

ADDITIONAL ITEMS!

**HIGH SPEED
END MILLS
FOR ALUMINUM**



GARR TOOL[®]

SUPPLEMENT 14.2

Series 142R

.1575" - .4724"
(4.000mm - 12.000mm)



TOLERANCES

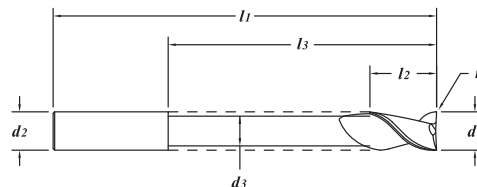
$d1$	+0.000" - .001" (+.000 - .025mm)
$d2$	h6
r	+0.0005" - .0005" (+.0127 - .0127mm)

Recommended for Aluminum

HSAL End Mill - 2 Flute - Corner Radius

ALUMASTAR Coated

- Solid submicron grain carbide end mill - center cutting
- Specific coating engineered to repel aluminum
- Engineered to run at 750-2500 SFM (225-750 M/Min.)
- For high speed machining of aluminum
- High velocity - high metal removal rate (for spindles 10,000 RPM and above)
- Need to use properly balanced holders
- Holds perpendicularity
- Flats can be added within 48 hours



MATERIAL HARDNESS (Rc)

70

35

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EDP#	$d1$ † Diameter		$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length	r Corner Radius	$l3$ Reach Length	$d3$ Neck Diameter	1-11	12-24	25-49	50-100
	Decimal	Metric										
39222	.1575	4.000	6.0	50	12	0.3	-	-	28.90	27.64	26.39	25.13
NEW 39232	.1575	4.000	6.0	65	6	0.5	20	3.7	35.34	33.80	32.27	30.73
NEW 39242	.1575	4.000	6.0	65	6	1.0	20	3.7	35.34	33.80	32.27	30.73
39282	.1875	3/16"	4.763	3/16"	2"	9/16"	.010"	-	21.44	20.50	19.57	18.64
39342	.1969	5.000	6.0	65	16	0.3	-	-	29.82	28.52	27.23	25.93
NEW 39352	.1969	5.000	6.0	75	8	0.5	20	4.7	48.73	46.61	44.49	42.37
NEW 39362	.1969	5.000	6.0	75	8	1.0	20	4.7	48.73	46.61	44.49	42.37
39402	.2362	6.000	6.0	65	19	0.3	-	-	28.87	27.61	26.36	25.10
NEW 39412	.2362	6.000	6.0	75	10	0.5	25	5.7	47.16	45.11	43.06	41.01
NEW 39422	.2362	6.000	6.0	75	10	1.0	25	5.7	47.16	45.11	43.06	41.01
NEW 39432	.2362	6.000	6.0	75	10	1.5	25	5.7	47.16	45.11	43.06	41.01
NEW 39442	.2362	6.000	6.0	75	10	2.0	25	5.7	47.16	45.11	43.06	41.01
39462	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.015"	-	27.43	26.24	25.04	23.85
39602	.3125	5/16"	7.938	5/16"	2-1/2"	3/4"	.015"	-	36.29	34.72	33.14	31.56
39662	.3150	8.000	8.0	65	19	0.5	-	-	38.19	36.53	34.87	33.21
NEW 39672	.3150	8.000	8.0	75	12	0.5	25	7.4	58.19	55.66	53.13	50.60
NEW 39682	.3150	8.000	8.0	75	12	1.0	25	7.4	58.19	55.66	53.13	50.60
NEW 39692	.3150	8.000	8.0	75	12	2.0	25	7.4	58.19	55.66	53.13	50.60
NEW 39702	.3150	8.000	8.0	75	12	3.0	25	7.4	58.19	55.66	53.13	50.60
39722	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.030"	-	42.30	40.46	38.62	36.78
39802	.3937	10.000	10.0	70	24	0.5	-	-	64.87	62.05	59.23	56.41
NEW 39812	.3937	10.000	10.0	100	12	1.0	35	9.4	87.20	83.41	79.62	75.83
NEW 39822	.3937	10.000	10.0	100	12	1.5	35	9.4	87.20	83.41	79.62	75.83
NEW 39832	.3937	10.000	10.0	100	12	2.0	35	9.4	87.20	83.41	79.62	75.83
NEW 39842	.3937	10.000	10.0	100	12	3.0	35	9.4	87.20	83.41	79.62	75.83
39882	.4724	12.000	12.0	75	32	0.5	-	-	80.24	76.75	73.26	69.77
NEW 39892	.4724	12.000	12.0	100	16	0.5	40	11.4	103.13	98.65	94.16	89.68
NEW 39902	.4724	12.000	12.0	100	16	1.0	40	11.4	103.13	98.65	94.16	89.68
NEW 39912	.4724	12.000	12.0	100	16	1.5	40	11.4	103.13	98.65	94.16	89.68
NEW 39922	.4724	12.000	12.0	100	16	2.0	40	11.4	103.13	98.65	94.16	89.68
NEW 39932	.4724	12.000	12.0	100	16	3.0	40	11.4	103.13	98.65	94.16	89.68

Series 142R (continued)

.5000" - 1.000"
(12.700mm - 25.400mm)

HIGH PERFORMANCE
END MILLS

EDP#	$d1$ † Diameter		$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length	r Corner Radius	$l3$ Reach Length	$d3$ Neck Diameter	1-11	12-24	25-49	50-100	
	Decimal	Metric											
39942	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.030"	-	-	76.23	72.92	69.60	66.29
40022	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.030"	-	-	131.86	126.13	120.39	114.66
40082	.6299		16.000	16.0	100	40	1.0	-	-	138.81	132.77	126.74	120.70
NEW 40092	.6299		16.000	16.0	125	20	1.0	60	15.4	188.62	180.42	172.22	164.02
NEW 40102	.6299		16.000	16.0	125	20	2.0	60	15.4	188.62	180.42	172.22	164.02
40142	.7500	3/4"	19.050	3/4"	4"	1-5/8"	.030"	-	-	171.13	163.69	156.25	148.81
40182	.7874		20.000	20.0	100	40	1.0	-	-	240.22	229.78	219.33	208.89
NEW 40192	.7874		20.000	20.0	150	20	1.0	65	19.0	328.96	314.66	300.35	286.05
NEW 40202	.7874		20.000	20.0	150	20	2.0	65	19.0	328.96	314.66	300.35	286.05
NEW 40212	.7874		20.000	20.0	150	20	3.0	65	19.0	328.96	314.66	300.35	286.05
40242	.9843		25.000	25.0	100	40	1.0	-	-	277.96	265.87	253.79	241.70
40302	1.000	1"	25.400	1"	4"	1-5/8"	.060"	-	-	291.85	279.16	266.47	253.78

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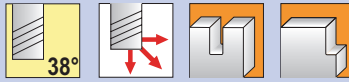
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MATERIAL HARDNESS (Rc)

Series 143R

.1575" - .3150"
(4.000mm - 8.000mm)



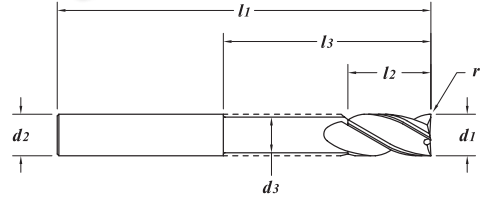
TOLERANCES

$d1$	+0.000" -0.001" (+0.000 -0.025mm)
$d2$	h6
r	+0.0005" -0.0005" (+0.0127 -0.0127mm)

Recommended for Aluminum

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MATERIAL HARDNESS (Rc) 70
35
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EDP#	$d1$ † Diameter		$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length	r Corner Radius	$l3$ Reach Length	$d3$ Neck Diameter	1-11	12-24	25-49	50-100
	Decimal	Metric										
39223	.1575	4.000	6.0	50	12	0.3	-	-	28.90	27.64	26.39	25.13
39243	.1575	4.000	6.0	65	6	0.3	20	3.7	35.34	33.80	32.27	30.73
NEW 39253	.1575	4.000	6.0	65	6	0.5	20	3.7	35.34	33.80	32.27	30.73
NEW 39263	.1575	4.000	6.0	65	6	1.0	20	3.7	35.34	33.80	32.27	30.73
39283	.1875	3/16"	4.763	3/16"	2"	9/16"	.010"	-	21.44	20.50	19.57	18.64
39293	.1875	3/16"	4.763	3/16"	2"	9/16"	.030"	-	21.44	20.50	19.57	18.64
39303	.1875	3/16"	4.763	3/16"	3"	7/32"	.010"	3/4"	39.24	37.53	35.83	34.12
39313	.1875	3/16"	4.763	3/16"	3"	7/32"	.030"	3/4"	39.24	37.53	35.83	34.12
39343	.1969	5.000	6.0	65	16	0.3	-	-	29.82	28.52	27.23	25.93
39363	.1969	5.000	6.0	75	8	0.3	20	4.7	48.73	46.61	44.49	42.37
NEW 39373	.1969	5.000	6.0	75	8	0.5	20	4.7	48.73	46.61	44.49	42.37
NEW 39383	.1969	5.000	6.0	75	8	1.0	20	4.7	48.73	46.61	44.49	42.37
39403	.2362	6.000	6.0	65	19	0.3	-	-	28.87	27.61	26.36	25.10
39423	.2362	6.000	6.0	75	10	0.3	25	5.7	47.16	45.11	43.06	41.01
NEW 39433	.2362	6.000	6.0	75	10	0.5	25	5.7	47.16	45.11	43.06	41.01
NEW 39443	.2362	6.000	6.0	75	10	1.0	25	5.7	47.16	45.11	43.06	41.01
NEW 39453	.2362	6.000	6.0	75	10	1.5	25	5.7	47.16	45.11	43.06	41.01
NEW 39463	.2362	6.000	6.0	75	10	2.0	25	5.7	47.16	45.11	43.06	41.01
39453	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.010"	-	27.43	26.24	25.04	23.85
39463	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.015"	-	27.43	26.24	25.04	23.85
39473	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.030"	-	27.43	26.24	25.04	23.85
39493	.2500	1/4"	6.350	1/4"	4"	3/8"	.015"	1-1/8"	47.51	45.44	43.38	41.31
40403	.2500	1/4"	6.350	1/4"	4"	3/8"	.030"	1-1/8"	47.51	45.44	43.38	41.31
39503	.2500	1/4"	6.350	1/4"	4"	3/8"	.015"	2-1/8"	52.41	50.13	47.85	45.57
39543	.2756	7.000	8.0	65	19	0.3	-	-	41.98	40.15	38.33	36.50
39563	.2756	7.000	8.0	75	12	0.3	25	6.4	63.95	61.17	58.39	55.61
39593	.3125	5/16"	7.938	5/16"	2-1/2"	3/4"	.010"	-	36.29	34.72	33.14	31.56
39603	.3125	5/16"	7.938	5/16"	2-1/2"	3/4"	.015"	-	36.29	34.72	33.14	31.56
39613	.3125	5/16"	7.938	5/16"	2-1/2"	3/4"	.030"	-	36.29	34.72	33.14	31.56
39623	.3125	5/16"	7.938	5/16"	4"	7/16"	.015"	1-1/8"	62.46	59.74	57.03	54.31
39633	.3125	5/16"	7.938	5/16"	4"	7/16"	.030"	1-1/8"	62.46	59.74	57.03	54.31
39663	.3150	8.000	8.0	65	19	0.5	-	-	38.19	36.53	34.87	33.21
39683	.3150	8.000	8.0	75	12	0.5	25	7.4	58.19	55.66	53.13	50.60
NEW 39688	.3150	8.000	8.0	75	12	1.0	25	7.4	58.19	55.66	53.13	50.60
NEW 39693	.3150	8.000	8.0	75	12	2.0	25	7.4	58.19	55.66	53.13	50.60
NEW 39698	.3150	8.000	8.0	75	12	3.0	25	7.4	58.19	55.66	53.13	50.60

Series 143R (continued)

.3750" - .6299"
(9.525mm - 16.000mm)

HIGH PERFORMANCE
END MILLS

EDP#	$d1$ †		$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length	r Corner Radius	$l3$ Reach Length	$d3$ Neck Diameter	1-11	12-24	25-49	50-100	
	Decimal	Diameter											Metric
39703	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.010"	-	-	42.30	40.46	38.62	36.78
39713	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.015"	-	-	42.30	40.46	38.62	36.78
39723	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.030"	-	-	42.30	40.46	38.62	36.78
39733	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.060"	-	-	42.30	40.46	38.62	36.78
39763	.3750	3/8"	9.525	3/8"	4"	1/2"	.030"	2-1/8"	.355"	72.23	69.09	65.95	62.81
39773	.3750	3/8"	9.525	3/8"	4"	1/2"	.060"	2-1/8"	.355"	72.23	69.09	65.95	62.81
39783	.3750	3/8"	9.525	3/8"	6"	1/2"	.030"	4"	.355"	105.47	100.88	96.30	91.71
39803	.3937		10.000	10.0	70	24	0.5	-	-	64.87	62.05	59.23	56.41
39843	.3937		10.000	10.0	100	12	0.5	35	9.4	87.20	83.41	79.62	75.83
NEW 39848	.3937		10.000	10.0	100	12	1.0	35	9.4	87.20	83.41	79.62	75.83
NEW 39853	.3937		10.000	10.0	100	12	1.5	35	9.4	87.20	83.41	79.62	75.83
NEW 39863	.3937		10.000	10.0	100	12	2.0	35	9.4	87.20	83.41	79.62	75.83
NEW 39873	.3937		10.000	10.0	100	12	3.0	35	9.4	87.20	83.41	79.62	75.83
39883	.4724		12.000	12.0	75	32	0.5	-	-	80.24	76.75	73.26	69.77
39903	.4724		12.000	12.0	100	16	0.5	40	11.4	103.13	98.65	94.16	89.68
NEW 39907	.4724		12.000	12.0	100	16	1.0	40	11.4	103.13	98.65	94.16	89.68
NEW 39911	.4724		12.000	12.0	100	16	1.5	40	11.4	103.13	98.65	94.16	89.68
NEW 39915	.4724		12.000	12.0	100	16	2.0	40	11.4	103.13	98.65	94.16	89.68
NEW 39919	.4724		12.000	12.0	100	16	3.0	40	11.4	103.13	98.65	94.16	89.68
39923	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.010"	-	-	76.23	72.92	69.60	66.29
39933	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.015"	-	-	76.23	72.92	69.60	66.29
39943	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.030"	-	-	76.23	72.92	69.60	66.29
39953	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.060"	-	-	76.23	72.92	69.60	66.29
39963	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.120"	-	-	76.23	72.92	69.60	66.29
39973	.5000	1/2"	12.700	1/2"	4"	2"	.010"	-	-	88.15	84.32	80.48	76.65
40413	.5000	1/2"	12.700	1/2"	4"	2"	.030"	-	-	88.15	84.32	80.48	76.65
40423	.5000	1/2"	12.700	1/2"	4"	2"	.060"	-	-	88.15	84.32	80.48	76.65
40433	.5000	1/2"	12.700	1/2"	4"	5/8"	.010"	2-1/8"	.475"	97.97	93.71	89.45	85.19
39983	.5000	1/2"	12.700	1/2"	4"	5/8"	.030"	2-1/8"	.475"	97.97	93.71	89.45	85.19
40443	.5000	1/2"	12.700	1/2"	4"	5/8"	.060"	2-1/8"	.475"	97.97	93.71	89.45	85.19
40453	.5000	1/2"	12.700	1/2"	4"	5/8"	.120"	2-1/8"	.475"	97.97	93.71	89.45	85.19
39993	.5000	1/2"	12.700	1/2"	6"	5/8"	.030"	4-1/8"	.475"	147.03	140.64	134.24	127.85
40463	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.015"	-	-	131.86	126.13	120.39	114.66
40023	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.030"	-	-	131.86	126.13	120.39	114.66
40473	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.060"	-	-	131.86	126.13	120.39	114.66
40483	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.120"	-	-	131.86	126.13	120.39	114.66
40033	.6250	5/8"	15.875	5/8"	6"	3/4"	.030"	2-3/8"	.590"	188.53	180.33	172.14	163.94
40043	.6250	5/8"	15.875	5/8"	6"	3/4"	.030"	4-3/8"	.590"	198.38	189.75	181.13	172.50
40083	.6299		16.000	16.0	100	40	1.0	-	-	138.81	132.77	126.74	120.70
40103	.6299		16.000	16.0	100	20	1.0	40	15.4	143.72	137.47	131.22	124.97
NEW 40113	.6299		16.000	16.0	125	20	2.0	60	15.4	188.62	180.42	172.22	164.02
NEW 40118	.6299		16.000	16.0	125	20	3.0	60	15.4	188.62	180.42	172.22	164.02
NEW 40123	.6299		16.000	16.0	125	20	4.0	60	15.4	188.62	180.42	172.22	164.02

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MATERIAL HARDNESS (RC)

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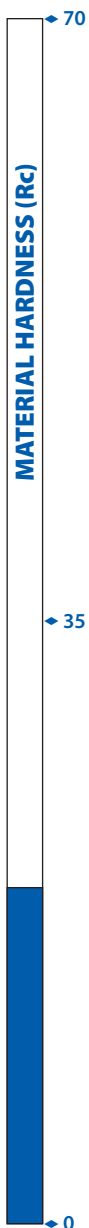
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continued →

Series 143R (continued)

.7500" - 1.000"
(19.050mm - 25.400mm)

EDP#	$d1$ † Diameter			$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length	r Corner Radius	$l3$ Reach Length	$d3$ Neck Diameter	1-11	12-24	25-49	50-100
	Decimal		Metric										
40133	.7500	3/4"	19.050	3/4"	4"	1-5/8"	.015"	-	-	171.13	163.69	156.25	148.81
40143	.7500	3/4"	19.050	3/4"	4"	1-5/8"	.030"	-	-	171.13	163.69	156.25	148.81
40153	.7500	3/4"	19.050	3/4"	4"	1-5/8"	.060"	-	-	171.13	163.69	156.25	148.81
40493	.7500	3/4"	19.050	3/4"	4"	1-5/8"	.120"	-	-	171.13	163.69	156.25	148.81
40503	.7500	3/4"	19.050	3/4"	6"	1"	.015"	2-1/2"	.715"	255.04	243.95	232.86	221.77
40163	.7500	3/4"	19.050	3/4"	6"	1"	.030"	2-1/2"	.715"	255.04	243.95	232.86	221.77
40513	.7500	3/4"	19.050	3/4"	6"	1"	.060"	2-1/2"	.715"	255.04	243.95	232.86	221.77
40523	.7500	3/4"	19.050	3/4"	6"	1"	.120"	2-1/2"	.715"	255.04	243.95	232.86	221.77
40173	.7500	3/4"	19.050	3/4"	6"	1"	.030"	4-3/8"	.715"	261.96	250.57	239.18	227.79
40183	.7874		20.000	20.0	100	32	1.0	-	-	240.22	229.78	219.33	208.89
40223	.7874		20.000	20.0	100	20	1.0	40	19.0	245.12	234.47	223.81	213.15
NEW 40225	.7874		20.000	20.0	150	20	1.0	65	19.0	328.96	314.66	300.35	286.05
NEW 40226	.7874		20.000	20.0	150	20	2.0	65	19.0	328.96	314.66	300.35	286.05
NEW 40229	.7874		20.000	20.0	150	20	3.0	65	19.0	328.96	314.66	300.35	286.05
NEW 40231	.7874		20.000	20.0	150	20	4.0	65	19.0	328.96	314.66	300.35	286.05
40243	.9843		25.000	25.0	100	38	1.0	-	-	277.96	265.87	253.79	241.70
40283	.9843		25.000	25.0	100	25	1.0	50	24.0	282.87	270.57	258.27	245.97
40293	1.000	1"	25.400	1"	4"	1-5/8"	.030"	-	-	291.85	279.16	266.47	253.78
40303	1.000	1"	25.400	1"	4"	1-5/8"	.060"	-	-	291.85	279.16	266.47	253.78
40313	1.000	1"	25.400	1"	4"	1-5/8"	.120"	-	-	291.85	279.16	266.47	253.78
40343	1.000	1"	25.400	1"	6"	1-1/4"	.030"	3-3/8"	.960"	427.70	409.10	390.51	371.91
40353	1.000	1"	25.400	1"	6"	1-1/4"	.060"	3-3/8"	.960"	427.70	409.10	390.51	371.91
40363	1.000	1"	25.400	1"	6"	1-1/4"	.120"	3-3/8"	.960"	427.70	409.10	390.51	371.91



GARR TOOL Application Guide for Alumastar Coated End Mills in Aircraft Grade Aluminum

Fractional

Diameter	SLOTTING		SIDE MILLING
	Axial = .5xD	Axial = 1xD	Axial ≤ 1xD Radial ≤ .5xD
	SFM = 1500 - 2000	SFM = 750 - 1500	SFM = 1500 - 2000
	CPT = 1.5% - 3% of diameter	CPT = 1% - 2% of diameter	CPT = 2% - 3% 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"

Metric

Diameter	SLOTTING		SIDE MILLING
	Axial = .5xD	Axial = 1xD	Axial ≤ 1xD Radial ≤ 0.5xD
	M/Min. = 450 - 760	M/Min. = 225 - 450	M/Min. = 450 - 760
	CPT = 1.5% - 3% of diameter	CPT = 1% - 2% of diameter	CPT = 2% - 3% of diameter
4.0	.060 - .120	.040 - .080	.080 - .120
6.0	.090 - .180	.060 - .120	.120 - .180
8.0	.120 - .240	.080 - .160	.160 - .240
10.0	.150 - .300	.100 - .200	.200 - .300
12.0	.180 - .360	.120 - .240	.240 - .360
16.0	.240 - .480	.160 - .320	.320 - .480
20.0	.300 - .600	.200 - .400	.400 - .600
25.0	.375 - .750	.250 - .500	.500 - .750

CPT = Chipload per flute (Fz)

For CAT 40 machines using tools over 5/8" diameter, speeds and feeds may need to be reduced by as much as 50%

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 Chipload Per Flute, and 50% of Dia. axial depth were obtained
 In cases for tools with slower SFM (M/Min.), reference Series 242M/842M, page 62

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



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