

NEW!

**HIGH PERFORMANCE
DRILLS AND END MILLS
FOR HIGH SPEED
MACHINING OF
ALUMINUM**

Pricing current as of January 1, 2006

**No. 0601A
SUPPLEMENT TO
CATALOG 2003-04**

GARR[®] TOOL

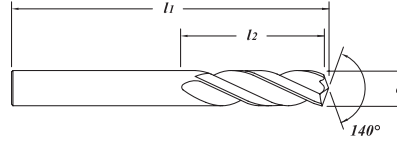
Series 1180 - 3 flute High Performance Drill for Aluminum

5xD Drill - AlumaStar Coated

TOLERANCES

d : +.0000 - .0005" (+0.0000 - 0.0127mm)
 l_1 : +.125 - .125" (+3.175 - 3.175mm)
 l_2 : +.125 - .125" (+3.175 - 3.175mm)

High performance solid carbide drill
 Designed for drilling aluminum and other soft materials
 No spot drilling required
 Unique point geometry and coating for higher speeds and feeds
 Up to 5x longer tool life than Zrn coated drills
 140° high performance drill point



EDP#	Decimal Equivalent	d Diameter †	l_1 Overall Length	l_2 Flute Length	1-11	12-25	26-49	50-100
70166	.1575	4mm	65mm	24mm	37.74	36.10	34.46	32.82
70191	.1772	4.5mm	65mm	25mm	39.87	38.14	36.40	34.67
70211	.1875	3/16 (4.76mm)	2-3/4	1-1/4	40.93	39.15	37.37	35.59
70216	.1890	No. 12 (4.80mm)	2-3/4	1-1/4	42.44	40.59	38.75	36.90
70221	.1910	No. 11 (4.85mm)	2-3/4	1-1/4	42.70	40.84	38.99	37.13
70226	.1935	No. 10 (4.91mm)	2-3/4	1-1/4	42.98	41.11	39.24	37.37
70231	.1969	5mm	75mm	32mm	43.50	41.61	39.72	37.83
70236	.1990	No. 8 (5.05mm)	3	1-5/16	43.71	41.81	39.91	38.01
70241	.2010	No. 7 (5.10mm)	3	1-5/16	43.88	41.97	40.06	38.16
70246	.2031	13/64 (5.16mm)	3	1-5/16	44.19	42.27	40.35	38.43
70251	.2040	No. 6 (5.18mm)	3	1-3/8	44.49	42.56	40.62	38.69
70256	.2055	No. 5 (5.22mm)	3	1-3/8	44.78	42.83	40.89	38.94
70261	.2090	No. 4 (5.31mm)	3	1-3/8	45.05	43.09	41.13	39.17
70266	.2130	No. 3 (5.41mm)	3	1-3/8	45.33	43.36	41.39	39.42
70271	.2165	5.5mm	75mm	35mm	45.60	43.62	41.63	39.65
70276	.2188	7/32 (5.56mm)	3	1-3/8	45.87	43.88	41.88	39.89
70281	.2210	No. 2 (5.61mm)	3	1-3/8	46.79	44.76	42.72	40.69
70286	.2280	No. 1 (5.79mm)	3	1-3/8	47.01	44.97	42.92	40.88
70296	.2344	15/64 (5.95mm)	3-1/4	1-1/2	47.97	45.88	43.80	41.71
70301	.2362	6mm	82mm	38mm	48.10	46.01	43.92	41.83
70306	.2380	B (6.04mm)	3-1/4	1-5/8	48.23	46.13	44.04	41.94
70311	.2420	C (6.15mm)	3-1/4	1-5/8	48.54	46.43	44.32	42.21
70316	.2460	D (6.25mm)	3-1/4	1-5/8	48.84	46.72	44.59	42.47
70321	.2500	1/4 (E) (6.35mm)	3-1/4	1-5/8	49.09	46.96	44.82	42.69
70326	.2559	6.5mm	82mm	41mm	52.38	50.10	47.83	45.55
70331	.2570	F (6.53mm)	3-1/4	1-11/16	53.18	50.87	48.56	46.24
70336	.2610	G (6.63mm)	3-1/2	1-11/16	53.99	51.64	49.30	46.95
70341	.2656	17/64 (6.75mm)	3-1/2	1-11/16	54.79	52.41	50.03	47.64
70346	.2660	H (6.76mm)	3-1/2	1-11/16	55.63	53.21	50.79	48.37
70351	.2720	I (6.91mm)	3-1/2	1-11/16	56.42	53.97	51.51	49.06
70356	.2756	7mm	88mm	43mm	57.21	54.72	52.24	49.75
70361	.2770	J (7.03mm)	3-1/2	1-11/16	58.03	55.51	52.98	50.46
70371	.2812	9/32 (7.14mm)	3-1/2	1-3/4	59.66	57.07	54.47	51.88
70376	.2900	L (7.37mm)	3-1/2	1-3/4	60.41	57.78	55.16	52.53

3 flute High Performance Drill for Aluminum - Series 1180

5xD Drill - AlumaStar Coated

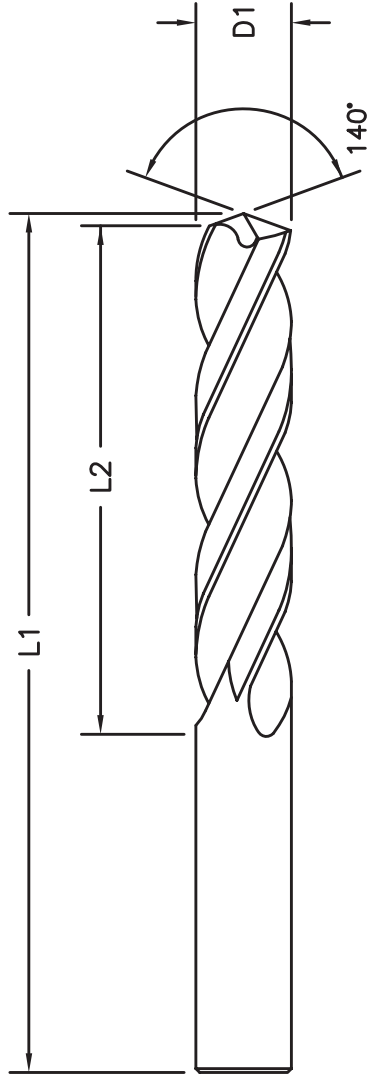
EDP#	Decimal Equivalent	<i>d</i> Diameter †		<i>l₁</i> Overall Length	<i>l₂</i> Flute Length	1-11	12-25	26-49	50-100
70381	.2953	7.5mm		95mm	44mm	61.20	58.54	55.88	53.22
70386	.2969	19/64	(7.54mm)	3-3/4	1-7/8	61.73	59.05	56.36	53.68
70391	.3020	N (7.67mm)		3-3/4	1-7/8	63.97	61.19	58.41	55.63
70396	.3125	5/16 (7.94mm)		3-3/4	1-7/8	64.15	61.36	58.57	55.78
70401	.3150	8mm		95mm	48mm	67.70	64.76	61.81	58.87
70406	.3160	O (8.03mm)		3-3/4	1-7/8	67.70	64.76	61.81	58.87
70411	.3230	P (8.20mm)		3-3/4	2-3/32	67.92	64.97	62.01	59.06
70416	.3281	21/64	(8.33mm)	4	2-3/32	68.49	65.51	62.53	59.56
70421	.3320	Q (8.43mm)		4	2-3/32	69.75	66.72	63.68	60.65
70426	.3346	8.5mm		100mm	53mm	70.22	67.17	64.11	61.06
70431	.3390	R (8.61mm)		4	2-3/32	71.98	68.85	65.72	62.59
70436	.3438	11/32 (8.73mm)		4	2-3/16	74.32	71.09	67.86	64.63
70441	.3480	S (8.84mm)		4	2-3/16	78.61	75.19	71.77	68.36
70446	.3543	9mm		100mm	55mm	79.04	75.60	72.17	68.73
70451	.3580	T (9.09mm)		4-1/4	2-9/32	83.27	79.65	76.03	72.41
70456	.3594	23/64	(9.13mm)	4-1/4	2-9/32	83.72	80.08	76.44	72.80
70461	.3680	U (9.35mm)		4-1/4	2-9/32	91.49	87.51	83.53	79.56
70466	.3740	9.5mm		108mm	58mm	92.30	88.29	84.27	80.26
70471	.3750	3/8 (9.52mm)		4-1/4	2-3/8	93.14	89.09	85.04	80.99
70476	.3770	V (9.57mm)		4-1/4	2-3/8	95.60	91.44	87.29	83.13
70481	.3860	W (9.80mm)		4-1/2	2-3/8	97.13	92.91	88.68	84.46
70486	.3906	25/64 (9.92mm)		4-1/2	2-3/8	98.21	93.94	89.67	85.40
70491	.3937	10mm		114mm	60mm	100.88	96.49	92.11	87.72
70496	.3970	X (10.08mm)		4-1/2	2-1/2	102.99	98.51	94.03	89.56
70501	.4040	Y (10.26mm)		4-1/2	2-9/16	105.83	101.23	96.63	92.03
70506	.4062	13/32	(10.32mm)	4-1/2	2-9/16	106.66	102.02	97.38	92.75
70511	.4134	10.5mm		114mm	67mm	107.56	102.88	98.21	93.53
70516	.4219	27/64	(10.72mm)	4-1/2	2-11/16	108.46	103.74	99.03	94.31
70521	.4331	11mm		114mm	68mm	115.71	110.68	105.65	100.62
70526	.4375	7/16 (11.11mm)		4-3/4	2-13/16	116.14	111.09	106.04	100.99
70531	.4528	11.5mm		120mm	70mm	123.50	118.13	112.76	107.39
70536	.4531	29/64	(11.51mm)	4-3/4	2-7/8	123.50	118.13	112.76	107.39
70541	.4688	15/32 (11.91mm)		4-3/4	2-7/8	129.26	123.64	118.02	112.40
70546	.4724	12mm		120mm	73mm	129.61	123.97	118.34	112.70
70551	.4844	31/64	(12.30mm)	5-5/16	3	131.91	126.17	120.44	114.70
70556	.4921	12.5mm		135mm	75mm	133.37	127.57	121.77	115.97
70561	.5000	1/2 (12.70mm)		5-3/8	3-1/16	133.62	127.81	122.00	116.19
70566	.5118	13mm		136mm	78mm	150.39	143.85	137.31	130.77
70571	.5156	33/64	(13.10mm)	5-3/8	3-1/8	153.61	146.93	140.25	133.57
70576	.5312	17/32	(13.49mm)	5-11/16	3-5/16	156.92	150.10	143.27	136.45

Series 1180 - 3 flute High Performance Drill for Aluminum

5xD Drill - *AlumaStar* Coated

EDP#	Decimal Equivalent	<i>d</i> Diameter †	<i>l₁</i> Overall Length	<i>l₂</i> Flute Length	1-11	12-25	26-49	50-100
70581	.5469	35/64 (13.89mm)	5-13/16	3-3/8	163.31	156.21	149.11	142.01
70586	.5512	14mm	148mm	86mm	166.55	159.31	152.07	144.83
70591	.5625	9/16 (14.29mm)	5-15/16	3-1/2	179.03	171.25	163.46	155.68
70596	.5781	37/64 (14.68mm)	6	3-1/2	185.13	177.08	169.03	160.98
70601	.5906	15mm	152mm	90mm	188.35	180.16	171.97	163.78
70606	.5938	19/32 (15.08mm)	6	3-9/16	189.26	181.03	172.80	164.57
70611	.6094	39/64 (15.48mm)	6-3/16	3-11/16	205.15	196.23	187.31	178.39
70616	.6250	5/8 (15.87mm)	6-5/16	3-3/4	206.94	197.94	188.94	179.95
70621	.6299	16mm	160mm	95mm	211.27	202.08	192.90	183.71

AlumaStar (Titanium Diboride - TiB₂) is a thin film coating with a low affinity for aluminum. Thus, it is ideal for machining aluminum alloys where a primary cause of failure is from adhesive wear. The resistance to adhesion of aluminum allows the user to work at higher speeds or feeds, enhancing productivity. The coating thickness is intentionally kept lower than other materials in order to maintain a sharp edge for cutting softer materials. The high hardness reduces tool wear when machining abrasive non-ferrous materials, such as Al-Si (up to 12% Si) alloys. The combined features of AlumaStar allow the machining of a range of aluminum, magnesium, copper, and titanium alloys with the possibility of reducing, but not eliminating, lubrication.



D: _____ TOL: _____
 L1: _____
 L2: _____

DIMENSIONS NOT SHOWN TO BE GARR TOOL STANDARDS
 TOLERANCES ARE BEFORE ANY COATING IS APPLIED

SOLID CARBIDE - MICRO GRAIN
 3 RHS FLUTES
 30° HELIX
 ALUMASTAR (TiB2) COATED

FOR HIGH SPEED DRILLING OF ALUMINIUM

REVISIONS

GARR TOOL

ALMA, MICHIGAN

SCALE: -	DRAWN BY:	APPR. BY:
DATE:	DATE:	

TITLE: 5xD DRILL - 3 FLUTE

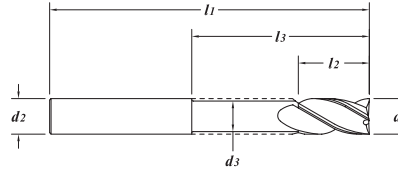
CUSTOMER:	DWG NO.: SERIES 1180
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Series 142M - 2 flute Series 143M - 3 flute HSAL Square End - AlumaStar Coated

TOLERANCES

d_1 : $+0.000 -0.001"$ ($+0.000 -0.025\text{mm}$)
 d_2 : h6

High Speed Aluminum solid carbide end mill
Specific coating engineered to repel aluminum
Engineered to run at 750-2500 SFM
High velocity - high metal removal rate
Use properly balanced holders
Holds perpendicularity
Flats can be added within 48 hours for a nominal charge



2 Flute EDP#	3 Flute EDP#	Dec. Equiv.	d_1 Flute Diameter †	d_2 Shank Dia.	l_1 Overall Length	l_2 Flute Length	l_3 Reach Length	d_3 Neck Dia.	1-11	12-25	26-49	50-100
41222	41223	.1575	4mm	6mm	50mm	12mm			20.65	19.75	18.85	17.96
-	41243	.1575	4mm	6mm	65mm	6mm	16mm	3.7mm	25.85	24.73	23.60	22.48
41282	41283	.1875	3/16 (4.76mm)	3/16	2	9/16			15.57	14.89	14.22	13.54
-	41303	.1875	3/16 (4.76mm)	3/16	3	7/32	3/4	.170	29.22	27.95	26.68	25.41
-	41313	.1875	3/16 (4.76mm)	3/16	3	1			25.12	24.03	22.94	21.84
41342	41343	.1969	5mm	6mm	65mm	16mm			21.31	20.38	19.46	18.53
-	41363	.1969	5mm	6mm	75mm	8mm	20mm	4.7mm	36.24	34.66	33.09	31.51
41402	41403	.2362	6mm	6mm	65mm	19mm			20.63	19.73	18.84	17.94
-	41423	.2362	6mm	6mm	75mm	10mm	25mm	5.7mm	35.08	33.55	32.03	30.50
41462	41463	.2500	1/4 (6.35mm)	1/4	2-1/2	3/4			19.60	18.75	17.90	17.04
-	41493	.2500	1/4 (6.35mm)	1/4	4	3/8	1-1/8	.235	35.43	33.89	32.35	30.81
-	41503	.2500	1/4 (6.35mm)	1/4	4	3/8	2-1/8	.235	39.54	37.82	36.10	34.38
-	41513	.2500	1/4 (6.35mm)	1/4	4	1-5/8			31.33	29.97	28.61	27.24
41542	41543	.2756	7mm	8mm	65mm	19mm			31.64	30.26	28.89	27.51
-	41563	.2756	7mm	8mm	75mm	12mm	25mm	6.4mm	47.53	45.46	43.40	41.33
41602	41603	.3125	5/16 (7.94mm)	5/16	2-1/2	3/4			27.22	26.04	24.85	23.67
-	41623	.3125	5/16 (7.94mm)	5/16	4	7/16	1-1/8	.297	46.48	44.46	42.44	40.42
41662	41663	.3150	8mm	8mm	65mm	19mm			28.66	27.41	26.17	24.92
-	41683	.3150	8mm	8mm	75mm	12mm	25mm	7.4mm	43.25	41.37	39.49	37.61
41722	41723	.3750	3/8 (9.52mm)	3/8	2-1/2	7/8			31.98	30.59	29.20	27.81
-	41763	.3750	3/8 (9.52mm)	3/8	4	1/2	2-1/8	.355	54.05	51.70	49.35	47.00
-	41773	.3750	3/8 (9.52mm)	3/8	4	1-5/8			45.84	43.85	41.85	39.86
-	41783	.3750	3/8 (9.52mm)	3/8	6	1/2	4	.355	81.88	78.32	74.76	71.20
41802	41803	.3937	10mm	10mm	70mm	24mm			48.13	46.04	43.94	41.85
-	41843	.3937	10mm	10mm	100mm	12mm	35mm	9.4mm	64.16	61.37	58.58	55.79
41882	41883	.4724	12mm	12mm	75mm	32mm			53.83	51.49	49.15	46.81
-	41903	.4724	12mm	12mm	100mm	16mm	35mm	11.4mm	79.05	75.61	72.18	68.74
41942	41943	.5000	1/2 (12.70mm)	1/2	3	1-1/4			51.14	48.92	46.69	44.47
-	41983	.5000	1/2 (12.70mm)	1/2	4	5/8	2-1/8	.475	75.08	71.82	68.55	65.29
-	41993	.5000	1/2 (12.70mm)	1/2	6	5/8	4-1/8	.475				99.83
-	42003	.5000	1/2 (12.70mm)	1/2	6	3-1/8			98.37	94.09	89.82	85.54

2 flute- Series 142M
3 flute- Series 143M

HSAL Square End - *AlumaStar Coated*

2 Flute EDP#	3 Flute EDP#	Dec. Equiv.	d_1 Flute Diameter †	d_2 Shank Dia.	l_1 Overall Length	l_2 Flute Length	l_3 Reach Length	d_3 Neck Dia.	1-11	12-25	26-49	50-100
42022	42023	.6250	5/8 (15.87mm)	5/8	4	1-5/8			101.92	97.49	93.06	88.63
-	42033	.6250	5/8 (15.87mm)	5/8	6	3/4	2-3/8	.590	142.27	136.08	129.90	123.71
-	42043	.6250	5/8 (15.87mm)	5/8	6	3/4	4-3/8	.590	150.49	143.95	137.40	130.86
-	42053	.6250	5/8 (15.87mm)	5/8	6	3-1/8			134.06	128.23	122.40	116.57
42082	42083	.6299	16mm	16mm	100mm	40mm			107.28	102.62	97.95	93.29
-	42103	.6299	16mm	16mm	100mm	20mm	40mm	15.4mm	111.39	106.55	101.70	96.86
42142	42143	.7500	3/4 (19.05mm)	3/4	4	1-5/8			130.42	124.75	119.08	113.41
-	42153	.7500	3/4 (19.05mm)	3/4	5	2			172.21	164.72	157.23	149.75
-	42163	.7500	3/4 (19.05mm)	3/4	6	1	2-1/2	.715	187.35	179.20	171.06	162.91
-	42173	.7500	3/4 (19.05mm)	3/4	6	1	4-3/8	.715	193.14	184.74	176.34	167.95
42212	42213	.7874	20mm	20mm	100mm	32mm			175.10	167.49	159.87	152.26
-	42223	.7874	20mm	20mm	100mm	20mm	40mm	19mm	179.20	171.41	163.62	155.83
42242	42243	.9843	25mm	25mm	100mm	38mm			202.03	193.25	184.46	175.68
-	42283	.9843	25mm	25mm	100mm	25mm	50mm	24mm	206.14	197.18	188.21	179.25
42302	42303	1.000	1 (25.40mm)	1	4	1-5/8			196.02	187.50	178.97	170.45
-	42343	1.000	1 (25.40mm)	1	6	1-1/4	3-3/8	.960	313.51	299.88	286.25	272.62
-	42353	1.000	1 (25.40mm)	1	6	3-1/8			301.20	288.10	275.01	261.91

Series 143R - 3 flute

HSAL Corner Radius - *AlumaStar Coated*

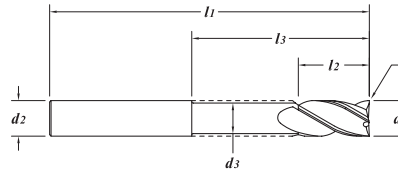
TOLERANCES

d_1 : +.000 - .001" (+0.000 - 0.025mm)

d_2 : h6

r : +.0005 - .0005" (+0.0127 - 0.0127mm)

High Speed Aluminum solid carbide end mill
 Specific coating engineered to repel aluminum
 Engineered to run at 750-2500 SFM
 High velocity - high metal removal rate
 Use properly balanced holders
 Holds perpendicularity
 Flats can be added within 48 hours for a nominal charge



EDP#	Dec. Equiv.	d_1 Flute Diameter †	d_2 Shank Dia.	l_1 Overall Length	l_2 Flute Length	r Corner Radius	l_3 Reach Length	d_3 Neck Dia.	1-11	12-25	26-49	50-100
39223	.1575	4mm	6mm	50mm	12mm	0.3mm			24.16	23.11	22.06	21.01
39243	.1575	4mm	6mm	65mm	6mm	0.3mm	16mm	3.7mm	29.54	28.26	26.97	25.69
39283	.1875	3/16 (4.76mm)	3/16	2	9/16	.010			17.93	17.15	16.37	15.59
39303	.1875	3/16 (4.76mm)	3/16	3	7/32	.010	3/4	.170	32.81	31.38	29.96	28.53
39343	.1969	5mm	6mm	65mm	16mm	0.3mm			24.93	23.85	22.76	21.68
39363	.1969	5mm	6mm	75mm	8mm	0.3mm	20mm	4.7mm	40.73	38.96	37.19	35.42
39403	.2362	6mm	6mm	65mm	19mm	0.3mm			24.14	23.09	22.04	20.99
39423	.2362	6mm	6mm	75mm	10mm	0.3mm	25mm	5.7mm	39.43	37.72	36.00	34.29
39463	.2500	1/4 (6.35mm)	1/4	2-1/2	3/4	.015			22.93	21.93	20.94	19.94
39493	.2500	1/4 (6.35mm)	1/4	4	3/8	.015	1-1/8	.235	39.72	37.99	36.27	34.54
39503	.2500	1/4 (6.35mm)	1/4	4	3/8	.015	2-1/8	.235	43.83	41.92	40.02	38.11
39543	.2756	7mm	8mm	65mm	19mm	0.3mm			35.10	33.57	32.05	30.52
39563	.2756	7mm	8mm	75mm	12mm	0.3mm	25mm	6.4mm	53.48	51.15	48.83	46.50
39603	.3125	5/16 (7.94mm)	5/16	2-1/2	3/4	.015			30.34	29.02	27.70	26.38
39623	.3125	5/16 (7.94mm)	5/16	4	7/16	.015	1-1/8	.297	52.22	49.95	47.68	45.41
39663	.3150	8mm	8mm	65mm	19mm	0.5mm			31.94	30.55	29.16	27.77
39683	.3150	8mm	8mm	75mm	12mm	0.5mm	25mm	7.4mm	48.66	46.54	44.43	42.31
39723	.3750	3/8 (9.52mm)	3/8	2-1/2	7/8	.030			35.36	33.82	32.29	30.75
39763	.3750	3/8 (9.52mm)	3/8	4	1/2	.030	2-1/8	.355	60.40	57.77	55.15	52.52
39783	.3750	3/8 (9.52mm)	3/8	6	1/2	.030	4	.355	88.18	84.35	80.51	76.68
39803	.3937	10mm	10mm	70mm	24mm	0.5mm			54.23	51.87	49.51	47.16
39843	.3937	10mm	10mm	100mm	12mm	0.5mm	35mm	9.4mm	72.91	69.74	66.57	63.40
39883	.4724	12mm	12mm	75mm	32mm	0.5mm			67.09	64.17	61.26	58.34
39903	.4724	12mm	12mm	100mm	16mm	0.5mm	35mm	11.4mm	86.23	82.48	78.73	74.98
39943	.5000	1/2 (12.70mm)	1/2	3	1-1/4	.030			63.73	60.96	58.19	55.42
39983	.5000	1/2 (12.70mm)	1/2	4	5/8	.030	2-1/8	.475	81.91	78.35	74.79	71.23
39993	.5000	1/2 (12.70mm)	1/2	6	5/8	.030	4-1/8	.475	122.92	117.58	112.23	106.89
40023	.6250	5/8 (15.87mm)	5/8	4	1-5/8	.030			110.25	105.46	100.66	95.87
40033	.6250	5/8 (15.87mm)	5/8	6	3/4	.030	2-3/8	.590	157.64	150.79	143.93	137.08
40043	.6250	5/8 (15.87mm)	5/8	6	3/4	.030	4-3/8	.590	165.86	158.65	151.44	144.23
40083	.6299	16mm	16mm	100mm	40mm	1.0mm			116.06	111.01	105.97	100.92
40103	.6299	16mm	16mm	100mm	20mm	1.0mm	40mm	15.4mm	120.16	114.94	109.71	104.49
40143	.7500	3/4 (19.05mm)	3/4	4	1-5/8	.030			143.08	136.86	130.64	124.42
40163	.7500	3/4 (19.05mm)	3/4	6	1	.030	2-1/2	.715	213.23	203.96	194.69	185.42
40173	.7500	3/4 (19.05mm)	3/4	6	1	.030	4-3/8	.715	219.03	209.51	199.98	190.46

HSAL Corner Radius - *AlumaStar* Coated

EDP#	Dec. Equiv.	d_1 Flute Diameter †	d_2 Shank Dia.	l_1 Overall Length	l_2 Flute Length	r Corner Radius	l_3 Reach Length	d_3 Neck Dia.	1-11	12-25	26-49	50-100
40183	.7874	20mm	20mm	100mm	32mm	1.0mm			200.85	192.12	183.38	174.65
40223	.7874	20mm	20mm	100mm	20mm	1.0mm	40mm	19mm	204.95	196.04	187.13	178.22
40243	.9843	25mm	25mm	100mm	38mm	1.0mm			232.40	222.30	212.19	202.09
40283	.9843	25mm	25mm	100mm	25mm	1.0mm	50mm	24mm	236.51	226.23	215.94	205.66
40303	1.000	1 (25.40mm)	1	4	1-5/8	.060			244.02	233.41	222.80	212.19
40343	1.000	1 (25.40mm)	1	6	1-1/4	.060	3-3/8	.960	357.60	342.05	326.50	310.96

AlumaStar Coating (Titanium Diboride - TiB₂) has a low affinity to aluminum and high hardness, making it integral to the productive machining of aluminum alloys. The thickness is kept intentionally lower in order to maintain sharp cutting edges needed for the machining of softer materials like magnesium, and various copper and titanium alloys.

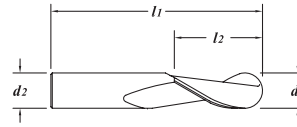
Series 142B - 2 flute

HSAL Ball End - AlumaStar Coated

TOLERANCES

d_1 : +.000 - .001" (+0.000 - 0.025mm)
 d_2 : h6

High Speed Aluminum solid carbide end mill
 Specific coating engineered to repel aluminum
 Engineered to run at 750-2500 SFM
 High velocity - high metal removal rate
 Use properly balanced holders
 Holds perpendicularity
 Flats can be added within 48 hours for a nominal charge
 Tolerance on ball radius is +.0000 - .0005" (+0.0000 - 0.0127mm)



EDP#	Dec. Equiv.	d_1 Flute Diameter †	d_2 Shank Dia.	l_1 Overall Length	l_2 Flute Length	1-11	12-25	26-49	50-100
42522	.1575	4mm	6mm	50mm	12mm	24.16	23.11	22.06	21.01
42582	.1875	3/16 (4.76mm)	3/16	2	9/16	17.93	17.15	16.37	15.59
42642	.1969	5mm	6mm	65mm	16mm	24.93	23.85	22.76	21.68
42702	.2362	6mm	6mm	65mm	19mm	24.14	23.09	22.04	20.99
42762	.2500	1/4 (6.35mm)	1/4	2-1/2	3/4	22.93	21.93	20.94	19.94
42842	.2756	7mm	8mm	65mm	19mm	35.10	33.57	32.05	30.52
42902	.3125	5/16 (7.94mm)	5/16	2-1/2	3/4	30.34	29.02	27.70	26.38
42962	.3150	8mm	8mm	65mm	19mm	31.94	30.55	29.16	27.77
43022	.3750	3/8 (9.52mm)	3/8	2-1/2	7/8	35.36	33.82	32.29	30.75
43102	.3937	10mm	10mm	70mm	24mm	54.23	51.87	49.51	47.16
43182	.4724	12mm	12mm	75mm	32mm	67.09	64.17	61.26	58.34
43242	.5000	1/2 (12.70mm)	1/2	3	1-1/4	63.73	60.96	58.19	55.42
43322	.6250	5/8 (15.87mm)	5/8	4	1-5/8	110.25	105.46	100.66	95.87
43382	.6299	16mm	16mm	100mm	40mm	116.06	111.01	105.97	100.92
43442	.7500	3/4 (19.05mm)	3/4	4	1-5/8	143.08	136.86	130.64	124.42
43482	.7874	20mm	20mm	100mm	32mm	200.85	192.12	183.38	174.65
43542	.9843	25mm	25mm	100mm	38mm	232.40	222.30	212.19	202.09
43602	1.000	1 (25.40mm)	1	4	1-5/8	244.02	233.41	222.80	212.19

GARR TOOL Aluminum Series Application Guide

END MILL (FRACTIONAL)			
SLOTTING		SIDE MILLING	
Axial = .5xD		Axial = 1xD	
SFM = 1500 - 2000		SFM = 750 - 1500	
Diameter	CPT = 1.5% - 3.0% of diameter	CPT = 1.0% - 2.0% of diameter	CPT = 2.0% - 3.0% of diameter
3/16	.0028 - .0056	.0018 - .0037	.0037 - .0056
1/4	.0037 - .0074	.0025 - .0050	.0050 - .0075
5/16	.0052 - .0104	.0031 - .0062	.0062 - .0094
3/8	.0055 - .0110	.0037 - .0074	.0075 - .0112
1/2	.0075 - .0150	.0050 - .0100	.0100 - .0150
5/8	.0093 - .0186	.0062 - .0125	.0125 - .0187
3/4	.0112 - .0224	.0075 - .0150	.0150 - .0225
1	.0150 - .0300	.0100 - .0200	.0200 - .0300

END MILL (METRIC)			
SLOTTING		SIDE MILLING	
Axial = .5xD		Axial = 1xD	
SMM = 450 - 760		SMM = 225 - 450	
Diameter	CPT = 1.5% - 3.0% of diameter	CPT = 1.0% - 2.0% of diameter	CPT = 2.0% - 3.0% of diameter
4mm	0.060 - 0.120	0.040 - 0.080	0.080 - 0.120
6mm	0.090 - 0.180	0.060 - 0.120	0.120 - 0.180
8mm	0.120 - 0.240	0.080 - 0.160	0.160 - 0.240
10mm	0.150 - 0.300	0.100 - 0.200	0.200 - 0.300
12mm	0.180 - 0.360	0.120 - 0.240	0.240 - 0.360
16mm	0.240 - 0.480	0.160 - 0.320	0.320 - 0.480
20mm	0.300 - 0.600	0.200 - 0.400	0.400 - 0.600
25mm	0.375 - 0.750	0.250 - 0.500	0.500 - 0.750

END MILL NOTES: Climb milling recommended for best finish
 Figures shown are based on 6061 / 7075
 CAT 50 Taper holders are recommended for 3/4" and 1" diameter end mills
 In controlled slotting tests, 4000 SFM, 1% diameter CPT, and .5xD axial depth were obtained
 In cases for slower SFM, reference Series 242M, page 46 of Garr Tool 2003-04 catalog

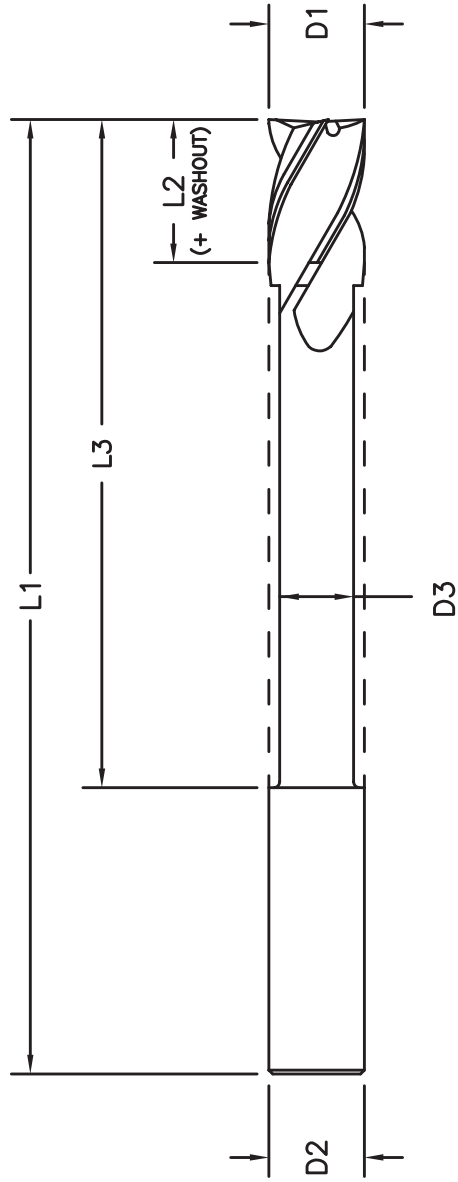
NOTE - ALL ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

GARR TOOL Aluminum Series Application Guide

DRILLS (Feedrate = IPR)								
Material	Type	SFM	3/16" (4.760mm)	1/4" (6.350mm)	5/16" (7.940mm)	3/8" (9.520mm)	1/2" (12.700mm)	5/8" (15.870mm)
Aluminum Alloy	6061	600 - 800	.008 - .012	.010 - .016	.012 - .016	.012 - .020	.016 - .024	.020 - .030
Cast Aluminum	380	450 - 600	.008 - .012	.010 - .016	.012 - .016	.012 - .020	.016 - .024	.020 - .030
Titanium	6Al-4V	100 - 300	.003 - .004	.004 - .006	.005 - .007	.005 - .007	.006 - .008	.007 - .009
Copper & Brass		400 - 600	.004 - .006	.005 - .008	.006 - .010	.007 - .012	.008 - .015	.010 - .015

PHYSICAL PROPERTIES AND CHARACTERISTICS OF ALUMASTAR COATING	
Property/Characteristic	Description
Nomenclature	TiB ₂
Color	Silver
Hardness	4000 Hv
Coating Thickness	1-2 μm
Thermal Stability	850° C (1562° F)
Deposition Temperature	450° C (842° F)
Applications	Aluminum, AlSi Alloys (<12% Si), Magnesium, Copper, Titanium Alloys, Non-ferrous

NOTE - ALL ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.



D1: _____ TOL: _____
 D2: _____ TOL: _____
 D3: _____
 L1: _____
 L2: _____
 L3: _____

DIMENSIONS NOT SHOWN TO BE GARR TOOL STANDARDS
 TOLERANCES ARE BEFORE ANY COATING IS APPLIED

SOLID CARBIDE - MICRO GRAIN
 3 RHS/RHC FLUTES
 38° HELIX
 ALUMASTAR (TiB2) COATED

FOR HIGH SPEED MILLING OF ALUMINUM

REVISIONS

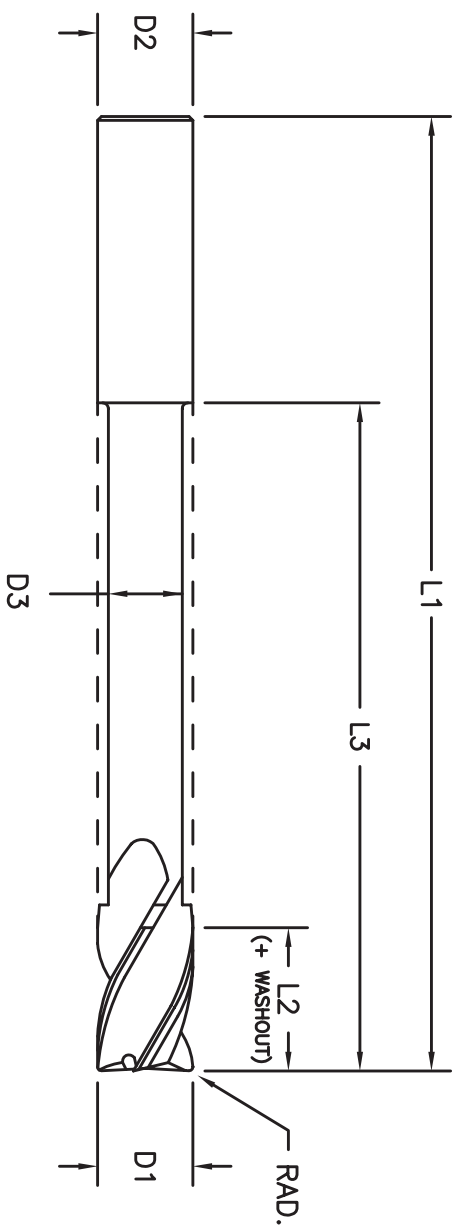
GARR TOOL

ALMA, MICHIGAN

SCALE: -	DRAWN BY:	APPR. BY:
DATE:	DATE:	

TITLE: HSAL SQ. END MILL - 3 FLUTE

CUSTOMER:	DWG NO.:
	SERIES 143M



- D1: _____ TOL: _____
- D2: _____ TOL: _____
- D3: _____ TOL: _____
- L1: _____ TOL: _____
- L2: _____ TOL: _____
- L3: _____ TOL: _____
- RAD: _____ TOL: _____

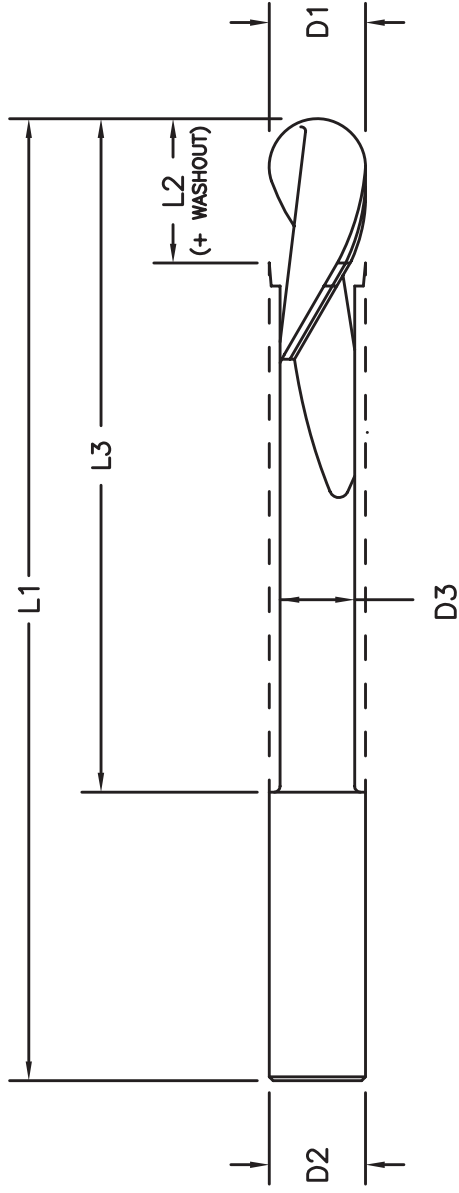
DIMENSIONS NOT SHOWN TO BE GARR TOOL STANDARDS
 TOLERANCES ARE BEFORE ANY COATING IS APPLIED

SOLID CARBIDE – MICRO GRAIN
 3 RHS/RHC FLUTES
 38° HELIX
 ALUMASTAR (TiB2) COATED

FOR HIGH SPEED MILLING OF ALUMINUM

REVISIONS

GARR TOOL			
ALMA, MICHIGAN			
SCALE: -	DRAWN BY:	APPR. BY:	
DATE:		DATE:	
TITLE: HSAL RAD. END MILL – 3 FLUTE			
CUSTOMER:		DWG NO.:	
			SERIES 143R



D1: _____ TOL: _____
 D2: _____ TOL: _____
 D3: _____
 L1: _____
 L2: _____
 L3: _____

DIMENSIONS NOT SHOWN TO BE GARR TOOL STANDARDS
 TOLERANCES ARE BEFORE ANY COATING IS APPLIED

SOLID CARBIDE - MICRO GRAIN
 2 RHS/RHC FLUTES
 41° HELIX
 ALUMASTAR (TiB2) COATED

FOR HIGH SPEED MILLING OF ALUMINUM

REVISIONS

GARR TOOL

ALMA, MICHIGAN

SCALE: -	DRAWN BY:	APPR. BY:
DATE:	DATE:	

TITLE: HSAL BALL END MILL - 2 FLUTE

CUSTOMER:	DWG NO.:
	SERIES 142B

The background is a complex, abstract composition of overlapping geometric shapes and lines. A prominent feature is a large, glowing orange and yellow circle in the lower-left quadrant, surrounded by smaller, similar circles and lines. The overall color palette is dominated by dark reds, oranges, and yellows, with some darker, almost black, areas. The shapes are sharp and angular, creating a sense of depth and movement.

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