



FEATURED SOLUTIONS

Deburring

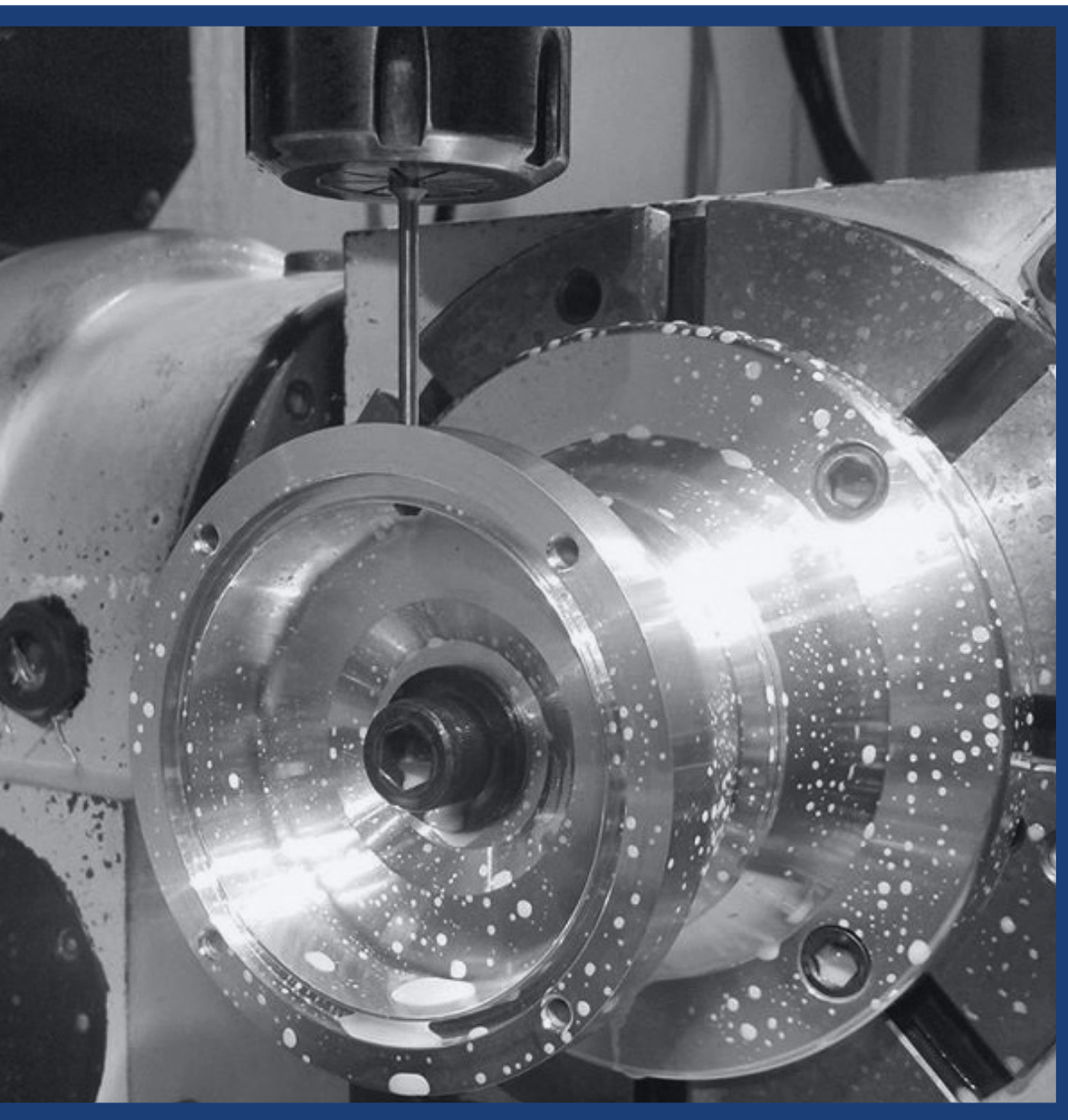


Photo courtesy of Albert R.

"For this particular part we typically run a couple hundred at a time. Utilizing this Harvey Tool XLR Double Angle Shank Cutter helped us to eliminate a cumbersome hand deburring operation. In this instance, Harvey helped us save money and time, which are basically the same thing!"

– Albert R.

Deburring

Deburring parts can be tiresome, expensive, and time-consuming, especially if done by hand. Harvey Tool's engineers have created a variety of **CNC-toleranced** deburring tools that allow you to deburr **in your CNC machine**, providing better finish, **reduced part and labor costs**, and increased capacity.

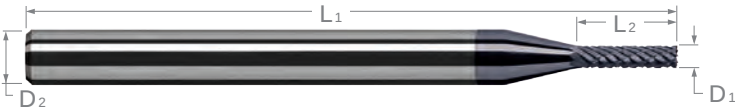
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MINIATURE END MILLS

Square – Deburring End Mill



End Mill Tolerances with Bur-Style Geometry!

- Deburr in your CNC machine with these high-precision burs held to end mill tolerances
- Stop scrapping expensive parts due to handheld operator errors
- High flute count allows for increased feeds which reduces cycle times
- Achieve better finish than with milling type cutters
- Bur geometry is optimized for removing burrs and/or adding a small controlled edge break with superior finish
- Double cut style flute pattern
- Bur-style end allows for shallow ramping, not suited for plunge cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	RIGHT HAND TEETH	LEFT HAND TEETH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AITIN COATED	
D ₁ ^{+0.0005"} _{-0.0005"}	L ₂ ^{+0.020"} _{-0.000"}			D ₂	L ₁	TOOL #	PRICE	TOOL #	PRICE
.015 (1/64)	.045 (3x)	6	3	1/8	2-1/2	60715	35.50	60715-C3	40.70
.031 (1/32)	.093 (3x)	6	3	1/8	2-1/2	60731	27.20	60731-C3	32.40
.047 (3/64)	.141 (3x)	8	4	1/8	2-1/2	60747	26.30	60747-C3	31.50
.062 (1/16)	.186 (3x)	8	4	1/8	2-1/2	60762	26.30	60762-C3	31.50
.078 (5/64)	.234 (3x)	10	5	1/8	2-1/2	60778	26.80	60778-C3	32.00
.093 (3/32)	.279 (3x)	12	6	1/8	2-1/2	60793	26.80	60793-C3	32.00

D ₁ ^{+0.000"} _{-0.002"}	L ₂ ^{+0.030"} _{-0.000"}			D ₂	L ₁	TOOL #	PRICE	TOOL #	PRICE
.125 (1/8)	.375 (3x)	14	7	1/8	2-1/2	60808	24.80	60808-C3	30.00
.187 (3/16)	.562 (3x)	16	8	3/16	2-1/2	60812	45.20	60812-C3	50.80
.250 (1/4)	.750 (3x)	18	9	1/4	2-1/2	60816	52.70	60816-C3	60.30



Tips for Maintaining Tight Tolerances

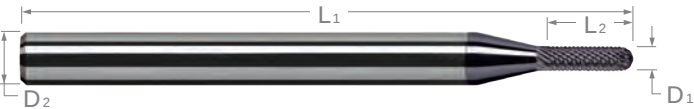
Tolerances are very important for machining operations, but do you know what they mean? Do you know how to maintain tight tolerances even in difficult operations, such as machining thin walls? Our "In the Loupe" blog post **Tips for Maintaining Tight Tolerances** is a must-read before beginning any job.

Read more on harveyperformance.com/in-the-loupe/

SQUARE

MINIATURE END MILLS

Ball – Deburring End Mill



End Mill Tolerances with Bur-Style Geometry!

- Deburr in your CNC machine with these high-precision burs held to end mill tolerances
- Stop scrapping expensive parts due to handheld operator errors
- High flute count allows for increased feeds which reduces cycle times
- Achieve better finish than with milling type cutters
- Bur geometry is optimized for removing burrs and/or adding a small controlled edge break with superior finish
- Double cut style flute pattern
- Center cutting (2 flutes to center)
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	RIGHT HAND TEETH	LEFT HAND TEETH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AITIN COATED	
D ₁ ^{+ .0005"} _{– .0005"}	L ₂ ^{+ .020"} _{– .000"}			D ₂	L ₁	TOOL #	PRICE	TOOL #	PRICE
.015 (1/64)	.045 (3x)	12	10	1/8	2-1/2	892115	31.10	892115-C3	36.30
.020	.060 (3x)	12	10	1/8	2-1/2	892120	31.10	892120-C3	36.30
.031 (1/32)	.093 (3x)	12	10	1/8	2-1/2	892131	30.80	892131-C3	36.00
.047 (3/64)	.141 (3x)	12	10	1/8	2-1/2	892147	31.10	892147-C3	36.30
.062 (1/16)	.186 (3x)	14	12	1/8	2-1/2	892162	29.70	892162-C3	34.90
.078 (5/64)	.234 (3x)	14	12	1/8	2-1/2	892178	31.10	892178-C3	36.30
.093 (3/32)	.279 (3x)	14	12	1/8	2-1/2	892193	29.70	892193-C3	34.90

D ₁ ^{+ .000"} _{– .002"}	L ₂ ^{+ .030"} _{– .000"}			D ₂	L ₁	TOOL #	PRICE	TOOL #	PRICE
.125 (1/8)	.375 (3x)	16	13	1/8	2-1/2	892208	28.40	892208-C3	33.60
.187 (3/16)	.561 (3x)	16	13	3/16	2-1/2	892212	39.50	892212-C3	45.10
.250 (1/4)	.750 (3x)	16	13	1/4	2-1/2	892216	50.10	892216-C3	57.70



Download Speeds & Feeds Charts
For Every Harvey Tool End Mill

harveytool.com/resources/speeds-feeds

UNDERCUTTING END MILLS

270° Deburring Undercut



High Number of Flutes

Stocked in Multiple Reach Lengths



- 270° spherical ball is ideal for deburring complex shapes and multi-axis machining
- Deburr in your CNC machine with these high-precision burs held to end mill tolerances
- Stop scrapping expensive parts due to handheld operator errors
- High flute count allows for increased feeds which reduces cycle times
- Achieve better finish than with milling-type cutters
- Double cut style flute pattern • Center cutting
- Solid carbide • CNC ground in the USA

CUTTER DIA.	LOC	NECK DIA.	NECK LENGTH	RIGHT HAND TEETH	LEFT HAND TEETH	SHANK DIA.	OAL	UNCOATED		AITIN COATED	
								TOOL #	PRICE	TOOL #	PRICE
D ₁	L ₂ $\pm .010"$ - .000"		L ₃ $\pm .020"$ - .000"			D ₂	L ₁				
.031 (1/32)	.026	.014	.031	12	10	1/8	1-1/2	899631	72.00	899631-C3	77.20
.031 (1/32)	.026	.014	.062	12	10	1/8	1-1/2	980531	71.40	980531-C3	76.60
.031 (1/32)	.026	.014	.093	12	10	1/8	1-1/2	926431	73.60	926431-C3	78.80
.031 (1/32)	.026	.014	.125	12	10	1/8	1-1/2	883231	76.00	883231-C3	81.20
.039 (1 mm)	.033	.019	.047	12	10	1/8	1-1/2	89961M	71.40	89961M-C3	76.60
.039 (1 mm)	.033	.019	.125	12	10	1/8	1-1/2	92641M	76.00	92641M-C3	81.20
.047 (3/64)	.040	.024	.093	12	10	1/8	1-1/2	980547	71.40	980547-C3	76.60
.047 (3/64)	.040	.024	.125	12	10	1/8	1-1/2	890847	73.60	890847-C3	78.80
.047 (3/64)	.040	.024	.156	12	10	1/8	1-1/2	926447	73.60	926447-C3	78.80
.047 (3/64)	.040	.024	.250	12	10	1/8	1-1/2	883247	76.00	883247-C3	81.20
.062 (1/16)	.053	.032	.062	15	12	1/8	1-1/2	899662	53.60	899662-C3	58.80
.062 (1/16)	.053	.032	.093	15	12	1/8	1-1/2	980562	53.60	980562-C3	58.80
.062 (1/16)	.053	.032	.125	15	12	1/8	1-1/2	890862	55.40	890862-C3	60.60
.062 (1/16)	.053	.032	.187	15	12	1/8	1-1/2	926462	55.40	926462-C3	60.60
.062 (1/16)	.053	.032	.250	15	12	1/8	1-1/2	883262	57.40	883262-C3	62.60
.062 (1/16)	.053	.032	.312	15	12	1/8	1-1/2	808362	57.40	808362-C3	62.60
.078 (5/64)	.067	.035	.062	15	12	1/8	1-1/2	899678	53.60	899678-C3	58.80
.078 (5/64)	.067	.035	.125	15	12	1/8	1-1/2	980578	53.60	980578-C3	58.80
.078 (5/64)	.067	.035	.250	15	12	1/8	1-1/2	926478	55.40	926478-C3	60.60
.078 (5/64)	.067	.035	.375	15	12	1/8	2	883278	56.20	883278-C3	61.40
.093 (3/32)	.079	.038	.062	15	12	1/8	1-1/2	899693	56.90	899693-C3	62.10
.093 (3/32)	.079	.038	.125	15	12	1/8	1-1/2	895393	56.90	895393-C3	62.10
.093 (3/32)	.079	.038	.187	15	12	1/8	1-1/2	809693	56.90	809693-C3	62.10
.093 (3/32)	.079	.038	.250	15	12	1/8	1-1/2	980593	56.90	980593-C3	62.10
.093 (3/32)	.079	.038	.312	15	12	1/8	1-1/2	890893	59.00	890893-C3	64.20
.093 (3/32)	.079	.038	.375	15	12	1/8	1-1/2	926493	58.40	926493-C3	63.60
.093 (3/32)	.079	.038	.500	15	12	1/8	2	883293	64.70	883293-C3	69.90
.118 (3 mm)	.101	.056	.250	15	12	1/8	1-1/2	98053M	59.30	98053M-C3	64.50
.118 (3 mm)	.101	.056	.375	15	12	1/8	1-1/2	89083M	61.40	89083M-C3	66.60
.118 (3 mm)	.101	.056	.500	15	12	1/8	2	92643M	63.00	92643M-C3	68.20

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UNDERCUTTING END MILLS

UNDERCUTTING END MILLS

270° Deburring Undercut (cont.)

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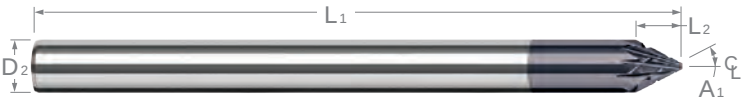
CUTTER DIA.	LOC	NECK DIA.	NECK LENGTH	RIGHT HAND TEETH	LEFT HAND TEETH	SHANK DIA.	OAL	UNCOATED		AITiN COATED	
								TOOL #	PRICE	TOOL #	PRICE
D ₁	L ₂ ^{+.020"} _{-.000"}		L ₃ ^{+.030"} _{-.000"}			D ₂	L ₁				
.125 (1/8)	.107	.059	.125	16	13	1/8	1-1/2	899708	54.90	899708-C3	60.10
.125 (1/8)	.107	.059	.187	16	13	1/8	1-1/2	809908	55.10	809908-C3	60.30
.125 (1/8)	.107	.059	.250	16	13	1/8	1-1/2	980608	56.90	980608-C3	62.10
.125 (1/8)	.107	.059	.375	16	13	1/8	1-1/2	890908	57.80	890908-C3	63.00
.125 (1/8)	.107	.059	.500	16	13	1/8	2	926508	59.00	926508-C3	64.20
.125 (1/8)	.107	.059	.750	16	13	1/8	2	886108	61.80	886108-C3	67.00
.125 (1/8)	.107	.059	1.000	16	13	1/8	3	883308	65.40	883308-C3	70.60
.156 (5/32)	.133	.078	.250	16	13	3/16	2	980610	62.40	980610-C3	68.00
.156 (5/32)	.133	.078	.500	16	13	3/16	2	926510	67.20	926510-C3	72.80
.187 (3/16)	.160	.097	.125	16	13	3/16	2	899712	58.40	899712-C3	64.00
.187 (3/16)	.160	.097	.250	16	13	3/16	2	980612	61.80	980612-C3	67.40
.187 (3/16)	.160	.097	.375	16	13	3/16	2	890912	63.90	890912-C3	69.50
.187 (3/16)	.160	.097	.500	16	13	3/16	2	926512	67.20	926512-C3	72.80
.187 (3/16)	.160	.097	.750	16	13	3/16	2	886112	72.50	886112-C3	78.10
.187 (3/16)	.160	.097	1.000	16	13	3/16	3	883312	76.30	883312-C3	81.90
.250 (1/4)	.213	.136	.125	16	13	1/4	2-1/2	899716	73.10	899716-C3	80.70
.250 (1/4)	.213	.136	.375	16	13	1/4	2-1/2	980616	73.90	980616-C3	81.50
.250 (1/4)	.213	.136	.500	16	13	1/4	2-1/2	890916	75.90	890916-C3	83.50
.250 (1/4)	.213	.136	.750	16	13	1/4	2-1/2	926516	79.40	926516-C3	87.00
.250 (1/4)	.213	.136	1.125	16	13	1/4	2-1/2	886116	82.00	886116-C3	89.60
.375 (3/8)	.320	.200	.375	16	13	3/8	2-1/2	980624	98.50	980624-C3	108.60
.375 (3/8)	.320	.200	.750	16	13	3/8	2-1/2	926524	104.30	926524-C3	114.40

UNDERCUTTING END MILLS

CHAMFER CUTTERS

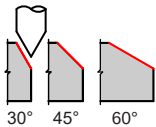
Deburring Chamfer Cutters

CHAMFER CUTTERS



End Mill Tolerances with Bur-Style Geometry!

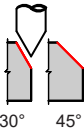
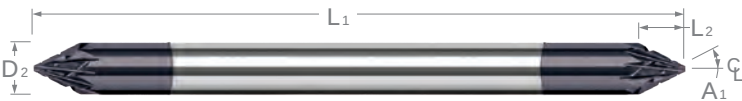
- Deburr in your CNC machine with these high precision burs held to end mill tolerances
- Stop scrapping expensive parts due to handheld operator errors
- High flute count allows for increased feeds which reduces cycle times
- Achieve better finish than with milling type cutters
- Tight end mill tolerances allow use of standard programming and tool paths
- Cone shaped burs are effective in removing burrs and/or adding a small controlled edge break with superior finish
- Double cut style flute pattern
- Solid carbide
- CNC ground in the USA



Stocked in **Three** Angles Per Side!

Single-Ended

ANGLE PER SIDE	LOC	RIGHT HAND TEETH	LEFT HAND TEETH	MINOR DIA.	SHANK DIA.	OAL	UNCOATED		AITiN COATED		AMORPHOUS DIAMOND	
A ₁ ^{+0°30'} _{-0°30'}	L ₂				D ₂	L ₁	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
30°	.099	12	6	.012 (Max.)	1/8	2-1/2	58130	26.90	58130-C3	32.10		
	.207	12	6	.012 (Max.)	1/4	2-1/2	994030	38.30	994030-C3	45.90		
45°	.057	12	6	.012 (Max.)	1/8	2-1/2	58145	26.90	58145-C3	32.10	58145-C4	40.00
	.088	12	6	.012 (Max.)	3/16	2-1/2	891145	33.70	891145-C3	39.30	891145-C4	51.80
	.120	12	6	.012 (Max.)	1/4	2-1/2	994045	38.30	994045-C3	45.90	994045-C4	58.90
	.181	14	7	.013 (Max.)	3/8	2-1/2	784445	54.20	784445-C3	64.30	784445-C4	79.00
60°	.033	12	6	.012 (Max.)	1/8	2-1/2	58160	27.20	58160-C3	32.40		



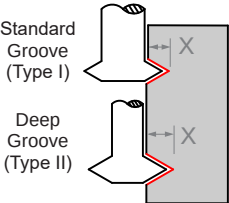
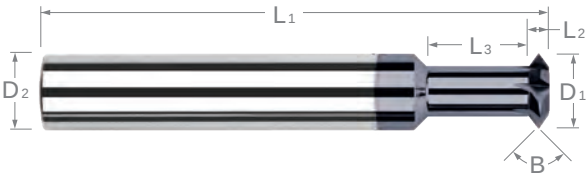
Stocked in **Two** Angles Per Side!

Double-Ended

ANGLE PER SIDE	LENGTH OF CUT	RIGHT HAND TEETH	LEFT HAND TEETH	MINOR DIAMETER	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AITiN COATED	
A ₁ ^{+0°30'} _{-0°30'}	L ₂				D ₂	L ₁	TOOL #	PRICE	TOOL #	PRICE
30°	.099	12	6	.012 (Max.)	1/8	2-1/2	898330	40.50	898330-C3	46.90
45°	.057	12	6	.012 (Max.)	1/8	2-1/2	898345	40.50	898345-C3	46.90
	.088	12	6	.012 (Max.)	3/16	2-1/2	879745	48.70	879745-C3	56.30
	.120	12	6	.012 (Max.)	1/4	2-1/2	867545	57.60	867545-C3	67.70
	.181	14	7	.013 (Max.)	3/8	2-1/2	788145	74.20	788145-C3	89.30

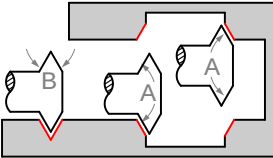
DOUBLE ANGLE SHANK CUTTERS

Pointed



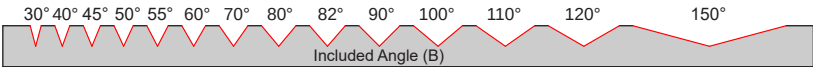
- Ideal for back chamfering, chamfering, deburring, and milling a "V-groove"
- Reduced neck for long reach machining
- Tip of included angle ground to a point
- 60° angle can also be used for thread milling
- Solid carbide
- CNC ground in the USA

Great for Chamfering and Deburring



Included Angle Conversion

A = 180 - B	150°	140°	135°	130°	125°	120°	110°	100°	98°	90°	80°	70°	60°	30°
B = 180 - A	30°	40°	45°	50°	55°	60°	70°	80°	82°	90°	100°	110°	120°	150°



Stocked in **Fourteen** Included Angles!

INCL. ANGLE	CUTTER DIA. $D_1 \begin{smallmatrix} +.000'' \\ -.002'' \end{smallmatrix}$	CUTTER WIDTH L_2	NECK DIA. $L_3 \begin{smallmatrix} +.020'' \\ -.000'' \end{smallmatrix}$	NECK LENGTH	TYPE	FLUTES	SHANK DIA. D_2	OAL L_1	UNCOATED		AITIN COATED		AITIN NANO COATED	
									TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
30°	1/16	.008	1/32	.093	I	2	1/8	1-1/2	66062	52.50	66062-C3	57.70		
	5/64	.010	.039	.118	I	2	1/8	1-1/2	66078	52.50	66078-C3	57.70		
	3/32	.012	3/64	.141	I	2	1/8	1-1/2	66093	52.50	66093-C3	57.70		
	1/8	.017	1/16	.187	I	4	1/8	1-1/2	66108	51.20	66108-C3	56.40		
	1/8	.017	1/16	.500	I	4	1/8	1-1/2	934308	52.50	934308-C3	57.70		
	3/16	.025	3/32	.312	I	4	3/16	2	66112	53.10	66112-C3	58.70		
	1/4	.033	1/8	.312	I	4	1/4	2	66116	67.40	66116-C3	75.00		
	1/4	.033	1/8	.625	I	4	1/4	2	921716	79.50	921716-C3	87.10		
	3/8	.033	1/4	.500	I	6	3/8	2-1/2	66105	90.50	66105-C3	100.60		
	3/8	.033	1/4	1.500	I	6	3/8	3-1/2	934324	105.60	934324-C3	115.70		
	1/2	.050	5/16	.500	I	6	1/2	3	66110	122.30	66110-C3	137.40		
	1/2	.050	5/16	1.500	I	6	1/2	4	934332	156.00	934332-C3	171.10		
40°	1/4	.045	1/8	.312	I	4	1/4	2	29720	67.90	29720-C3	75.50		
	1/4	.045	1/8	.625	I	4	1/4	2	918116	80.50	918116-C3	88.10		
	3/8	.045	1/4	.500	I	6	3/8	2-1/2	909924	87.50	909924-C3	97.60		
	3/8	.045	1/4	1.500	I	6	3/8	3-1/2	967505	108.70	967505-C3	118.80		
	1/2	.068	5/16	.500	I	6	1/2	3	909932	117.00	909932-C3	132.10		
	1/2	.068	5/16	1.500	I	6	1/2	4	967510	152.10	967510-C3	167.20		
45°	1/8	.026	1/16	.187	I	4	1/8	1-1/2	905608	52.50	905608-C3	57.70		
	3/16	.039	3/32	.312	I	4	3/16	2	905612	53.10	905612-C3	58.70		
	3/16	.039	3/32	.750	I	4	3/16	2-1/2	984902	61.90	984902-C3	67.50		NEW
	1/4	.052	1/8	.312	I	4	1/4	2	29723	67.40	29723-C3	75.00		
	1/4	.052	1/8	.625	I	4	1/4	2	917016	79.50	917016-C3	87.10		
	1/4	.052	1/8	1.000	I	4	1/4	3	984903	82.60	984903-C3	90.20		
	3/8	.052	1/4	.500	I	6	3/8	2-1/2	905624	85.40	905624-C3	95.50		
	3/8	.052	1/4	1.000	I	6	3/8	2-1/2	917024	97.40	917024-C3	107.50		
	3/8	.052	1/4	1.500	I	6	3/8	3-1/2	984905	106.10	984905-C3	116.20		
	1/2	.078	5/16	.500	I	6	1/2	3	905632	116.40	905632-C3	131.50		
	1/2	.078	5/16	1.500	I	6	1/2	4	984910	151.40	984910-C3	166.50		

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DOUBLE ANGLE SHANK CUTTERS

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INCL. ANGLE	CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AITIN COATED		AITIN NANO COATED	
B ^{+1°} -1°	D ₁ ^{+0.000"} -0.002"	L ₂		L ₃ ^{+0.020"} -0.000"			D ₂	L ₁	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
50°	1/8	.029	1/16	.187	I	4	1/8	1-1/2	985801	51.70	985801-C3	56.90		
	1/8	.029	1/16	.500	I	4	1/8	1-1/2	974401	61.70	974401-C3	66.90		
	3/16	.044	3/32	.312	I	4	3/16	2	985802	54.10	985802-C3	59.70		
	3/16	.044	3/32	.750	I	4	3/16	2-1/2	974402	62.90	974402-C3	68.50		
	1/4	.058	1/8	.312	I	4	1/4	2	29725	71.70	29725-C3	79.30		
	1/4	.058	1/8	1.000	I	4	1/4	3	974403	84.60	974403-C3	92.20		
	3/8	.058	1/4	.500	I	6	3/8	2-1/2	985805	89.90	985805-C3	100.00		
	3/8	.058	1/4	1.500	I	6	3/8	3-1/2	974405	110.30	974405-C3	120.40		
	1/2	.088	5/16	.500	I	6	1/2	3	985810	122.60	985810-C3	137.70		
	1/2	.088	5/16	1.500	I	6	1/2	4	974410	154.30	974410-C3	169.40		
55°	1/4	.065	1/8	.312	I	4	1/4	2	29728	72.10	29728-C3	79.70		
60°	1/16	.018	1/32	.093	I	2	1/8	1-1/2	47362	50.90	47362-C3	56.10		
	1/16	.018	1/32	.156	I	2	1/8	1-1/2	965562	50.90	965562-C3	56.10		
	5/64	.023	.039	.118	I	2	1/8	1-1/2	47378	50.90	47378-C3	56.10		
	3/32	.027	3/64	.141	I	2	1/8	1-1/2	47393	50.90	47393-C3	56.10		
	3/32	.027	3/64	.250	I	2	1/8	1-1/2	965593	50.90	965593-C3	56.10		
	1/8	.036	1/16	.125	I	4	1/8	1-1/2	937501	47.00	937501-C3	52.20		
	1/8	.036	1/16	.187	I	4	1/8	1-1/2	16201	47.00	16201-C3	52.20		
	1/8	.036	1/16	.312	I	4	1/8	1-1/2	984401	52.80	984401-C3	58.00		
	1/8	.036	1/16	.500	I	4	1/8	2	27501	57.50	27501-C3	62.70		
	1/8	.036	1/16	.875	I	4	1/8	2	981001	62.80	981001-C3	68.00		
	5/32	.045	5/64	.250	I	4	3/16	2	16256	50.90	16256-C3	56.50		
	5/32	.045	5/64	.625	I	4	3/16	2-1/2	27556	57.50	27556-C3	63.10		
	3/16	.055	3/32	.187	I	4	3/16	2	937502	50.00	937502-C3	55.60		
	3/16	.055	3/32	.312	I	4	3/16	2	16202	50.00	16202-C3	55.60		
	3/16	.055	3/32	.500	I	4	3/16	2	984402	57.90	984402-C3	63.50		
	3/16	.055	3/32	.750	I	4	3/16	2-1/2	27502	61.50	27502-C3	67.10		
	3/16	.055	3/32	1.000	I	4	3/16	2-1/2	925502	64.30	925502-C3	69.90		
	1/4	.072	1/8	.187	I	4	1/4	2	937503	67.40	937503-C3	75.00		
	1/4	.072	1/8	.312	I	4	1/4	2	16203	67.40	16203-C3	75.00		
	1/4	.072	1/8	.312	I	6	1/4	2	808016	72.30	808016-C3	79.90		
	1/4	.072	1/8	.625	I	4	1/4	2-1/2	984403	75.70	984403-C3	83.30		
	1/4	.072	1/8	1.000	I	4	1/4	3	27503	80.80	27503-C3	88.40		
	1/4	.072	1/8	1.312	I	4	1/4	3	925503	81.20	925503-C3	88.80		
	1/4	.072	1/8	1.750	I	4	1/4	3	981003	82.30	981003-C3	89.90		
	5/16	.072	3/16	.375	I	6	5/16	2-1/2	16272	81.80	16272-C3	90.70		
	5/16	.072	3/16	.875	I	6	5/16	2-1/2	984472	84.20	984472-C3	93.10		
	3/8	.072	1/4	.312	I	6	3/8	2-1/2	937505	86.10	937505-C3	96.20		
	3/8	.072	1/4	.500	I	6	3/8	2-1/2	16205	86.10	16205-C3	96.20		
	3/8	.072	1/4	.750	I	6	3/8	2-1/2	773305	91.50	773305-C3	101.60		
	3/8	.072	1/4	1.000	I	6	3/8	2-1/2	984405	97.00	984405-C3	107.10		
	3/8	.072	1/4	1.500	I	6	3/8	3-1/2	27505	107.80	27505-C3	117.90		
	3/8	.072	1/4	2.000	I	6	3/8	3-1/2	925505	112.90	925505-C3	123.00		
	1/2	.109	5/16	.500	I	6	1/2	3	16210	117.90	16210-C3	133.00		
	1/2	.109	5/16	.750	I	6	1/2	3	773310	122.50	773310-C3	137.60		
	1/2	.109	5/16	1.000	I	6	1/2	3	984410	128.40	984410-C3	143.50		
	1/2	.109	5/16	1.250	I	6	1/2	3-1/2	762310	139.30	762310-C3	154.40		
	1/2	.109	5/16	1.500	I	6	1/2	4	27510	150.20	27510-C3	165.30		
	1/2	.109	5/16	2.000	I	6	1/2	4	925510	154.10	925510-C3	169.20		
	1/2	.109	5/16	2.625	I	6	1/2	4	981010	158.10	981010-C3	173.20		
	5/8	.144	3/8	.750	I	6	5/8	3-1/2	16215	212.20	16215-C3	227.30		

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INCL. ANGLE	CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AITIN COATED		AITIN NANO COATED	
									TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
70°	B $\begin{smallmatrix} +1^{\circ} \\ -1^{\circ} \end{smallmatrix}$	D ₁ $\begin{smallmatrix} +.000" \\ -.002" \end{smallmatrix}$	L ₂	L ₃ $\begin{smallmatrix} +.020" \\ -.000" \end{smallmatrix}$			D ₂	L ₁						
70°	1/4	.088	1/8	.312	I	4	1/4	2	871903	72.10	871903-C3	79.70		
	3/8	.088	1/4	1.500	I	6	3/8	3-1/2	791005	113.80	791005-C3	123.90		
80°	1/4	.105	1/8	.312	I	4	1/4	2	29740	72.10	29740-C3	79.70		
	3/8	.105	1/4	1.500	I	6	3/8	3-1/2	792005	116.00	792005-C3	126.10		
82°	1/4	.109	1/8	.312	I	4	1/4	2	29741	72.10	29741-C3	79.70		
	3/8	.109	1/4	1.500	I	6	3/8	3-1/2	920805	116.00	920805-C3	126.10		
	1/2	.163	5/16	1.500	I	6	1/2	4	920810	158.60	920810-C3	173.70		
	1/32	.015	.016	.062	I	2	1/8	1-1/2	807002	46.70	807002-C3	51.90		
	1/32	.015	.016	.093	I	2	1/8	1-1/2	45131	45.80	45131-C3	51.00		
	1/32	.015	.016	.125	I	2	1/8	1-1/2	71604	46.70	71604-C3	51.90		
	1/16	.031	1/32	.062	I	2	1/8	1-1/2	946862	45.80	946862-C3	51.00		
	1/16	.031	1/32	.093	I	2	1/8	1-1/2	19162	45.80	19162-C3	51.00		
	1/16	.031	1/32	.093	I	4	1/8	1-1/2	838804	45.80	838804-C3	51.00		
	1/16	.031	1/32	.125	I	2	1/8	1-1/2	807662	45.80	807662-C3	51.00		
	1/16	.031	1/32	.156	I	2	1/8	1-1/2	45162	50.90	45162-C3	56.10		
	1/16	.031	1/32	.156	I	4	1/8	1-1/2	832404	53.50	832404-C3	58.70		
	1/16	.031	1/32	.187	I	2	1/8	1-1/2	822104	55.80	822104-C3	61.00		
	1/16	.031	1/32	.250	I	2	1/8	1-1/2	71662	55.80	71662-C3	61.00		
	1/16	.031	1/32	.250	I	4	1/8	1-1/2	792962	56.90	792962-C3	62.10		
	1/16	.031	1/32	.312	I	2	1/8	1-1/2	857862	55.80	857862-C3	61.00		
	1/16	.031	1/32	.375	I	2	1/8	1-1/2	963662	55.80	963662-C3	61.00		
	1/16	.031	1/32	.437	I	2	1/8	1-1/2	855762	56.90	855762-C3	62.10		
	5/64	.039	.039	.078	I	2	1/8	1-1/2	946878	45.80	946878-C3	51.00		
	5/64	.039	.039	.093	I	2	1/8	1-1/2	807105	45.80	807105-C3	51.00		
	5/64	.039	.039	.118	I	2	1/8	1-1/2	19178	45.80	19178-C3	51.00		
	5/64	.039	.039	.125	I	2	1/8	1-1/2	807005	45.80	807005-C3	51.00		
	5/64	.039	.039	.187	I	2	1/8	1-1/2	45178	50.90	45178-C3	56.10		
	5/64	.039	.039	.187	I	4	1/8	1-1/2	832405	53.50	832405-C3	58.70		
	5/64	.039	.039	.250	I	2	1/8	1-1/2	822178	53.50	822178-C3	63.40		
	5/64	.039	.039	.312	I	2	1/8	1-1/2	71678	55.80	71678-C3	61.00		
	5/64	.039	.039	.312	I	4	1/8	1-1/2	792978	56.90	792978-C3	62.10		
	5/64	.039	.039	.375	I	2	1/8	1-1/2	771978	56.90	771978-C3	62.10		
	5/64	.039	.039	.500	I	2	1/8	1-1/2	963678	55.80	963678-C3	61.00		
	3/32	.047	3/64	.093	I	2	1/8	1-1/2	946893	45.80	946893-C3	51.00		
	3/32	.047	3/64	.125	I	2	1/8	1-1/2	807106	45.80	807106-C3	51.00		
	3/32	.047	3/64	.141	I	2	1/8	1-1/2	19193	45.80	19193-C3	51.00		
	3/32	.047	3/64	.141	I	4	1/8	1-1/2	838806	45.80	838806-C3	51.00		
	3/32	.047	3/64	.187	I	2	1/8	1-1/2	807693	45.80	807693-C3	51.00		
	3/32	.047	3/64	.250	I	2	1/8	1-1/2	45193	50.90	45193-C3	56.10		
	3/32	.047	3/64	.250	I	4	1/8	1-1/2	832406	53.50	832406-C3	58.70		
	3/32	.047	3/64	.312	I	2	1/8	1-1/2	807493	55.80	807493-C3	61.00		
	3/32	.047	3/64	.375	I	2	1/8	1-1/2	71693	55.80	71693-C3	61.00		
	3/32	.047	3/64	.375	I	4	1/8	1-1/2	792906	55.80	792906-C3	61.00		
	3/32	.047	3/64	.500	I	2	1/8	1-1/2	857893	55.80	857893-C3	61.00		
	3/32	.047	3/64	.625	I	2	1/8	2	963693	57.90	963693-C3	63.10		
	3/32	.047	3/64	.750	I	2	1/8	2	855793	60.30	855793-C3	65.50		
	3 mm	.059	.059	.187	I	2	1/8	1-1/2	1913M	46.50	1913M-C3	51.70		
	3 mm	.059	.059	.250	I	2	1/8	1-1/2	80763M	54.50	80763M-C3	59.70		
	3 mm	.059	.059	.312	I	2	1/8	1-1/2	4513M	53.50	4513M-C3	58.70		
	3 mm	.059	.059	.438	I	2	1/8	1-1/2	82213M	61.30	82213M-C3	66.50		

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INCL. ANGLE	CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AITIN COATED		AITIN NANO COATED	
B ^{+1°} _{-1°}	D ₁ ^{+ .000"} _{- .002"}	L ₂		L ₃ ^{+ .020"} _{- .000"}			D ₂	L ₁	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
90°	1/4	.125	1/8	.500	I	4	1/4	2	807316	59.20	807316-C3	66.80		
	1/4	.125	1/8	.625	I	4	1/4	2-1/2	72603	65.00	72603-C3	72.60		
	1/4	.125	1/8	.625	I	6	1/4	2-1/2	847416	68.30	847416-C3	75.90		
	1/4	.125	1/8	.750	I	4	1/4	2-1/2	807216	65.00	807216-C3	72.60		
	1/4	.125	1/8	1.000	I	4	1/4	3	19503	71.10	19503-C3	78.70		
	1/4	.125	1/8	1.000	I	6	1/4	3	822616	74.40	822616-C3	79.50		
	1/4	.125	1/8	1.250	I	4	1/4	3	822216	76.00	822216-C3	83.60		
	1/4	.125	1/8	1.312	I	4	1/4	3	71703	76.00	71703-C3	83.60		
	1/4	.125	1/8	1.500	I	4	1/4	3	821816	78.30	821816-C3	85.90		
	1/4	.125	1/8	1.750	I	4	1/4	3	26803	78.30	26803-C3	85.90		
	1/4	.125	1/8	2.125	I	4	1/4	4	963703	84.70	963703-C3	93.60		
	5/16	.125	3/16	.250	I	6	5/16	2-1/2	946904	79.20	946904-C3	88.10		
	5/16	.125	3/16	.375	I	6	5/16	2-1/2	19272	81.80	19272-C3	90.70		
	5/16	.125	3/16	.375	I	8	5/16	2-1/2	838820	90.50	838820-C3	99.40		
	5/16	.125	3/16	.625	I	6	5/16	2-1/2	833572	82.90	833572-C3	91.80		
	5/16	.125	3/16	.625	I	8	5/16	2-1/2	754920	89.60	754920-C3	98.50		
	5/16	.125	3/16	.875	I	6	5/16	2-1/2	72672	82.90	72672-C3	91.80		
	5/16	.125	3/16	.875	I	8	5/16	2-1/2	847420	91.30	847420-C3	100.20		
	5/16	.125	3/16	1.000	I	6	5/16	3	807220	88.80	807220-C3	97.70		
	5/16	.125	3/16	1.250	I	6	5/16	3	19572	88.80	19572-C3	97.70		
	5/16	.125	3/16	1.250	I	8	5/16	3	822620	93.00	822620-C3	101.90		
	5/16	.125	3/16	1.500	I	6	5/16	3	772873	90.30	772873-C3	99.20		
	5/16	.125	3/16	1.625	I	6	5/16	3	71772	92.20	71772-C3	101.10		
	5/16	.125	3/16	2.125	I	6	5/16	3	26872	95.50	26872-C3	104.40		
	3/8	.125	1/4	.312	I	6	3/8	2-1/2	946905	79.50	946905-C3	89.60		
	3/8	.125	1/4	.375	I	6	3/8	2-1/2	807124	82.10	807124-C3	92.20		
	3/8	.125	1/4	.500	I	6	3/8	2-1/2	19205	83.60	19205-C3	92.20	19205-C6	96.20
	3/8	.250	1/8	.500	II	6	3/8	2-1/2	759924	90.80	759924-C3	100.90		
	3/8	.125	1/4	.500	I	8	3/8	2-1/2	838824	87.80	838824-C3	97.90	838824-C6	100.40
	3/8	.125	1/4	.750	I	6	3/8	2-1/2	807324	88.40	807324-C3	98.50		
	3/8	.125	1/4	1.000	I	6	3/8	2-1/2	72605	93.00	72605-C3	103.10		
	3/8	.125	1/4	1.000	I	8	3/8	2-1/2	847424	102.70	847424-C3	112.80		
	3/8	.125	1/4	1.250	I	6	3/8	3	807224	104.00	807224-C3	114.10		
	3/8	.125	1/4	1.500	I	6	3/8	3-1/2	19505	105.20	19505-C3	115.30		
	3/8	.125	1/4	1.500	I	8	3/8	3-1/2	822624	109.40	822624-C3	114.40		
	3/8	.125	1/4	1.750	I	6	3/8	3-1/2	822224	110.30	822224-C3	120.40		
	3/8	.125	1/4	2.000	I	6	3/8	3-1/2	71705	110.30	71705-C3	120.40		
	3/8	.125	1/4	2.312	I	6	3/8	3-1/2	26805	113.20	26805-C3	123.30		
	3/8	.125	1/4	2.625	I	6	3/8	4	963705	119.90	963705-C3	133.70		
	.393	.133	.260	.500	I	6	7/16	2-3/4	19279	125.80	19279-C3	138.40		
	.393	.133	.260	1.500	I	6	7/16	3-1/2	19579	145.70	19579-C3	160.80		
	7/16	.157	9/32	.500	I	6	7/16	2-3/4	19208	123.40	19208-C3	136.00		
	7/16	.157	9/32	1.500	I	6	7/16	3-1/2	19508	143.00	19508-C3	158.10		
	1/2	.187	5/16	.312	I	6	1/2	3	946910	108.20	946910-C3	123.30		
	1/2	.187	5/16	.500	I	6	1/2	3	19210	111.80	19210-C3	126.90	19210-C6	128.10
	1/2	.187	5/16	.500	I	8	1/2	3	838832	117.30	838832-C3	132.40	838832-C6	133.60
	1/2	.187	5/16	.750	I	6	1/2	3	807332	114.90	807332-C3	130.00		
	1/2	.187	5/16	1.000	I	6	1/2	3	72610	121.80	72610-C3	136.90		
	1/2	.187	5/16	1.000	I	8	1/2	3	847432	123.80	847432-C3	138.90		
	1/2	.187	5/16	1.250	I	6	1/2	3-1/2	822432	124.90	822432-C3	133.50		

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DOUBLE ANGLE SHANK CUTTERS

Pointed (cont.)

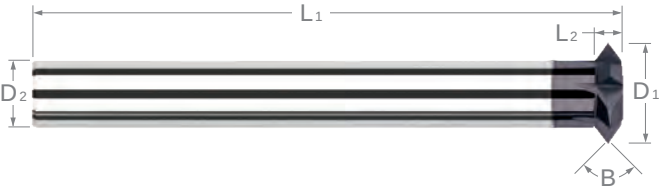
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INCL. ANGLE	CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AITIN COATED		AITIN NANO COATED	
B ^{+1°} _{-1°}	D ₁ ^{+0.000"} _{-.002"}	L ₂		L ₃ ^{+0.020"} _{+.000"}			D ₂	L ₁	TOOL #	PRICE	TOOL #	PRICE	TOOL #	PRICE
90°	1/2	.187	5/16	1.500	I	6	1/2	4	19510	143.00	19510-C3	158.10		
	1/2	.187	5/16	1.500	I	8	1/2	4	807932	148.60	807932-C3	163.70		
	1/2	.187	5/16	1.750	I	6	1/2	4	822232	145.70	822232-C3	160.80		
	1/2	.187	5/16	2.000	I	6	1/2	4	71710	148.00	71710-C3	163.10		
	1/2	.187	5/16	2.312	I	6	1/2	4	821810	149.30	821810-C3	164.40		
	1/2	.187	5/16	2.625	I	6	1/2	4	26810	152.00	26810-C3	167.10		
	1/2	.187	5/16	3.125	I	6	1/2	6	963710	159.00	963710-C3	174.10		
	1/2	.333	.167	.500	II	6	1/2	3	759932	115.20	759932-C3	130.30		
	5/8	.250	3/8	.750	I	6	5/8	3-1/2	19215	212.70	19215-C3	227.80		
	5/8	.250	3/8	1.250	I	6	5/8	3-1/2	72615	218.60	72615-C3	233.70		
100°	1/8	.075	1/16	.187	I	4	1/8	1-1/2	983401	50.50	983401-C3	55.70		
	1/8	.075	1/16	.500	I	4	1/8	1-1/2	969901	60.80	969901-C3	66.00		
	3/16	.113	3/32	.312	I	4	3/16	2	983402	52.10	983402-C3	57.70		
	3/16	.113	3/32	.750	I	4	3/16	2-1/2	969902	63.20	969902-C3	68.80		
	1/4	.149	1/8	.312	I	4	1/4	2	29750	72.60	29750-C3	80.20		
	1/4	.149	1/8	1.000	I	4	1/4	3	969903	84.80	969903-C3	92.40		
	3/8	.149	1/4	.500	I	6	3/8	2-1/2	983405	85.80	983405-C3	95.90		
	3/8	.149	1/4	1.500	I	6	3/8	3-1/2	969905	110.80	969905-C3	120.90		
	1/2	.224	5/16	.500	I	6	1/2	3	983410	114.10	983410-C3	129.20		
	1/2	.224	5/16	1.500	I	6	1/2	4	969910	147.70	969910-C3	162.80		
110°	1/4	.179	1/8	.312	I	4	1/4	2	830503	76.10	830503-C3	83.70		
120°	1/8	.109	1/16	.125	I	4	1/8	1-1/2	903608	47.00	903608-C3	52.20		
	1/8	.109	1/16	.187	I	4	1/8	1-1/2	39108	47.00	39108-C3	52.20		
	1/8	.109	1/16	.500	I	4	1/8	2	989401	55.80	989401-C3	61.00		
	3/16	.163	3/32	.187	I	4	3/16	2	903612	50.50	903612-C3	56.10		
	3/16	.163	3/32	.312	I	4	3/16	2	39112	51.20	39112-C3	56.80		
	3/16	.163	3/32	.750	I	4	3/16	2-1/2	989402	60.10	989402-C3	65.70		
	1/4	.216	1/8	.187	I	4	1/4	2	903616	66.70	903616-C3	74.30		
	1/4	.216	1/8	.312	I	4	1/4	2	39116	67.40	39116-C3	75.00		
	1/4	.216	1/8	.625	I	4	1/4	2-1/2	910716	65.00	910716-C3	72.60		
	1/4	.216	1/8	1.000	I	4	1/4	3	989403	76.60	989403-C3	84.20		
	3/8	.216	1/4	.500	I	6	3/8	2-1/2	39124	88.20	39124-C3	98.30		
	3/8	.216	1/4	1.000	I	6	3/8	2-1/2	910724	97.80	910724-C3	107.90		
	3/8	.216	1/4	1.500	I	6	3/8	3-1/2	989405	110.30	989405-C3	120.40		
	1/2	.325	5/16	.500	I	6	1/2	3	39132	117.30	39132-C3	132.40		
	1/2	.325	5/16	1.000	I	6	1/2	3	910732	127.40	910732-C3	142.50		
	1/2	.325	5/16	1.500	I	6	1/2	4	989410	149.70	989410-C3	164.80		
150°	1/4	.467	1/8	.312	I	4	1/4	2	826003	76.10	826003-C3	83.70		
	3/8	.467	1/4	.500	I	6	3/8	2-1/2	826005	98.80	826005-C3	108.90		

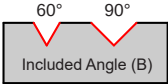
DOUBLE ANGLE SHANK CUTTERS

DOUBLE ANGLE SHANK CUTTERS

Pointed - Reduced Shank



- Ideal for back chamfering, chamfering, deburring, and milling a "V-groove"
- Reduced straight shank allows any chucking depth
- Tip of included angle ground to a point
- 60° angle can also be used for thread milling
- Solid carbide head brazed onto steel shank
- CNC ground in the USA



Stocked in **Two** Included Angles!

INCL. ANGLE	CUTTER DIAMETER	CUTTER WIDTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AIIIN COATED	
						TOOL #	PRICE	TOOL #	PRICE
B $\begin{smallmatrix} +1^{\circ} \\ -1^{\circ} \end{smallmatrix}$	D1 $\begin{smallmatrix} +.000'' \\ -.002'' \end{smallmatrix}$	L2		D2	L1				
60°	1/4	.072	6	1/8	2.572	866403	95.30	866403-C3	102.50
	3/8	.108	8	3/16	3.108	866405	133.80	866405-C3	143.30
	1/2	.144	8	1/4	3.144	866410	150.80	866410-C3	165.90
	3/4	.144	8	1/2	3.644	16220	159.20	16220-C3	175.50
	3/4	.144	8	1/2	6.144	27520	166.70	27520-C3	190.30
	1	.217	8	5/8	4.217	16230	175.20	16230-C3	200.00
90°	1/4	.125	6	1/8	2.625	875503	95.30	875503-C3	102.90
	1/4	.125	6	1/8	4.125	777903	96.40	777903-C3	104.40
	5/16	.155	8	4 mm	3.155	877572	115.50	877572-C3	124.40
	3/8	.188	8	3/16	3.188	875505	133.80	875505-C3	150.10
	7/16	.201	8	15/64	3.201	877508	142.30	877508-C3	157.40
	1/2	.250	8	1/4	3.250	875510	150.80	875510-C3	165.90
	1/2	.250	8	1/4	6.250	777910	158.00	777910-C3	186.90
	5/8	.313	8	5/16	3.313	875515	153.00	875515-C3	169.30
	3/4	.250	8	1/2	3.750	19220	158.70	19220-C3	175.00
	3/4	.250	8	1/2	6.250	19520	166.00	19520-C3	189.60
	1	.375	8	5/8	4.375	19230	175.50	19230-C3	200.30
	1-1/4	.500	8	3/4	4.500	875520	217.10	875520-C3	248.80

DOUBLE ANGLE SHANK CUTTERS

NEW
NEW
NEW

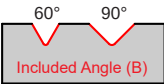
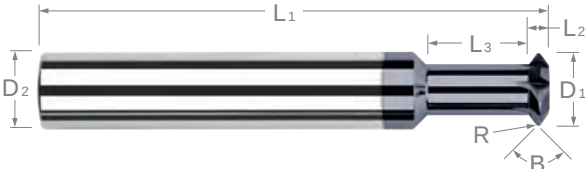


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DOUBLE ANGLE SHANK CUTTERS

Tip Radius



- Ideal for back chamfering, chamfering, deburring, and milling a "V-groove"
- Radius on tip for improved strength and wear resistance
- Reduced neck for long reach machining
- Solid carbide
- CNC ground in the USA

Stocked in **Two** Included Angles!

INCL. ANGLE	CUTTER DIA.	RADIUS	CUTTER WIDTH	NECK DIAMETER	NECK LENGTH	FLUTES	SHANK DIA.	OAL	UNCOATED		AISI IN COATED	
									TOOL #	PRICE	TOOL #	PRICE
60°	B ^{+1°} / _{-1°}	D1 ^{+ .000"} / _{- .002"}	R ^{+ .001"} / _{- .001"}	L2	L3 ^{+ .020"} / _{- .000"}		D2	L1				
		1/8	.005	.042	1/16	.187	4	1/8	1-1/2	922508	59.30	922508-C3 64.50
		3/16	.005	.060	3/32	.312	4	3/16	2	922512	62.50	922512-C3 68.10
		1/4	.005	.078	1/8	.312	4	1/4	2	922516	80.00	922516-C3 87.60
		1/4	.010	.084	1/8	.312	4	1/4	2	934716	80.00	934716-C3 87.60
		1/4	.010	.084	1/8	1.000	4	1/4	3	930516	89.80	930516-C3 97.40
		3/8	.010	.084	1/4	.500	6	3/8	2-1/2	934724	107.40	934724-C3 117.50
		3/8	.015	.089	1/4	.500	6	3/8	2-1/2	911224	107.40	911224-C3 117.50
90°		1/2	.010	.120	5/16	.500	6	1/2	3	934732	133.30	934732-C3 148.40
		1/2	.015	.126	5/16	.500	6	1/2	3	911232	133.30	911232-C3 148.40
		1/16	.005	.035	1/32	.093	2	1/8	1-1/2	45804	61.10	45804-C3 66.30
		5/64	.005	.043	.039	.118	2	1/8	1-1/2	45805	61.10	45805-C3 66.30
		3/32	.005	.050	3/64	.141	2	1/8	1-1/2	45806	61.10	45806-C3 66.30
		1/8	.005	.067	1/16	.187	4	1/8	1-1/2	45808	61.10	45808-C3 66.30
		1/8	.005	.067	1/16	.312	4	1/8	1-1/2	898408	68.70	898408-C3 73.90
		1/8	.005	.067	1/16	.500	4	1/8	1-1/2	928708	75.30	928708-C3 80.50
		1/8	.010	.071	1/16	.187	4	1/8	1-1/2	46608	61.60	46608-C3 66.80
		5/32	.005	.082	5/64	.250	4	3/16	2	45810	64.30	45810-C3 69.90
		5/32	.005	.082	5/64	.625	4	3/16	2-1/2	928710	72.00	928710-C3 77.60
		3/16	.005	.099	3/32	.187	4	3/16	2	755212	64.90	755212-C3 70.50
		3/16	.005	.099	3/32	.312	4	3/16	2	45812	64.30	45812-C3 69.90
		3/16	.005	.099	3/32	.500	4	3/16	2	898412	68.20	898412-C3 73.80
		3/16	.005	.099	3/32	.750	4	3/16	2-1/2	928712	72.00	928712-C3 77.60
		3/16	.010	.103	3/32	.312	4	3/16	2	46612	64.30	46612-C3 69.90
		1/4	.005	.129	1/8	.312	4	1/4	2	45816	74.10	45816-C3 81.70
		1/4	.005	.129	1/8	.625	4	1/4	2-1/2	898416	79.40	898416-C3 87.00
		1/4	.005	.129	1/8	1.000	4	1/4	3	928716	86.50	928716-C3 94.10
		1/4	.010	.133	1/8	.312	4	1/4	2	46616	74.10	46616-C3 81.70
		1/4	.010	.133	1/8	.625	4	1/4	2-1/2	890716	79.40	890716-C3 87.00
		1/4	.010	.133	1/8	1.000	4	1/4	3	931916	86.50	931916-C3 94.10
		1/4	.015	.137	1/8	.312	4	1/4	2	988616	74.80	988616-C3 82.40
		1/4	.020	.142	1/8	.312	4	1/4	2	831016	74.10	831016-C3 81.70
		5/16	.005	.130	3/16	1.250	6	5/16	3	928720	91.60	928720-C3 100.50
		5/16	.010	.134	3/16	.375	6	5/16	2-1/2	46620	93.20	46620-C3 102.10
		5/16	.010	.134	3/16	.875	6	5/16	2-1/2	890720	94.50	890720-C3 103.40
		5/16	.010	.134	3/16	1.250	6	5/16	3	931920	94.10	931920-C3 103.00

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DOUBLE ANGLE SHANK CUTTERS

DOUBLE ANGLE SHANK CUTTERS

Tip Radius (cont.)

continued from previous page

INCL. ANGLE	CUTTER DIA.	RADIUS	CUTTER WIDTH	NECK DIAMETER	NECK LENGTH	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
									TOOL #	PRICE	TOOL #	PRICE
B ^{+1°} _{-1°}	D ₁ ^{+0.000"} _{-.002"}	R ^{+0.001"} _{-.001"}	L ₂		L ₃ ^{+0.020"} _{-.000"}		D ₂	L ₁				
90°	3/8	.010	.133	1/4	.500	6	3/8	2-1/2	46624	100.30	46624-C3	110.40
	3/8	.010	.133	1/4	1.000	6	3/8	2-1/2	890724	102.00	890724-C3	112.10
	3/8	.010	.133	1/4	1.500	6	3/8	3-1/2	931924	121.00	931924-C3	131.10
	3/8	.015	.137	1/4	.500	6	3/8	2-1/2	988624	99.40	988624-C3	109.50
	3/8	.015	.137	1/4	1.000	6	3/8	2-1/2	894124	102.00	894124-C3	112.10
	3/8	.015	.137	1/4	1.500	6	3/8	3-1/2	923524	121.00	923524-C3	131.10
	3/8	.020	.142	1/4	.500	6	3/8	2-1/2	831024	99.40	831024-C3	109.50
	1/2	.010	.196	5/16	.500	6	1/2	3	46632	128.70	46632-C3	143.80
	1/2	.010	.196	5/16	1.000	6	1/2	3	890732	131.20	890732-C3	146.30
	1/2	.010	.196	5/16	1.500	6	1/2	4	931932	158.20	931932-C3	173.30
	1/2	.015	.200	5/16	.500	6	1/2	3	988632	128.70	988632-C3	143.80
	1/2	.015	.200	5/16	1.000	6	1/2	3	894132	131.20	894132-C3	146.30
	1/2	.015	.200	5/16	1.500	6	1/2	4	923532	158.20	923532-C3	173.30

DOUBLE ANGLE SHANK CUTTERS

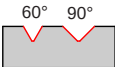
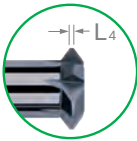
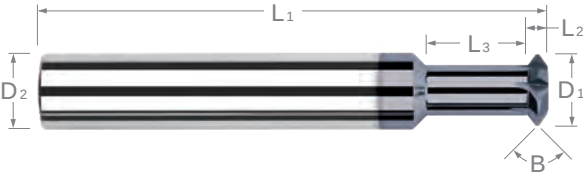


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DOUBLE ANGLE SHANK CUTTERS

Tip Flat



- Ideal for back chamfering, chamfering, deburring, and milling a “V-groove”
- Flat on tip for improved strength and wear resistance
- Reduced neck for long reach machining
- Solid carbide
- CNC ground in the USA

Included Angle (B)
Stocked in **Two** Included Angles!

INCL. ANGLE	CUTTER DIA.	TIP FLAT	CUTTER WIDTH	NECK DIAMETER	NECK LENGTH	FLUTES	SHANK DIA.	OAL	UNCOATED		AITIN COATED	
B ^{+1°} _{-1°}	D ₁ ^{+0.000"} _{-.002"}	L ₄ ^{+0.001"} _{-.001"}	L ₂		L ₃ ^{+0.020"} _{-.000"}		D ₂	L ₁	TOOL #	PRICE	TOOL #	PRICE
60°	1/8	.010	.046	1/16	.187	4	1/8	1-1/2	778008	49.10	778008-C3	54.30
	3/16	.010	.065	3/32	.312	4	3/16	2	778012	52.20	778012-C3	57.80
	1/4	.010	.082	1/8	.312	4	1/4	2	778016	69.80	778016-C3	77.40
	3/8	.010	.082	1/4	.500	6	3/8	2-1/2	778024	89.10	778024-C3	99.20
	1/2	.010	.119	5/16	.500	6	1/2	3	778032	122.00	778032-C3	137.10
90°	1/8	.010	.073	1/16	.187	4	1/8	1-1/2	776608	47.30	776608-C3	52.50
	1/8	.010	.073	1/16	.500	4	1/8	1-1/2	775108	61.50	775108-C3	66.70
	3/16	.010	.105	3/32	.312	4	3/16	2	776612	49.40	776612-C3	55.00
	3/16	.010	.105	3/32	.750	4	3/16	2-1/2	775112	62.40	775112-C3	68.00
	1/4	.010	.135	1/8	.312	4	1/4	2	776616	60.50	776616-C3	68.10
	1/4	.010	.135	1/8	1.000	4	1/4	3	775116	73.60	775116-C3	81.20
	3/8	.010	.135	1/4	.500	6	3/8	2-1/2	776624	86.50	776624-C3	96.60
	3/8	.010	.135	1/4	1.500	6	3/8	3-1/2	775124	108.80	775124-C3	118.90
	1/2	.010	.198	5/16	.500	6	1/2	3	776632	115.70	776632-C3	130.80
	1/2	.010	.198	5/16	1.500	6	1/2	4	775132	148.00	775132-C3	163.10

DOUBLE ANGLE SHANK CUTTERS

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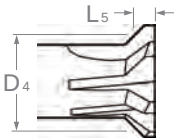
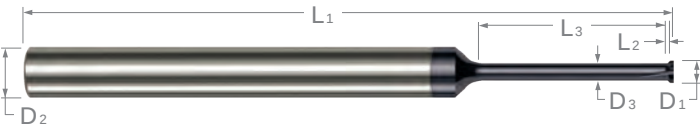
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BACK DEBURRING MILLS



- Ideal for deburring on backside of small holes and tight pockets
- Slightly undersized to fit in common hole sizes
- 90° included angle, cutting on angle only
- Design has smaller radial projection than double angle shank cutters and back chamfer cutters, which results in increased neck diameter and improved strength
- Left hand shear flute / right hand cut evacuates chip away from part
- Multiple flutes for improved finish
- Solid carbide • CNC ground in the USA

Reach Through
Miniature Holes and
Slots to Remove Burr
on Backside of Part



HEAD DIA.	AXIAL LOC	NECK DIA.	NECK LENGTH	CHAMFER CENTER LENGTH	CHAMFER CENTER DIAMETER	FLUTES	SHANK DIA.	OAL	UNCOATED		AItIn COATED	
D ₁ ^{+0.000"} _{-0.001"}	L ₂	D ₃	L ₃ ^{+0.010"} _{-0.000"}	L ₅ ^{+0.0005"} _{-0.0005"}	D ₄ (Max.)		D ₂	L ₁	TOOL #	PRICE	TOOL #	PRICE
.028	.0029	.021	.093	.0215	.0261	3	1/8	2	846328	68.70	846328-C3	73.90
.028	.0029	.021	.125	.0215	.0261	3	1/8	2	65728	68.70	65728-C3	73.90
.028	.0029	.021	.250	.0215	.0261	3	1/8	2	57028	68.70	57028-C3	73.90
.040	.0048	.028	.125	.0324	.0362	4	1/8	2	846340	63.90	846340-C3	69.10
.040	.0048	.028	.187	.0324	.0362	4	1/8	2	65740	63.90	65740-C3	69.10
.040	.0048	.028	.312	.0324	.0362	4	1/8	2	57040	63.90	57040-C3	69.10
.055	.0045	.043	.187	.0423	.0515	4	1/8	2	846355	63.90	846355-C3	69.10
.055	.0045	.043	.281	.0423	.0515	4	1/8	2	65755	63.90	65755-C3	69.10
.055	.0045	.043	.437	.0423	.0515	4	1/8	2	57055	63.90	57055-C3	69.10
.080	.0077	.060	.250	.0638	.0733	5	1/8	2	846380	57.80	846380-C3	63.00
.080	.0077	.060	.375	.0638	.0733	5	1/8	2	65780	57.80	65780-C3	63.00
.080	.0077	.060	.625	.0638	.0733	5	1/8	2	57080	57.80	57080-C3	63.00
.115	.0111	.087	.375	.0655	.1049	5	1/8	2	846410	57.80	846410-C3	63.00
.115	.0111	.087	.562	.0655	.1049	5	1/8	2	65810	57.80	65810-C3	63.00
.115	.0111	.087	1.000	.0655	.1049	5	1/8	2	57110	57.80	57110-C3	63.00

D ₁ ^{+0.000"} _{-0.002"}	L ₂	D ₃	L ₃ ^{+0.010"} _{-0.000"}	L ₅ ^{+0.0005"} _{-0.0005"}	D ₄ (Max.)		D ₂	L ₁	TOOL #	PRICE	TOOL #	PRICE
.125	.0111	.097	.375	.0655	.1139	6	1/8	2	846425	57.80	846425-C3	63.00
.135	.0111	.107	.437	.0655	.1249	5	3/16	2	846420	58.60	846420-C3	64.20
.135	.0111	.107	.625	.0655	.1249	5	3/16	2-1/2	65820	59.50	65820-C3	65.10
.135	.0111	.107	1.125	.0655	.1249	5	3/16	2-1/2	57120	59.50	57120-C3	65.10
.165	.0191	.121	.500	.0695	.1469	6	3/16	2	846430	58.60	846430-C3	64.20
.165	.0191	.121	.750	.0695	.1469	6	3/16	2-1/2	65830	59.50	65830-C3	65.10
.165	.0191	.121	1.375	.0695	.1469	6	3/16	2-1/2	57130	59.50	57130-C3	65.10
.187	.0191	.143	.563	.0695	.1679	6	3/16	2	846435	58.60	846435-C3	64.20
.210	.0191	.166	.625	.0695	.1919	6	1/4	2-1/2	846440	62.60	846440-C3	70.20
.210	.0191	.166	1.000	.0695	.1919	6	1/4	3	65840	63.90	65840-C3	71.50
.210	.0191	.166	1.750	.0695	.1919	6	1/4	3	57140	63.90	57140-C3	71.50
.262	.0251	.206	1.375	.0925	.2379	8	5/16	3	65850	64.90	65850-C3	73.80
.262	.0251	.206	2.125	.0925	.2379	8	5/16	4	57150	74.80	57150-C3	85.50
.315	.0251	.259	1.625	.0925	.2909	8	3/8	3	65860	80.20	65860-C3	90.30
.315	.0251	.259	2.500	.0925	.2909	8	3/8	4	57160	90.30	57160-C3	104.10
.420	.0321	.350	2.125	.1160	.3889	10	7/16	4	65870	101.60	65870-C3	116.70
.420	.0321	.350	3.375	.1160	.3889	10	7/16	6	57170	117.90	57170-C3	134.80

BACK DEBURRING MILLS