GARR TOOL®

High Performance Solid Carbide

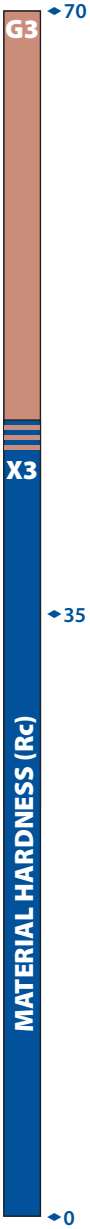
NEW SERIES

MATERIAL SPECIFIC COATINGS

X3

G3

SERIES HIGHLIGHT

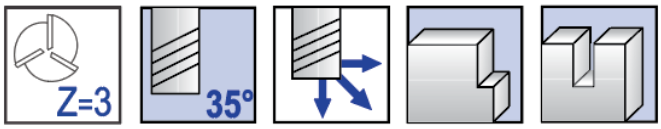


S M P K

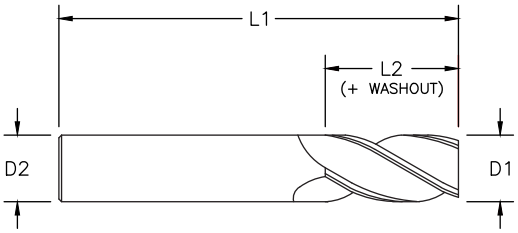
High Performance End Mills
X3 BALIQ® ALCRONOS Coating (AlCrN)
G3 BALIQ® TISINOS PRO Coating (AlTiSiN)

X3 Target Materials:
Stainless Steel (Inox, Austenitic/Martensitic)
Carbon Tools Steels (Up to 50 HRc)
Cast Iron

G3 Target Materials:
Heat Resistant Super Alloys
PH Stainless Steels (Inox, 13-8, 15-5, 17-4, Martensitic)
Conditioned Tool Steels (50-70 HRc)



CALCULATE IDEAL PARAMETERS FOR THE X3 AND G3 IN YOUR APPLICATION WITH THE GARR TECHNICAL ADVISOR

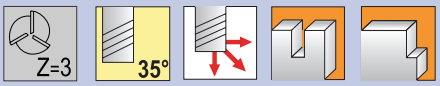


View the X3

View the G3

TOLERANCES	
d_1	+.000" –.002" (+.000mm –.050mm)
d_2	h6
r	+.001" –.001" (+.025 –.025mm)

HIGH EFFICIENCY MILLING



Series X3, G3

.0312" - .0787"
(0.792mm - 2.000mm)

X3 Recommended for Low, Medium, and High Carbon Tool Steels (up to 50 HRC), cast iron, and stainless steel (Inox).

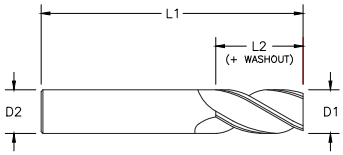
G3 Recommended for tough machining materials such as Heat Resistant Super Alloys, PH Stainless steels (Inox), and conditioned tool steels. (50-70 HRC)

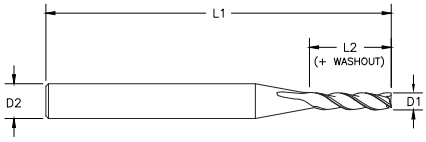
3 Flute High Performance End Mills

X3 BALIQ® ALCRONOS Coating (AlCrN-based)

G3 BALIQ® TISINOS PRO Coating (AlTiSiN)

Solid submicron grain carbide - center cutting
h6 shank tolerance
Engineered for High Efficiency Milling
Variable flute grind
Honed edge treatment
Polished fluting
Material and condition specific coatings





X3 EDP#	G3 EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	1-11	12-24	25-49	50-100
87100	88100	.0312	1/32"	0.792	1/4"	2"	1/16"	-	33.58	32.12	30.66	29.20
87101	88101	.0312	1/32"	0.792	1/4"	2"	3/32"	-	33.58	32.12	30.66	29.20
87102	88102	.0312	1/32"	0.792	1/4"	2"	1/8"	-	33.58	32.12	30.66	29.20
87103	88103	.0315		0.800	6	50	2.40	-	34.72	33.21	31.70	30.19
87104	88104	.0354		0.900	6	50	2.70	-	34.72	33.21	31.70	30.19
87105	88105	.0394		1.000	6	50	3	-	34.72	33.21	31.70	30.19
87106	88106	.0400	.040"	1.016	1/4"	2"	.120"	-	33.58	32.12	30.66	29.20
87107	88107	.0450	.045"	1.143	1/4"	2"	.135"	-	33.58	32.12	30.66	29.20
87108	88108	.0469	3/64"	1.191	1/4"	2"	5/32"	-	33.58	32.12	30.66	29.20
87109	88109	.0500	.050"	1.270	1/4"	2"	.150"	-	33.58	32.12	30.66	29.20
87110	88110	.0550	.055"	1.397	1/4"	2"	.250"	-	33.58	32.12	30.66	29.20
87111	88111	.0591		1.500	6	50	3	-	34.34	32.85	31.35	29.86
87112	88112	.0591		1.500	6	50	3	0.20	38.73	37.05	35.36	33.68
87113	88113	.0591		1.500	6	50	6	-	34.34	32.85	31.35	29.86
87114	88114	.0591		1.500	6	50	6	0.20	38.73	37.05	35.36	33.68
87115	88115	.0600	.060"	1.524	1/4"	2"	.090"	-	33.21	31.77	30.32	28.88
87116	88116	.0600	.060"	1.524	1/4"	2"	.180"	-	33.21	31.77	30.32	28.88
87117	88117	.0625	1/16"	1.587	1/4"	2"	1/8"	-	33.21	31.77	30.32	28.88
87118	88118	.0625	1/16"	1.587	1/4"	2"	1/8"	.005"	37.49	35.86	34.23	32.60
87119	88119	.0625	1/16"	1.587	1/4"	2"	1/8"	.010"	37.49	35.86	34.23	32.60
87120	88120	.0625	1/16"	1.587	1/4"	2"	1/4"	-	33.21	31.77	30.32	28.88
87121	88121	.0625	1/16"	1.587	1/4"	2"	1/4"	.005"	37.49	35.86	34.23	32.60
87122	88122	.0625	1/16"	1.587	1/4"	2"	1/4"	.010"	37.49	35.86	34.23	32.60
87123	88123	.0700	.070"	1.778	1/4"	2"	.210"	-	33.21	31.77	30.32	28.88
87124	88124	.0781	5/64"	1.983	1/4"	2"	1/4"	-	32.84	31.41	29.98	28.56
87125	88125	.0781	5/64"	1.983	1/4"	2"	1/4"	.005"	37.09	35.48	33.86	32.25
87126	88126	.0781	5/64"	1.983	1/4"	2"	1/4"	.010"	37.09	35.48	33.86	32.25
87127	88127	.0787		2.000	6	50	8	-	33.96	32.48	31.01	29.53
87128	88128	.0787		2.000	6	50	8	0.10	38.32	36.65	34.99	33.32
87129	88129	.0787		2.000	6	50	8	0.20	38.32	36.65	34.99	33.32

continued →

Series X3, G3 *(continued)*

.0800" - .1562"
(2.032mm - 3.967mm)

X3 EDP#	G3 EDP#	d_1 † Diameter Decimal	d_1 † Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	1-11	12-24	25-49	50-100
87130	88130	.0800	.080"	2.032	1/4"	2"	1/4"	-	32.84	31.41	29.98	28.56
87131	88131	.0900	.090"	2.286	1/4"	2"	9/32"	-	32.84	31.41	29.98	28.56
87132	88132	.0938	3/32"	2.382	1/4"	2"	3/16"	-	32.50	31.09	29.67	28.26
87133	88133	.0938	3/32"	2.382	1/4"	2"	3/16"	.005"	36.69	35.09	33.50	31.90
87134	88134	.0938	3/32"	2.382	1/4"	2"	3/16"	.010"	36.69	35.09	33.50	31.90
87135	88135	.0938	3/32"	2.382	1/4"	2"	3/8"	-	32.50	31.09	29.67	28.26
87136	88136	.0938	3/32"	2.382	1/4"	2"	3/8"	.005"	36.69	35.09	33.50	31.90
87137	88137	.0938	3/32"	2.382	1/4"	2"	3/8"	.010"	36.69	35.09	33.50	31.90
87138	88138	.0984		2.500	6	50	8	-	33.60	32.14	30.68	29.22
87139	88139	.0984		2.500	6	50	8	0.10	37.90	36.25	34.60	32.96
87140	88140	.0984		2.500	6	50	8	0.20	37.90	36.25	34.60	32.96
87141	88141	.1000	.100"	2.540	1/4"	2"	3/16"	-	32.50	31.09	29.67	28.26
87142	88142	.1000	.100"	2.540	1/4"	2"	5/16"	-	32.50	31.09	29.67	28.26
87143	88143	.1094	7/64"	2.778	1/4"	2"	1/4"	-	32.50	31.09	29.67	28.26
87144	88144	.1094	7/64"	2.778	1/4"	2"	1/4"	.005"	36.69	35.09	33.50	31.90
87145	88145	.1094	7/64"	2.778	1/4"	2"	1/4"	.010"	36.69	35.09	33.50	31.90
87146	88146	.1094	7/64"	2.778	1/4"	2"	3/8"	-	32.50	31.09	29.67	28.26
87147	88147	.1094	7/64"	2.778	1/4"	2"	3/8"	.005"	36.69	35.09	33.50	31.90
87148	88148	.1094	7/64"	2.778	1/4"	2"	3/8"	.010"	36.69	35.09	33.50	31.90
87149	88149	.1181		3.000	6.0	50	6	-	33.24	31.79	30.35	28.90
87150	88150	.1181		3.000	6.0	50	6	0.10	37.50	35.87	34.24	32.61
87151	88151	.1181		3.000	6.0	50	6	0.20	37.50	35.87	34.24	32.61
87152	88152	.1181		3.000	6.0	50	6	0.30	37.50	35.87	34.24	32.61
87153	88153	.1181		3.000	6.0	50	6	0.50	37.50	35.87	34.24	32.61
87154	88154	.1181		3.000	6.0	50	9	-	33.24	31.79	30.35	28.90
87155	88155	.1181		3.000	6.0	50	9	0.20	37.50	35.87	34.24	32.61
87156	88156	.1181		3.000	6.0	50	9	0.30	37.50	35.87	34.24	32.61
87157	88157	.1181		3.000	6.0	50	9	0.50	37.50	35.87	34.24	32.61
87158	88158	.1181		3.000	6.0	65	12	-	35.08	33.55	32.03	30.50
87159	88159	.1181		3.000	6.0	65	12	0.10	39.27	37.56	35.86	34.15
87160	88160	.1181		3.000	6.0	65	12	0.20	39.27	37.56	35.86	34.15
87161	88161	.1181		3.000	6.0	65	12	0.30	39.27	37.56	35.86	34.15
87162	88162	.1181		3.000	6.0	65	12	0.50	39.27	37.56	35.86	34.15
87163	88163	.1250	1/8"	3.175	1/4"	2"	1/4"	-	32.15	30.75	29.35	27.96
87164	88164	.1250	1/8"	3.175	1/4"	2"	1/4"	.010"	36.29	34.71	33.13	31.56
87165	88165	.1250	1/8"	3.175	1/4"	2"	1/4"	.015"	36.29	34.71	33.13	31.56
87166	88166	.1250	1/8"	3.175	1/4"	2"	1/4"	.020"	36.29	34.71	33.13	31.56
87167	88167	.1250	1/8"	3.175	1/4"	2"	3/8"	-	32.15	30.75	29.35	27.96
87168	88168	.1250	1/8"	3.175	1/4"	2"	3/8"	.010"	36.29	34.71	33.13	31.56
87169	88169	.1250	1/8"	3.175	1/4"	2"	3/8"	.015"	36.29	34.71	33.13	31.56
87170	88170	.1250	1/8"	3.175	1/4"	2-1/2"	1/2"	-	34.03	32.55	31.07	29.59
87171	88171	.1250	1/8"	3.175	1/4"	2-1/2"	1/2"	.005"	37.94	36.29	34.64	32.99
87172	88172	.1250	1/8"	3.175	1/4"	2-1/2"	1/2"	.010"	37.94	36.29	34.64	32.99
87173	88173	.1250	1/8"	3.175	1/4"	2-1/2"	1/2"	.015"	37.94	36.29	34.64	32.99
87174	88174	.1250	1/8"	3.175	1/4"	2-1/2"	1/2"	.020"	37.94	36.29	34.64	32.99
87175	88175	.1562	5/32"	3.967	1/4"	2"	5/16"	-	31.81	30.43	29.04	27.66
87176	88176	.1562	5/32"	3.967	1/4"	2"	5/16"	.010"	35.91	34.35	32.79	31.23
87177	88177	.1562	5/32"	3.967	1/4"	2"	7/16"	-	31.81	30.43	29.04	27.66
87178	88178	.1562	5/32"	3.967	1/4"	2"	7/16"	.010"	35.91	34.35	32.79	31.23
87179	88179	.1562	5/32"	3.967	1/4"	2-1/2"	9/16"	-	33.66	32.20	30.73	29.27
87180	88180	.1562	5/32"	3.967	1/4"	2-1/2"	9/16"	.010"	37.54	35.91	34.28	32.64

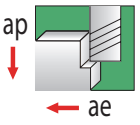
† *Metric equivalents are for reference only*

X3 EDP#	G3 EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	1-11	12-24	25-49	50-100
87181	88181	.1575		4.000	6	50	8	-	32.89	31.46	30.03	28.60
87182	88182	.1575		4.000	6	50	8	0.30	37.10	35.49	33.87	32.26
87183	88183	.1575		4.000	6	50	8	0.50	37.10	35.49	33.87	32.26
87184	88184	.1875	3/16"	4.763	1/4"	2"	5/16"	-	31.48	30.11	28.74	27.37
87185	88185	.1875	3/16"	4.763	1/4"	2"	5/16"	.010"	35.54	33.99	32.45	30.90
87186	88186	.1875	3/16"	4.763	1/4"	2"	5/16"	.015"	35.54	33.99	32.45	30.90
87187	88187	.1875	3/16"	4.763	1/4"	2"	7/16"	-	31.48	30.11	28.74	27.37
87188	88188	.1875	3/16"	4.763	1/4"	2"	7/16"	.010"	35.54	33.99	32.45	30.90
87189	88189	.1875	3/16"	4.763	1/4"	2"	7/16"	.015"	35.54	33.99	32.45	30.90
87190	88190	.1875	3/16"	4.763	1/4"	2-1/2"	9/16"	-	33.32	31.87	30.42	28.97
87191	88191	.1875	3/16"	4.763	1/4"	2-1/2"	9/16"	.010"	37.15	35.53	33.92	32.30
87192	88192	.1875	3/16"	4.763	1/4"	2-1/2"	9/16"	.015"	37.15	35.53	33.92	32.30
87193	88193	.1969		5.000	6	50	10	-	32.21	30.81	29.41	28.01
87194	88194	.1969		5.000	6	50	10	0.30	36.33	34.75	33.17	31.59
87195	88195	.1969		5.000	6	50	10	0.50	36.33	34.75	33.17	31.59
87196	88196	.1969		5.000	6	65	15	-	33.99	32.51	31.03	29.56
87197	88197	.1969		5.000	6	65	15	0.30	38.05	36.40	34.74	33.09
87198	88198	.1969		5.000	6	65	15	0.50	38.05	36.40	34.74	33.09
87199	88199	.2188	7/32"	5.558	1/4"	2"	3/8"	-	31.15	29.80	28.44	27.09
87200	88200	.2188	7/32"	5.558	1/4"	2"	3/8"	.015"	35.18	33.65	32.12	30.59
87201	88201	.2188	7/32"	5.558	1/4"	2-1/2"	3/4"	-	32.97	31.54	30.10	28.67
87202	88202	.2188	7/32"	5.558	1/4"	2-1/2"	3/4"	.015"	36.77	35.17	33.57	31.97
87203	88203	.2362		6.000	6	50	13	-	31.25	29.89	28.53	27.17
87204	88204	.2362		6.000	6	50	13	0.30	35.24	33.71	32.18	30.64
87205	88205	.2362		6.000	6	50	13	0.50	35.24	33.71	32.18	30.64
87206	88206	.2362		6.000	6	65	19	-	32.97	31.54	30.10	28.67
87207	88207	.2362		6.000	6	65	19	0.30	36.92	35.31	33.71	32.10
87208	88208	.2362		6.000	6	65	19	0.50	36.92	35.31	33.71	32.10
87209	88209	.2362		6.000	6	75	26	-	47.02	44.98	42.93	40.89
87210	88210	.2362		6.000	6	75	26	0.30	52.83	50.53	48.24	45.94
87211	88211	.2362		6.000	6	75	26	0.50	52.83	50.53	48.24	45.94
87212	88212	.2500	1/4"	6.350	1/4"	2-1/2"	1/2"	-	31.98	30.59	29.20	27.81
87213	88213	.2500	1/4"	6.350	1/4"	2-1/2"	1/2"	.010"	35.66	34.11	32.56	31.01
87214	88214	.2500	1/4"	6.350	1/4"	2-1/2"	1/2"	.015"	35.66	34.11	32.56	31.01
87215	88215	.2500	1/4"	6.350	1/4"	2-1/2"	1/2"	.020"	35.66	34.11	32.56	31.01
87216	88216	.2500	1/4"	6.350	1/4"	2-1/2"	1/2"	.030"	35.66	34.11	32.56	31.01
87217	88217	.2500	1/4"	6.350	1/4"	2-1/2"	5/8"	-	31.98	30.59	29.20	27.81
87218	88218	.2500	1/4"	6.350	1/4"	2-1/2"	5/8"	.010"	35.66	34.11	32.56	31.01
87219	88219	.2500	1/4"	6.350	1/4"	2-1/2"	5/8"	.015"	35.66	34.11	32.56	31.01
87220	88220	.2500	1/4"	6.350	1/4"	2-1/2"	5/8"	.020"	35.66	34.11	32.56	31.01
87221	88221	.2500	1/4"	6.350	1/4"	2-1/2"	5/8"	.030"	35.66	34.11	32.56	31.01
87222	88222	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	-	31.98	30.59	29.20	27.81
87223	88223	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.010"	35.66	34.11	32.56	31.01
87224	88224	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.015"	35.66	34.11	32.56	31.01
87225	88225	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.020"	35.66	34.11	32.56	31.01
87226	88226	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.030"	35.66	34.11	32.56	31.01
87227	88227	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.060"	35.66	34.11	32.56	31.01
87228	88228	.2500	1/4"	6.350	1/4"	3"	1"	-	46.59	44.56	42.54	40.51
87229	88229	.2500	1/4"	6.350	1/4"	3"	1"	.015"	50.80	48.59	46.38	44.17
87230	88230	.2500	1/4"	6.350	1/4"	3"	1"	.030"	50.80	48.59	46.38	44.17

GARR TOOL X3, G3 High Performance Milling Guide

	ISO Material	HRC	SFM (Vc)	CHIPLOAD PER TOOTH (Fz) 1/32"	1/16"	3/32"	1/8"	5/32"	3/16"	1/4"
S	**COBALT BASE ALLOYS**									
	Powdered Metal, Stellite, Hs-21, Haynes 25/188, X-40, L-605	< 40 > 40	120 - 240 100 - 195	.0001" - .0003" .0001" - .0003"	.0002" - .0007" .0001" - .0005"	.0002" - .0008" .0001" - .0006"	.0004" - .0010" .0003" - .0009"	.0006" - .0011" .0004" - .0010"	.0007" - .0015" .0005" - .0013"	.0008" - .0020" .0006" - .0018"
	NICKEL BASE ALLOYS									
	Invar, Kovar, Inconel-625/718, Waspaloy, Rene, Hastelloy, A286	< 40 > 40	120 - 240 100 - 195	.0001" - .0003" .0001" - .0003"	.0002" - .0007" .0001" - .0005"	.0002"" - .0008" .0001" - .0006"	.0004" - .0010" .0003" - .0009"	.0006" - .0011" .0004" - .0010"	.0007" - .0015" .0005" - .0013"	.0008" - .0020" .0006" - .0018"
	IRON BASE ALLOYS									
	Incoloy 800-802, Multimet N-155, Timkin 16-25-6, Carpenter 22-b3	< 40 > 40	120 - 240 100 - 195	.0001" - .0003" .0001" - .0003"	.0002" - .0007" .0001" - .0005"	.0002" - .0008" .0001" - .0006"	.0004" - .0010" .0003" - .0009"	.0006" - .0011" .0004" - .0010"	.0007" - .0015" .0005" - .0013"	.0008" - .0020" .0006" - .0018"
	MONEL									
	Monel - 65% Nickel		160 - 290	.0001" - .0003"	.0002" - .0007"	.0002" - .0008"	.0005" - .0010"	.0006" - .0011"	.0007" - .0015"	.0008" - .0020"
	TITANIUM ALLOYS									
	Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-2SN-4Zr-2Mo-Si		260 - 490	.0001" - .0003"	.0003" - .0007"	.0003" - .0008"	.0005" - .0010"	.0006" - .0011"	.0007" - .0015"	.0009" - .0019"
	5553 / Beta Titanium		195 - 365	.0001" - .0003"	.0002" - .0007"	.0003" - .0007"	.0005" - .0010"	.0006" - .0011"	.0006" - .0014"	.0009" - .0017"
M	**STAINLESS STEELS**									
	13/8, 15/5, 17-4, pH Types	< 40 > 40	290 - 490 225 - 360	.0001" - .0003" .0001" - .0003"	.0002" - .0007" .0001" - .0005"	.0003" - .0008" .0002" - .0006"	.0004" - .0010" .0003" - .0009"	.0006" - .0011" .0004" - .0010"	.0070" - .0015" .0005" - .0013"	.0007" - .0018" .0006" - .0015"
	200 Series, 300 Series	< 40 > 40	355 - 555 290 - 455	.0001" - .0003" .0001" - .0003"	.0002" - .0007" .0001" - .0005"	.0003" - .0008" .0002" - .0006"	.0004" - .0010" .0003" - .0009"	.0006" - .0011" .0004" - .0010"	.0007" - .0015" .0005" - .0014"	.0007" - .0018" .0006" - .0015"
	304L, 316L, Nitronic 50	< 40 > 40	325 - 520 225 - 360	.0001" - .0003" .0001" - .0003"	.0002" - .0007" .0001" - .0005"	.0003" - .0008" .0002" - .0006"	.0004" - .0010" .0003" - .0009"	.0006" - .0011" .0004" - .0010"	.0007" - .0015" .0005" - .0014"	.0007" - .0018" .0006" - .0014"
	400 Series	< 40 > 40	290 - 555 225 - 425	.0001" - .0003" .0001" - .0003"	.0002" - .0007" .0001" - .0005"	.0003" - .0008" .0002" - .0006"	.0004" - .0010" .0003" - .0009"	.0006" - .0011" .0004" - .0010"	.0007" - .0015" .0005" - .0014"	.0007" - .0018" .0006" - .0014"
P	**HIGH STRENGTH TOOL STEELS**									
	A2, D2, P20, H13, S7, O1	< 40 > 40	290 - 520 195 - 425	.0001" - .0003" .0001" - .0003"	.0002" - .0007" .0001" - .0005"	.0003" - .0008" .0002" - .0006"	.0004" - .0010" .0003" - .0009"	.0006" - .0011" .0004" - .0010"	.0007" - .0014" .0005" - .0011"	.0008" - .0018" .0007" - .0014"
	MEDIUM ALLOY TOOL STEELS									
	4140, 4340, 52100, 6150, 8620	< 40 > 40	455 - 650 325 - 490	.0001" - .0003" .0001" - .0003"	.0002" - .0007" .0001" - .0005"	.0003" - .0008" .0002" - .0006"	.0004" - .0011" .0003" - .0010"	.0006" - .0011" .0004" - .0010"	.0007" - .0015" .0005" - .0014"	.0008" - .0019" .0007" - .0014"
	CARBON STEELS									
	1000's - 1018, 1020, 12L14	< 40	490 - 780	.0001" - .0003"	.0002" - .0007"	.0003" - .0008"	.0004" - .0012"	.0006" - .0011"	.0005" - .0016"	.0001" - .0015"
K	**CAST MATERIAL**									
	Steel (Malleable)		455 - 685	.0001" - .0003"	.0002" - .007"	.0003" - .0008"	.0005" - .0010"	.0006" - .0011"	.0007" - .0018"	.0009" - .0023"
	Ductile Iron		455 - 685	.0001" - .0003"	.0002" - .0007"	.0003" - .0008"	.0005" - .0010"	.0006" - .0011"	.0007" - .0018"	.0009" - .0023"
	Gray Iron		585 - 770	.0001" - .0003"	.0002" - .0007"	.0003" - .0008"	.0005" - .0010"	.0006" - .0011"	.0007" - .0018"	.0010" - .0022"

	Profile/Trochoidal Milling	Slotting
Axial (ap)	MAX	0.5 to 1xD
Radial (ae)	Up to 15% Dia.	1xD



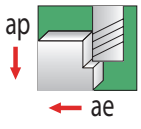
NOTE - DATA DOES NOT REFLECT CHIP THINNING.

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

GARR TOOL X3, G3 High Performance Milling Guide

ISO Material		HRC	M/Min. (Vc)	CHIPLOAD PER TOOTH (Fz) 1.0mm	2.0mm	3.0mm	4.0mm	5.0mm	6.0mm
S	**COBALT BASE ALLOYS**								
	Powdered Metal, Stellite, Hs-21, Haynes 25/188, X-40, L-605	< 40 > 40	37 - 75 30 - 60	.003 - .008 .003 - .008	.005 - .020 .003 - .015	.010 - .025 .008 - .023	.015 - .028 .010 - .025	.018 - .038 .013 - .033	.020 - .051 .015 - .046
	NICKEL BASE ALLOYS								
	Invar, Kovar, Inconel-625/718, Waspaloy, Rene, Hastelloy, A286	< 40 > 40	37 - 75 30 - 60	.003 - .008 .003 - .008	.005 - .020 .003 - .015	.010 - .025 .008 - .023	.015 - .028 .010 - .025	.018 - .038 .013 - .033	.020 - .051 .015 - .046
	IRON BASE ALLOYS								
	Incoloy 800-802, Multimet N-155, Timkin 16-25-6, Carpenter 22-b3	< 40 > 40	37 - 75 30 - 60	.003 - .008 .003 - .008	.005 - .020 .003 - .015	.010 - .025 .008 - .023	.015 - .028 .010 - .025	.018 - .038 .013 - .033	.020 - .051 .015 - .046
	MONEL								
	Monel - 65% Nickel		50 - 90	.003 - .008	.005 - .020	.013 - .025	.015 - .028	.018 - .038	.020 - .051
	TITANIUM ALLOYS								
	Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-2SN-4Zr-2Mo-Si		80 - 150	.003 - .008	.008 - .020	.013 - .025	.015 - .028	.018 - .038	.023 - .048
	5553 / Beta Titanium		60 - 110	.003 - .008	.008 - .018	.013 - .025	.015 - .028	.015 - .036	.023 - .043
M	**STAINLESS STEELS**								
	13/8, 15/5, 17-4, pH Types	< 40 > 40	90 - 150 70 - 110	.003 - .008 .003 - .008	.008 - .020 .005 - .015	.010 - .025 .008 - .023	.015 - .028 .010 - .025	.018 - .038 .013 - .033	.018 - .046 .015 - .038
	200 Series, 300 Series	< 40 > 40	110 - 170 90 - 140	.003 - .008 .003 - .008	.008 - .020 .005 - .015	.010 - .025 .008 - .023	.015 - .028 .010 - .025	.018 - .038 .013 - .036	.018 - .046 .015 - .038
	304L, 316L, Nitronic 50	< 40 > 40	100 - 160 70 - 110	.003 - .008 .003 - .008	.008 - .020 .005 - .015	.010 - .025 .008 - .023	.015 - .028 .010 - .025	.018 - .038 .013 - .036	.018 - .046 .015 - .036
	400 Series	< 40 > 40	90 - 170 70 - 130	.003 - .008 .003 - .008	.008 - .020 .005 - .015	.010 - .025 .008 - .023	.015 - .028 .010 - .025	.018 - .038 .013 - .036	.018 - .046 .015 - .036
P	**HIGH STRENGTH TOOL STEELS**								
	A2, D2, P20, H13, S7, O1	< 40 > 40	90 - 160 60 - 130	.003 - .008 .003 - .008	.008 - .020 .005 - .015	.010 - .025 .008 - .023	.015 - .028 .010 - .025	.018 - .036 .013 - .028	.020 - .046 .018 - .036
	MEDIUM ALLOY TOOL STEELS								
	4140, 4340, 52100, 6150, 8620	< 40 > 40	140 - 200 100 - 150	.003 - .008 .003 - .008	.008 - .020 .005 - .015	.010 - .028 .008 - .025	.015 - .028 .010 - .025	.018 - .038 .013 - .036	.020 - .048 .018 - .036
	CARBON STEELS								
	1000's - 1018, 1020, 12L14	< 40	150 - 240	.003 - .008	.008 - .020	.010 - .030	.015 - .028	.013 - .041	.025 - .038
K	**CAST MATERIAL**								
	Steel (Malleable)		140 - 210	.003 - .008	.008 - .020	.013 - .025	.015 - .028	.018 - .046	.023 - .058
	Ductile Iron		140 - 210	.003 - .008	.008 - .020	.013 - .025	.015 - .028	.018 - .046	.023 - .058
	Gray Iron		180 - 235	.003 - .008	.008 - .020	.013 - .025	.015 - .028	.018 - .046	.025 - .056

	Profile/Trochoidal Milling	Slotting
Axial (ap)	MAX	0.5 to 1xD
Radial (ae)	Up to 15% Dia.	1xD



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GARR TOOL®

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