ST	3/8	7/8	3/8	.015-.020	2 1/2
716VARI-ST	7/16	1	7/16	.015-.020	2 3/4
12VARI-ST	1/2	1	1/2	.025-.030	3
58VARI-ST	5/8	1 1/4	5/8	.030-.035	3 1/2
34VARI-ST	3/4	1 1/2	3/4	.030-.035	4
1VARI-ST	1	1 1/2	1	.030-.035	4

SQUARE CORNER

Part # 4 Flute	Cutter Dia	LOC	Shank	OAL
14VARI-ST-SQ	1/4	5/8	1/4	2 1/2
516VARI-ST-SQ	5/16	3/4	5/16	2 1/2
38VARI-ST-SQ	3/8	7/8	3/8	2 1/2
716VARI-ST-SQ	7/16	1	7/16	2 3/4
12VARI-ST-SQ	1/2	1	1/2	3
58VARI-ST-SQ	5/8	1 1/4	5/8	3 1/2
34VARI-ST-SQ	3/4	1 1/2	3/4	4
1VARI-ST-SQ	1	1 1/2	1	4

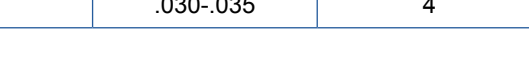
4 VARIABLE FLUTES FOR STEEL

STUB

Shorter flute length adds extra rigidity

Part # 4 Flute	Cutter Dia	LOC	Shank	Corner Rad	OAL
18VARI-ST-STUB	1/8	7/32	1/8	.005-.010	1.5
532VARI-ST-STUB	5/32	9/32	3/16	.005-.010	2
316VARI-ST-STUB	3/16	5/16	3/16	.010-.015	2
732VARI-ST-STUB	7/32	5/16	1/4	.015-.020	2
14VARI-ST-STUB	1/4	3/8	1/4	.015-.020	2
932VARI-ST-STUB	9/32	3/8	5/16	.015-.020	2
516VARI-ST-STUB	5/16	3/8	5/16	.015-.020	2
38VARI-ST-STUB	3/8	1/2	3/8	.015-.020	2
12VARI-ST-STUB	1/2	5/8	1/2	.025-.030	2 1/2
58VARI-ST-STUB	5/8	3/4	5/8	.030-.035	3
34VARI-ST-STUB	3/4	7/8	3/4	.030-.035	4
1VARI-ST-STUB	1	1	1	.030-.035	4

LONG VFS



Part # 4 Flute	Cutter Dia	LOC	Shank	Corner Rad	OAL
14VARI-ST-L	1/4	1 1/4	1/4	.015-.020	3
38VARI-ST-L	3/8	1 1/4	3/8	.015-.020	3
12VARI-ST-L	1/2	2	1/2	.025-.030	4
58VARI-ST-L	5/8	2 1/4	5/8	.030-.035	5
34VARI-ST-L	3/4	2 1/4	3/4	.030-.035	5

Tolerance – Diameter: +.000/-.002 Shank: -.0001/-.0003 Made from Submicrograin Carbide

4 VARIABLE FLUTES FOR STEEL

BALLNOSE VFS

Ideal for machining radius configurations and 3D milling

Part # 4 Flute	Cutter Dia	LOC	Shank	OAL
18MTMXB	1/8	3/8	1/8	1 1/2
532MTMXB	5/32	7/16	3/16	2
316MTMXB	3/16	7/16	3/16	2
732MTMXB	7/32	7/16	1/4	2 1/2
14MTMXB	1/4	5/8	1/4	2 1/2
932MTMXB	9/32	5/8	5/16	2 1/2
516MTMXB	5/16	3/4	5/16	2 1/2
38MTMXB	3/8	7/8	3/8	2 1/2
716MTMXB	7/16	1	7/16	2 3/4
12MTMXB	1/2	1	1/2	3
58MTMXB	5/8	1 1/4	5/8	3 1/2
34MTMXB	3/4	1 1/2	3/4	4
1MTMXB	1	1 1/2	1	4

Tolerance – Diameter: +.000/-.002 Shank: -.0001/-.0003 Made from Submicrograin Carbide

LONG REACH VFS

Part # 4 Flute	Cutter Dia	LOC	Shank	Corner Rad	OAL
14VARI-ST-2L	1/4	5/8	1/4	.015-.020	4
38VARI-ST-2L	3/8	7/8	3/8	.015-.020	4
12VARI-ST-2L	1/2	1	1/2	.025-.030	6
58VARI-ST-2L	5/8	1 1/4	5/8	.030-.035	6
34VARI-ST-2L	3/4	1 1/2	3/4	.030-.035	6

4 VARIABLE FLUTES FOR STEEL TECHNICAL DATA

Profile Width = 1/4 x Diameter Slotting Depth = 1 x Diameter

Materials	Steel	Cast Iron	Tool Steel	Steel	Cast Iron	Tool Steel
Diameter	600-750 SFM	500-650 SFM	425-525 SFM	475-660 SFM	400-550 SFM	325-425 SFM
1/4	.0014	.0014	.0013	.0012	.0013	.0011
5/16	.0017	.0017	.0016	.0013	.0016	.0013
3/8	.002	.0022	.002	.0016	.002	.0015
1/2	.0026	.0029	.0025	.0023	.0025	.002
5/8	.0028	.0032	.0028	.0024	.0028	.0022
3/4	.0032	.0036	.0031	.0025	.0031	.0025
1	.0038	.0043	.0038	.0032	.0038	.0032

NOTE:

-These are approximate numbers, a good starting point.

-Coolant Blast is essential.

-Tools perform best when balanced.

WARNING – Due to the high metal removal rates of the VFS tools, it is necessary to make all work holding components as rigid as possible.

5 VARIABLE FLUTE SS

5 VARIABLE FLUTE FOR STAINLESS AND EXOTICS

The center cutting 5 flute variable helix cutter is designed for use in stainless steels and exotic materials. This cutter will reduce work hardening and impact resistance common to high strength materials. AlTiN coated

REGULAR LENGTH

Part # 5 Flute	Cutter Dia	LOC	Shank	Corner Rad	OAL
18VARI-SS	1/8	3/8	1/8	.010-.015	1 1/2
532VARI-SS	5/32	7/16	3/16	.010-.015	2
316VARI-SS	3/16	7/16	3/16	.010-.015	2
732VARI-SS	7/32	7/16	1/4	.015-.020	2 1/2
14VARI-SS	1/4	5/8	1/4	.015-.020	2 1/2
932VARI-SS	9/32	5/8	5/16	.015-.020	2 1/2
516VARI-SS	5/16	3/4	5/16	.015-.020	2 1/2
38VARI-SS	3/8	7/8	3/8	.015-.020	2 1/2
716VARI-SS	7/16	1	7/16	.015-.020	2 3/4
12VARI-SS	1/2	1	1/2	.025-.030	3
58VARI-SS	5/8	1 1/4	5/8	.030-.035	3 1/2
34VARI-SS	3/4	1 1/2	3/4	.030-.035	4
1VARI-SS	1	1 1/2	1	.030-.035	4

Tolerance – Diameter: +.000/-.002 Shank: -.0001/-.0003 Made from Submicrograin Carbide

5 VFSS FL STUB & TECHNICAL DATA

5 VARIABLE FLUTE FOR STAINLESS AND EXOTICS

The stub length offers increased rigidity which can improve performance and tool life

STUB LENGTH

Part # 5 Flute	Cut Dia	Shank	LOC	Corner Rad	OAL
18VARI-SS-STUB	1/8	1/8	7/32	.010-.015	1.5
532VARI-SS-STUB	5/32	3/16	9/32	.010-.015	2
316VARI-SS-STUB	3/16	3/16	5/16	.010-.015	2
732VARI-SS-STUB	7/32	1/4	5/16	.015-.020	2
14VARI-SS-STUB	1/4	1/4	3/8	.015-.020	2
932VARI-SS-STUB	9/32	5/16	3/8	.015-.020	2
516VARI-SS-STUB	5/16	5/16	3/8	.015-.020	2
38VARI-SS-STUB	3/8	3/8	1/2	.015-.020	2
716VARI-SS-STUB	7/16	7/16	5/8	.015-.020	2 1/2
12VARI-SS-STUB	1/2	1/2	5/8	.025-.030	3

ALWAYS USE FLOOD COOLANT

STARTING RECOMMENDED SPEEDS AND FEEDS

Profile

Radial Depth = .5 x Diameter
Axial Depth = 1 x Diameter

Slotting

Axial Depth = .5 x Diameter

Materials	Stainless 300 Series 304, 310, 316	Stainless 400 Series & Titanium	Stainless 15-5 17-4PH	Stainless 300 Series 304, 310, 316	Stainless 400 Series & Titanium	Stainless 15-5 17-4PH
Diameter	300 SFM	250 SFM	250 SFM	240 SFM	200 SFM	200 SFM
1/4	.001	.001	.001	.0008	.0008	.0008
5/16	.0015	.0015	.0014	.0012	.0012	.0011
3/8	.002	.002	,0019	.0016	.0016	.0015
1/2	.0025	.0025	.0022	.002	.002	.0018
5/8	.003	.003	.0027	.0025	.0025	.0022
3/4	.0035	.0035	.003	.0028	.0028	.0024
1	.0042	.0042	.004	.0034	.0034	.0032

HARDMILLING ENDMILLS

HARDMILLING

These End Mills utilize a thicker core, unique hard milling geometry, and nACo coating. nACo offers a high nanohardness, and hot hardness (1200 degrees Celsius). Non-center cutting 6 Flute. FOR STEELS ABOVE 50Rc IN HARDNESS ONLY

CORNER RADIUS 6 FLUTE

Part # 6 Flute	Tool Dia	LOC	Shank	Corner Rad	OAL
18-HRDML-RD	1/8	3/8	1/8	.010R	1 1/2
532-HRDML-RD	5/32	7/16	3/16	.010R	2
316-HRDML-RD	3/16	1/2	3/16	.010R	2
14-HRDML-RD	1/4	5/8	1/4	.010R	2 1/2
516-HRDML-RD	5/16	3/4	5/16	.010R	2 1/2
38-HRDML-RD	3/8	7/8	3/8	.010R	2 1/2
12-HRDML-RD	1/2	1	1/2	.020R	3
58-HRDML-RD	5/8	1 1/4	5/8	.020R	3 1/2
34-HRDML-RD	3/4	1 5/8	3/4	.030R	4

*** WARNING ***
FOR CUTTING STEELS ABOVE 50Rc IN HARDNESS ONLY
MATERIALS UNDER 50Rc WILL CLOG CUTTING FLUTES
AND RESULT IN CUTTER FAILURE

SQUARE CORNER 6 FLUTE

Part # 6 Flute	Tool Dia	LOC	Shank	OAL
18-HRDML-SQ	1/8	3/8	1/8	1 1/2
532-HRDML-SQ	5/32	7/16	3/16	2
316-HRDML-SQ	3/16	1/2	3/16	2
14-HRDML-SQ	1/4	5/8	1/4	2 1/2
516-HRDML-SQ	5/16	3/4	5/16	2 1/2
38-HRDML-SQ	3/8	7/8	3/8	2 1/2
12-HRDML-SQ	1/2	1	1/2	3
58-HRDML-SQ	5/8	1 1/4	5/8	3 1/2
34-HRDML-SQ	3/4	1 5/8	3/4	4

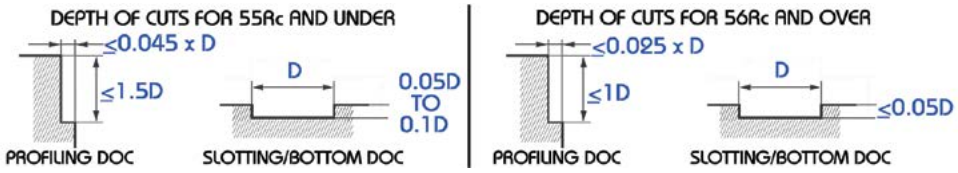
HARDMILL TECHNICAL DATA

HARDMILLING RECOMMENDATIONS

RUN HARDMILLS DRY WITH AIR BLAST OR OIL MIST
HARDMILLS ARE NOT CENTER CUTTING. DO NOT PLUNGE
THE HARDMILLS SHALLOW FLUTES ARE DESIGNED FOR HARDENED STEEL ABOVE 50Rc ONLY

Material	Hardened Steel (50-55HRC) AISI H13 ETC		Hardened Steel (55-60HRC) AISI A2 ETC		Hardened Steel (60-65HRC) AISI D2 ETC	
Dia. (Inch)	SFM	Chip Load (inch per tooth)	SFM	Chip Load (inch per tooth)	SFM	Chip Load (inch per tooth)
1/8 & 5/32	250 - 900	.0007 - .001	200 - 500	.0007 - .001	150 - 325	.0006 - .0008
3/16	250 - 900	.001 - .0015	200 - 500	.001 - .0015	150 - 325	.001 - .0014
1/4	250 - 800	.002 - .0025	200 - 500	.002 - .0025	150 - 300	.002 - .0024
5/16	250 - 800	.0025 - .003	250 - 500	.0025 - .003	150 - 250	.0020 - .003
3/8 & 1/2	300 - 850	.0030 - .004	300 - 500	.0030 - .004	150 - 250	.0030 - .004
5/8 & 3/4	350 - 800	.0030 - .004	350 - 500	.0030 - .004	150 - 250	.0030 - .004

HARDMILLS ARE NOT CENTER CUTTING. DO NOT PLUNGE
RUN HARDMILLS DRY WITH AIR BLAST OR OIL MIST



CARBIDE ROUGHERS

FINE PITCH ROUGHERS

Solid Carbide Fine Pitch Roughers are designed for maximum metal removal in all steel applications. AlTiN coated

STANDARD

Part # 4 Flute	Flute Dia	Tooth Pitch	LOC	OAL	# Flutes
31RUFF	3/16	.040	.625	2.0	3
14RUFF	1/4	.040	.750	2.5	4
51RUFF	5/16	.040	.875	2.5	4
38RUFF	3/8	.040	.875	2.5	4
12RUFF	1/2	.060	1.0	3.0	4
58RUFF	5/8	.060	1.25	3.5	4
34RUFF	3/4	.060	1.5	4.0	4
10RUFF	1	.060	1.5	4.0	4

LONG

Part # 4 Flute	Flute Dia	Tooth Pitch	LOC	OAL	# Flutes
31RUFF-L	3/16	.040	1.0	2.5	3
14RUFF-L	1/4	.040	1.5	4	4
51RUFF-L	5/16	.040	1.5	4	4
38RUFF-L	3/8	.040	1.75	4	4
12RUFF-L	1/2	.060	2	4	4
58RUFF-L	5/8	.060	2.5	5	4
34RUFF-L	3/4	.060	2.5	5	4
10RUFF-L	1	.060	2.5	5	4

CARBIDE ROUGHERS

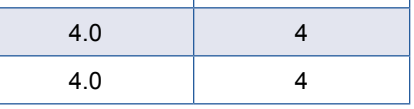
VARIABLE FLUTE

Variable Flutes increase production without the chatter from harmonics

STANDARD

Part # 4 Flute	Flute Dia	Tooth Pitch	LOC	OAL	# Flutes
31VARI-RUFF	3/16	.040	.625	2.0	3
14VARI-RUFF	1/4	.040	.750	2.5	4
51VARI-RUFF	5/16	.040	.875	2.5	4
38VARI-RUFF	3/8	.040	.875	2.5	4
12VARI-RUFF	1/2	.060	1.0	3.0	4
58VARI-RUFF	5/8	.060	1.25	3.5	4
34VARI-RUFF	3/4	.060	1.5	4.0	4
10VARI-RUFF	1	.060	1.5	4.0	4

STUB VARIABLE HELIX (ADDED RIGIDITY)



Part # 4 Flute	Flute Dia	Tooth Pitch	LOC	OAL	# Flutes
31RUFF-STUB	3/16	.040	.312	2.0	3
14RUFF-STUB	1/4	.040	.375	2.0	4
51RUFF-STUB	5/16	.040	.500	2.0	4
38RUFF-STUB	3/8	.040	.560	2.0	4
12RUFF-STUB	1/2	.060	.625	2.5	4

Material	Carbon Steel	Tool Steel	Titanium	Stainless Steel	Nickel Based Alloy	Cobalt Alloy
Diameter	225-550 SFM	210-450 SFM	125-215 SFM	225-475 SFM	55-120 SFM	40-75 SFM
3/16	.0007-.002	.0005-.0015	.0007-.0013	.0008-.0015	.0005-.0012	.0005-.0012
1/4	.0007-.002	.0005-.0015	.0007-.0013	.0008-.0015	.0005-.0012	.0005-.0012
5/16	.001-.0025	.0007-.002	.0009-.0015	.001-.002	.0007-.0014	.0007-.0014
3/8	.0015-.003	.001-.0025	.0009-.0015	.001-.002	.0009-.0016	.0009-.0016
1/2	.0015-.0035	.001-.003	.0010-.0018	.0012-.0025	.0009-.0018	.0009-.0018
5/8	.002-.004	.0015-.0035	.0012-.0022	.002-.0037	.0012-.0023	.0012-.0023
3/4	.002-.004	.0015-.004	.0015-.0025	.002-.0037	.0015-.0025	.0015-.0025
1	.002-.005	.002-.0045	.0018-.0027	.0025-.0042	.0018-.0027	.0018-.0018

Starting Speeds And Feeds. Strong Coolant Blast Recommended

SIX FLUTE

SIX FLUTE

High Performance Profiling/Finishing end mill. AlTiN coated.

STANDARD

Part # 6 Flute	Tool Dia	LOC	Shank	OAL
14-SIX-FL	1/4	3/4	1/4	2 1/2
516-SIX-FL	5/16	13/16	5/16	2 1/2
38-SIX-FL	3/8	1	3/8	2 1/2
716-SIX-FL	7/16	1	7/16	2 1/2
12-SIX-FL	1/2	1 1/4	1/2	3
58-SIX-FL	5/8	1 5/8	5/8	3 1/2
34-SIX-FL	3/4	1 5/8	3/4	4
1-SIX-FL	1	2	1	4

TECH NOTE – For best 6 Flute performance, use 5-30% radial depth of cut.

Materials Diameter	Carbon Steel (275-750 SFM)	Stainless Steel (90-450 SFM)	Alloy Steel (200-600 SFM)	Nickel/High Temp (45-115 SFM)	Titanium and Alloys (250-400 SFM)
1/4	.003	.002	.0008-.001	.0015-.002	.001-.002
3/8	.003	.002	.0008-.001	.0015-.002	.001-.002
1/2	.004	.0025-.003	.001-.002	.002-.0025	.001-.0025
5/8	.005	.003-.004	.0015-.003	.002-.0035	.002-.003
3/4	.006	.004-.005	.002-.004	.002-.004	.0025-.004
1	.007	.005-.006	.003-.005	.003-.005	.004-.006

-These are approximate numbers, a good starting point.

-Coolant blast is recommended

90° & 120° CARBIDE DRILLMILLS

90° DRILLMILLS/CHAMFER MILLS

Multi purpose tool for chamfering and milling parts.
Not recommended for drilling steel.

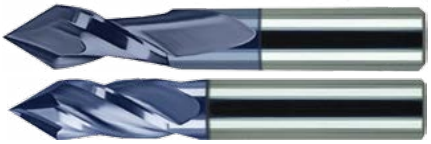
90° DRILLMILLS

Part # 2 Flute	Part # 4 Flute	Flute Dia	Point Angle	LOC	OAL
18DLML-2F90X	18DLML-4F90X	1/8	90°	.500	1.5
31DLML-2F90X	31DLML-4F90X	3/16	90°	.625	2.0
14DLML-2F90X	14DLML-4F90X	1/4	90°	.750	2.5
51DLML-2F90X	51DLML-4F90X	5/16	90°	.875	2.5
38DLML-2F90X	38DLML-4F90X	3/8	90°	1.0	2.5
12DLML-2F90X	12DLML-4F90X	1/2	90°	1.0	3.0
58DLML-2F90X	58DLML-4F90X	5/8	90°	1.25	3.5
34DLML-2F90X	34DLML-4F90X	3/4	90°	1.5	4.0

120° DRILLMILLS/CHAMFER MILLS

Part # 2 Flute	Part # 4 Flute	Flute Dia	Point Angle	LOC	OAL
18DLML-2F120X	18DLML-4F120X	1/8	120°	.500	1.5
31DLML-2F120X	31DLML-4F120X	3/16	120°	.625	2.0
14DLML-2F120X	14DLML-4F120X	1/4	120°	.750	2.5
51DLML-2F120X	51DLML-4F120X	5/16	120°	.875	2.5
38DLML-2F120X	38DLML-4F120X	3/8	120°	1.0	2.5
12DLML-2F120X	12DLML-4F120X	1/2	120°	1.0	3.0
58DLML-2F120X	58DLML-4F120X	5/8	120°	1.25	3.5
34DLML-2F120X	34DLML-4F120X	3/4	120°	1.5	4.0

60° CARBIDE DRILLMILLS



60° DRILLMILLS/CHAMFER MILLS

Multi purpose tool for chamfering and milling parts.
Not recommended for drilling steel.

Part # 2 Flute	Part # 4 Flute	Flute Dia	Point Angle	LOC	OAL
18DLML-2F60B	18DLML-4F60B	1/8	60°	.500	1.5
31DLML-2F60B	31DLML-4F60B	3/16	60°	.625	2.0
14DLML-2F60B	14DLML-4F60B	1/4	60°	.750	2.5
51DLML-2F60B	51DLML-4F60B	5/16	60°	.875	2.5
38DLML-2F60B	38DLML-4F60B	3/8	60°	1.0	2.5
12DLML-2F60B	12DLML-4F60B	1/2	60°	1.0	3.0
58DLML-2F60B	58DLML-4F60B	5/8	60°	1.25	3.5
34DLML-2F60B	34DLML-4F60B	3/4	60°	1.5	4.0

Multi purpose tool for chamfering and milling parts. Not recommended for drilling steel.
These do not have drill geometry. The 2 flute style can spot drill aluminum but not steel.
These tools are primarily for milling angles or chamfering applications.

ALL TOOLS ARE MADE FROM PREMIUM AMERICAN CARBIDE BLANKS AND GROUND IN THE USA
EXPERIENCE THE DIFFERENCE IN AMERICAN MADE

SPIRAL FLUTE CHAMFER MILLS

SPIRAL HELIX SOLID CARBIDE CHAMFER MILLS

Unique helical geometery reduces cutting forces and improves chip evacuation
Highly effective on exotic as well as standard steels and aluminum

90 DEGREE INCLUDED

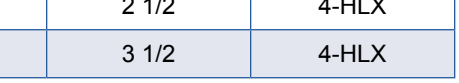
Part # 90 Deg	Shank Dia	Tip Dia	Included Angle	OAL	# Flutes
18CHMF90	1/8	To Point	90°	1-1/2	4-STR *
14CHMF90	1/4	0.046	90°	2	4-HLX
38CHMF90	3/8	0.062	90°	2	4-HLX
12CHMF90	1/2	0.093	90°	2 1/2	4-HLX
58CHMF90	5/8	.125	90°	3 1/2	4-HLX

* Straight Fluted Tool

82 DEGREE INCLUDED

Part # 82 Deg	Shank Dia	Tip Dia	Included Angle	OAL	# Flutes
18CHMF82	1/8	To Point	82°	1-1/2	4-STR *
14CHMF82	1/4	0.046	82°	2	4-HLX
38CHMF82	3/8	0.062	82°	2	4-HLX
12CHMF82	1/2	0.093	82°	2 1/2	4-HLX
58CHMF82	5/8	.125	82°	3 1/2	4-HLX

* Straight Fluted Tool



60 DEGREE INCLUDED

Part # 60 Deg	Shank Dia	Tip Dia	Included Angle	OAL	# Flutes
18CHMF60	1/8	To Point	60°	1-1/2	4-STR *
14CHMF60	1/4	0.046	60°	2	4-HLX
38CHMF60	3/8	0.062	60°	2	4-HLX
12CHMF60	1/2	0.093	60°	2 1/2	4-HLX
58CHMF60	5/8	.125	60°	3 1/2	4-HLX

* Straight Fluted Tool

NOTES:

NOTES:

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ALL BULLDOG CUTTING TOOLS ARE MADE FROM PREMIUM SUBMICRON AMERICAN CARBIDE BLANKS AND GROUND IN THE USA

EXPERIENCE THE DIFFERENCE IN AMERICAN MADE

MADE IN THE USA

Bulldog Cutting Tools produces 100% of our products in the United States of America, with American materials. That is not going to change. We make this commitment because we believe that American manufacturing is essential to keep our country's economy strong, and to maintain a stable platform for those entering into the workforce for years to come. This dedication to American manufacturing can be seen in the value of the cutting tools that we produce on a daily basis; and in the passion that our employees put into making the highest quality, most reliable and cost efficient products possible. That is the American way. It is our promise to keep manufacturing in the United States and to make sure that there will always be a manufacturer for an American made solid carbide cutting tool.

DISTRIBUTOR:

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