

# NEW SERIES

MATERIAL SPECIFIC COATINGS



X9

G9

**GARR TOOL<sup>®</sup>**  
High Performance Solid Carbide



™

HIGH PERFORMANCE  
END MILLS



**X9**

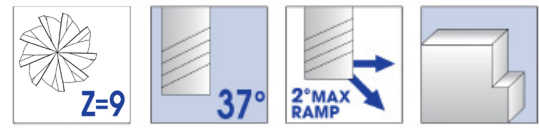
**G9**

**S M P K**

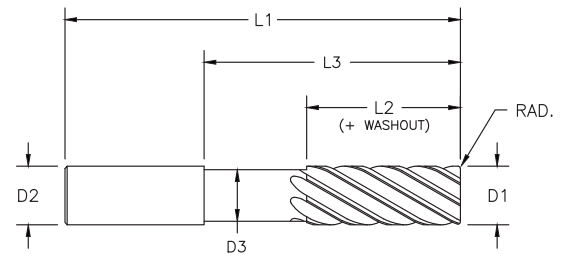
**High Performance End Mills**  
**X9 BALIQ® ALCRONOS Coating (AlCrN)**  
**G9 BALIQ® TISINOS PRO Coating (AlTiSiN)**

**X9 Target Materials:**  
 Stainless Steel (Inox, Austenitic/Martensitic)  
 Carbon Tools Steels (Up to 50 HRC)  
 Cast Iron

**G9 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 X9 AND G9 IN YOUR  
 APPLICATION WITH THE GARR  
 TECHNICAL ADVISOR**



← **View the X9**

**View the G9** →



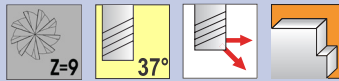
**TOLERANCES**

<i>d1</i>	+ .000" - .002" (+.000mm - .050mm)
<i>d2</i>	h6
<i>r</i>	+ .001" - .001" (+.025 - .025mm)

# HIGH EFFICIENCY MILLING

Series X9, G9

.5000" - .7500"  
(12.700mm - 19.050mm)



**X9** Recommended for Low, Medium, and High Carbon Tool Steels (up to 50 HRC), cast iron, and stainless steel (Inox).

**G9** Recommended for tough machining materials such as Heat Resistant Super Alloys, PH Stainless steels (Inox), and conditioned tool steels. (50-70 HRC)

HIGH PERFORMANCE  
END MILLS

## 9 Flute High Performance End Mills

**X9** BALIQ® ALCRONOS Coating (AlCrN-based)

**G9** BALIQ® TISINOS PRO Coating (AlTiSiN)

Solid submicron grain carbide - non-center cutting

h6 shank tolerance

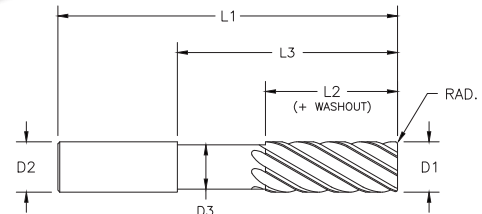
Engineered for High Efficiency Milling

Variable flute grind

Honed edge treatment

Polished fluting

Material and condition specific coatings



X9 EDP#	G9 EDP#	<i>d1</i> † Diameter		<i>d2</i> Shank Diameter	<i>l1</i> Overall Length	<i>l2</i> Flute Length	<i>r</i> Corner Radius	<i>d3</i> Neck Diameter	<i>l3</i> Reach Length	50-100	
		Decimal	Metric								
31100	31101	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.015"	-	-	92.19
31102	31103	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.030"	-	-	92.19
31104	31105	.6250	5/8"	15.875	5/8"	3"	3/4"	.030"	-	-	136.15
31106	31107	.6250	5/8"	15.875	5/8"	3-1/2"	3/4"	.060"	-	-	136.15
31108	31109	.6250	5/8"	15.875	5/8"	3-1/2"	3/4"	.090"	-	-	136.15
31110	31111	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.015"	-	-	140.89
31112	31113	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.030"	-	-	140.89
31114	31115	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.060"	-	-	140.89
31116	31117	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.090"	-	-	140.89
31118	31119	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/2"	.020"	-	-	140.89
31122	31121	.6250	5/8"	15.875	5/8"	3-1/2"	1-5/8"	.020"	-	-	140.89
31124	31123	.6250	5/8"	15.875	5/8"	4"	1-7/8"	.030"	-	-	148.53
31126	31125	.6250	5/8"	15.875	5/8"	5"	1-1/4"	.015"	.595"	2-1/2"	201.79
31128	31129	.6250	5/8"	15.875	5/8"	5"	1-1/4"	.030"	.595"	2-1/2"	201.79
31130	31131	.6250	5/8"	15.875	5/8"	5"	1-1/4"	.015"	.595"	3-1/8"	201.79
31132	31133	.6250	5/8"	15.875	5/8"	5"	1-1/4"	.030"	.595"	3-1/8"	201.79
31134	31135	.6299		16.000	16	100	42	1.00	-	-	157.80
31136	31137	.6299		16.000	16	120	65	0.50	-	-	198.41
31138	31139	.6299		16.000	16	120	40	0.50	15.2	65	202.30
31140	31141	.7500	3/4"	19.050	3/4"	3"	1"	.030"	-	-	184.90
31142	31143	.7500	3/4"	19.050	3/4"	3"	1"	.060"	-	-	184.90
31144	31145	.7500	3/4"	19.050	3/4"	3"	1"	.120"	-	-	184.90
31146	31147	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.015"	-	-	194.04
31148	31149	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.030"	-	-	194.04
31152	31151	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.060"	-	-	194.04
31154	31153	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.120"	-	-	194.04
31156	31155	.7500	3/4"	19.050	3/4"	5"	2-1/4"	.030"	-	-	262.80
31158	31159	.7500	3/4"	19.050	3/4"	6"	1-1/2"	.015"	.720"	3"	319.35
31162	31161	.7500	3/4"	19.050	3/4"	6"	1-1/2"	.030"	.720"	3"	319.35
31164	31163	.7500	3/4"	19.050	3/4"	6"	1-1/2"	.015"	.720"	3-3/4"	319.35
31166	31165	.7500	3/4"	19.050	3/4"	6"	1-1/2"	.030"	.720"	3-3/4"	319.35

70 → G9  
35 → X9  
0 ← MATERIAL HARDNESS (RC)

**S M P K**

## High Performance End Mills

**X9C BALIQ® ALCRONOS Coating (AlCrN)**

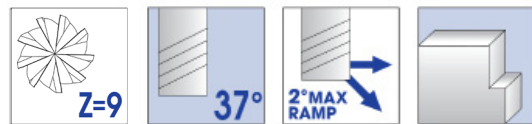
**G9C BALIQ® TISINOS PRO Coating (AlTiSiN)**

### X9C Target Materials:

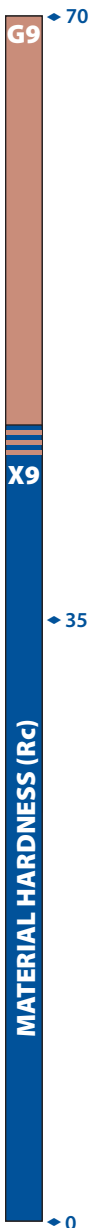
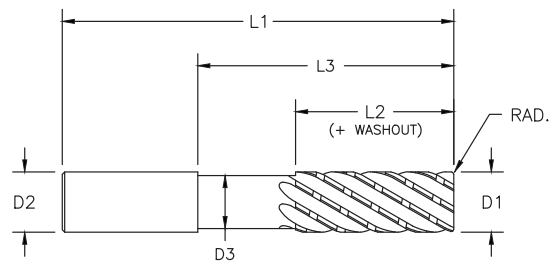
- Stainless Steel (Inox, Austenitic/Martensitic)
- Carbon Tools Steels (Up to 50 HRC)
- Cast Iron

### G9C 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 X9C AND G9C IN YOUR  
APPLICATION WITH THE GARR  
TECHNICAL ADVISOR



← View the X9C

View the G9C →

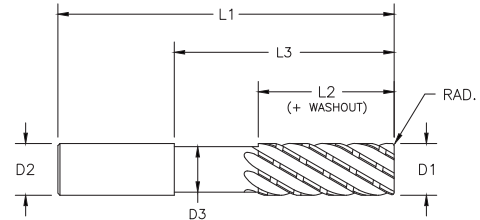


**X9C** Recommended for Low, Medium, and High Carbon Tool Steels (up to 50 HRC), cast iron, and stainless steel (Inox).

**G9C** Recommended for tough machining materials such as Heat Resistant Super Alloys,  
PH Stainless steels (Inox), and conditioned tool steels. (50-70 HRC)

**9 Flute High Performance End Mills**  
**X9C** BALIQ® ALCRONOS Coating (AlCrN-based)  
**G9C** BALIQ® TISINOS PRO Coating (AlTiSiN)

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



X9C EDP#	G9C EDP#	$d1$ † Diameter		$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length	$r$ Corner Radius	$d3$ Neck Diameter	$l3$ Reach Length	50-100	
		Decimal	Metric								
31168	31167	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.015"	-	-	100.29
31172	31169	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.030"	-	-	100.29
31174	31171	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.015"	-	-	150.23
31176	31173	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.030"	-	-	150.23
31178	31175	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.060"	-	-	150.23
31182	31177	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.090"	-	-	150.23
31184	31179	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/2"	.020"	-	-	150.23
31186	31181	.6250	5/8"	15.875	5/8"	3-1/2"	1-5/8"	.020"	-	-	150.23
31188	31183	.6250	5/8"	15.875	5/8"	4"	1-7/8"	.030"	-	-	158.25
31190	31185	.6299		16.000	16	100	42	1.00	-	-	167.51
31192	31187	.6299		16.000	16	120	65	0.50	-	-	207.75
31194	31189	.6299		16.000	16	120	40	0.50	15.2	65	211.65
31196	31191	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.015"	-	-	204.17
31198	31193	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.030"	-	-	204.17
31200	31195	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.060"	-	-	204.17
31202	31197	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.120"	-	-	204.17
31204	31199	.7500	3/4"	19.050	3/4"	5"	2-1/4"	.030"	-	-	272.53

70 → **G9**

→ 35

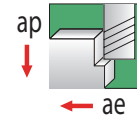
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MATERIAL HARDNESS (Rc)

# GARR TOOL X9, G9 High Performance Milling Guide

ISO Material	HRC	SFM (Vc)	CHIPLOAD PER TOOTH (Fz)			
			1/2"	5/8"	3/4"	1"
<b>COBALT BASE ALLOYS</b>						
Powdered Metal, Stellite, Hs-21, Haynes 25/188, X-40, L-605	< 40 > 40	120 - 240 100 - 195	.0019" - .0036" .0014" - .0031"	.0021" - .0043" .0017" - .0038"	.0026" - .0052" .0020" - .0048"	.0038" - .0072" .0028" - .0062"
<b>NICKEL BASE ALLOYS</b>						
Invar, Kovar, Inconel-625/718, Waspaloy, Rene, Hastelloy, A286	< 40 > 40	120 - 240 100 - 195	.0019" - .0036" .0014" - .0031"	.0021" - .0043" .0017" - .0038"	.0026" - .0052" .0020" - .0048"	.0038" - .0072" .0028" - .0062"
<b>IRON BASE ALLOYS</b>						
Incoloy 800-802, Multimet N-155, Timkin 16-25-6, Carpenter 22-b3	< 40 > 40	120 - 240 100 - 195	.0019" - .0036" .0014" - .0031"	.0021" - .0043" .0017" - .0038"	.0026" - .0052" .0020" - .0048"	.0038" - .0072" .0028" - .0062"
<b>MONEL</b>						
Monel - 65% Nickel		160 - 290	.0019" - .0036"	.0021" - .0043"	.0026" - .0052"	.0038" - .0072"
<b>TITANIUM ALLOYS</b>						
Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		260 - 490	.0021" - .0040"	.0026" - .0048"	.0028" - .0056"	.0042" - .0080"
5553 / Beta Titanium		195 - 365	.0021" - .0036"	.0026" - .0043"	.0028" - .0052"	.0042" - .0072"
<b>STAINLESS STEELS</b>						
13/8, 15/5, 17-4, pH Types	< 40 > 40	290 - 490 225 - 360	.0019" - .0036" .0014" - .0031"	.0022" - .0043" .0017" - .0039"	.0026" - .0052" .0020" - .0048"	.0038" - .0072" .0028" - .0062"
200 Series, 300 Series	< 40 > 40	355 - 555 290 - 455	.0019" - .0041" .0014" - .0031"	.0022" - .0048" .0017" - .0039"	.0026" - .0058" .0020" - .0048"	.0038" - .0082" .0028" - .0062"
304L, 316L, Nitronic 50	< 40 > 40	325 - 520 225 - 360	.0019" - .0036" .0014" - .0031"	.0022" - .0043" .0017" - .0039"	.0026" - .0052" .0020" - .0048"	.0038" - .0072" .0028" - .0062"
400 Series	< 40 > 40	290 - 555 225 - 425	.0019" - .0038" .0014" - .0034"	.0022" - .0046" .0017" - .0041"	.0026" - .0056" .0020" - .0050"	.0038" - .0076" .0028" - .0068"
<b>HIGH STRENGTH TOOL STEELS</b>						
A2, D2, P20, H13, S7, O1	< 40 > 40	290 - 520 195 - 425	.0024" - .0038" .0022" - .0031"	.0026" - .0046" .0024" - .0038"	.0032" - .0056" .0028" - .0048"	.0048" - .0076" .0044" - .0062"
<b>MEDIUM ALLOY TOOL STEELS</b>						
4140, 4340, 52100, 6150, 8620	< 40 > 40	455 - 650 325 - 490	.0024" - .0040" .0022" - .0033"	.0026" - .0048" .0024" - .0040"	.0032" - .0058" .0028" - .0048"	.0048" - .0080" .0044" - .0066"
<b>CARBON STEELS</b>						
1000's - 1018, 1020, 12L14	< 40	490 - 780	.0024" - .0043"	.0026" - .0050"	.0032" - .0060"	.0048" - .0086"
<b>CAST MATERIAL</b>						
Steel (Malleable)		455 - 685	.0029" - .0046"	.0031" - .0053"	.0036" - .0062"	.0058" - .0092"
Ductile Iron		455 - 685	.0029" - .0046"	.0031" - .0053"	.0036" - .0062"	.0058" - .0092"
Gray Iron		585 - 770	.0031" - .0048"	.0034" - .0055"	.0038" - .0064"	.0062" - .0096"

	Profile/Trochoidal Milling
Axial (ap)	MAX
Radial (ae)	Up to 10%



NOTE - DATA DOES NOT REFLECT CHIP THINNING.

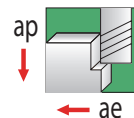
SPINDLE INTERFACE MUST BE SCRUTINIZED WHEN USING 5/8" DIAMETER AND LARGER END MILLS

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

# GARR TOOL X9, G9 High Performance Milling Guide

ISO Material	HRC	M/Min. (Vc)	CHIPLOAD PER TOOTH (Fz)			
			12.0mm	16.0mm	20.0mm	25.0mm
<b>COBALT BASE ALLOYS</b>						
Powdered Metal, Stellite, Hs-21, Haynes 25/188, X-40, L-605	< 40 > 40	37 - 75 30 - 60	.048 - .091 .036 - .079	.053 - .109 .043 - .097	.066 - .132 .051 - .122	.097 - .183 .071 - .157
<b>NICKEL BASE ALLOYS</b>						
Invar, Kovar, Inconel-625/718, Waspaloy, Rene, Hastelloy, A286	< 40 > 40	37 - 75 30 - 60	.048 - .091 .036 - .079	.053 - .109 .043 - .097	.066 - .132 .051 - .122	.097 - .183 .071 - .157
<b>IRON BASE ALLOYS</b>						
Incoloy 800-802, Multimet N-155, Timkin 16-25-6, Carpenter 22-b3	< 40 > 40	37 - 75 30 - 60	.048 - .091 .036 - .079	.053 - .109 .043 - .097	.066 - .132 .051 - .122	.097 - .183 .071 - .157
<b>MONEL</b>						
Monel - 65% Nickel		50 - 90	.048 - .091	.053 - .109	.066 - .132	.097 - .183
<b>TITANIUM ALLOYS</b>						
Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		80 - 150	.053 - .102	.066 - .122	.071 - .142	.107 - .203
5553 / Beta Titanium		60 - 110	.053 - .091	.066 - .109	.071 - .132	.107 - .183
<b>STAINLESS STEELS</b>						
13/8, 15/5, 17-4, pH Types	< 40 > 40	90 - 150 70 - 110	.048 - .091 .036 - .079	.056 - .109 .043 - .099	.066 - .132 .051 - .122	.097 - .183 .071 - .157
200 Series, 300 Series	< 40 > 40	110 - 170 90 - 140	.048 - .104 .036 - .079	.056 - .122 .043 - .099	.066 - .147 .051 - .122	.097 - .208 .071 - .157
304L, 316L, Nitronic 50	< 40 > 40	100 - 160 70 - 110	.048 - .091 .036 - .079	.056 - .109 .043 - .099	.066 - .132 .051 - .122	.097 - .183 .071 - .157
400 Series	< 40 > 40	90 - 170 70 - 130	.048 - .097 .036 - .086	.056 - .117 .043 - .104	.066 - .142 .051 - .127	.097 - .193 .071 - .173
<b>HIGH STRENGTH TOOL STEELS</b>						
A2, D2, P20, H13, S7, O1	< 40 > 40	90 - 160 60 - 130	.061 - .097 .056 - .079	.066 - .117 .061 - .097	.081 - .142 .071 - .122	.122 - .193 .112 - .157
<b>MEDIUM ALLOY TOOL STEELS</b>						
4140, 4340, 52100, 6150, 8620	< 40 > 40	140 - 200 100 - 150	.061 - .102 .056 - .084	.066 - .122 .061 - .102	.081 - .147 .071 - .122	.122 - .203 .112 - .168
<b>CARBON STEELS</b>						
1000's - 1018, 1020, 12L14	< 40	150 - 240	.061 - .109	.066 - .127	.081 - .152	.122 - .218
<b>CAST MATERIAL</b>						
Steel (Malleable)		140 - 210	.074 - .117	.079 - .135	.091 - .157	.147 - .234
Ductile Iron		140 - 210	.074 - .117	.079 - .135	.091 - .157	.147 - .234
Gray Iron		180 - 235	.079 - .122	.086 - .140	.097 - .163	.157 - .244

	Profile/Trochoidal Milling
Axial (ap)	MAX
Radial (ae)	Up to 10%



**NOTE - DATA DOES NOT REFLECT CHIP THINNING.**

**SPINDLE INTERFACE MUST BE SCRUTINIZED WHEN USING 16mm DIAMETER AND LARGER END MILLS**

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

# GARR TOOL®

High Performance Solid Carbide

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Fax: 989-463-3609  
Email: [sales@garrtool.com](mailto:sales@garrtool.com)

New EDPs are consistently moving through production to build an initial stock, based on demand. If an item is not yet stocked, we are happy to provide an estimated delivery date!

Sold through select industrial distributors  
Prices subject to change without notice



TM