

# NEW SERIES

MATERIAL SPECIFIC COATINGS

# AHB

TOOLING & MACHINERY

COMPLETE METALWORKING SOLUTIONS

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## X9

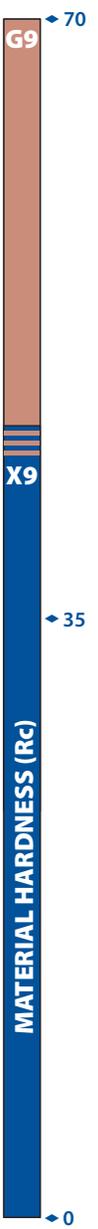
## G9

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



™

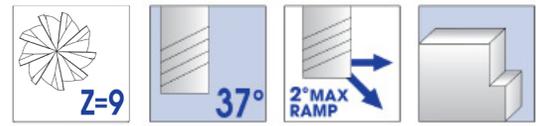
HIGH PERFORMANCE  
END MILLS



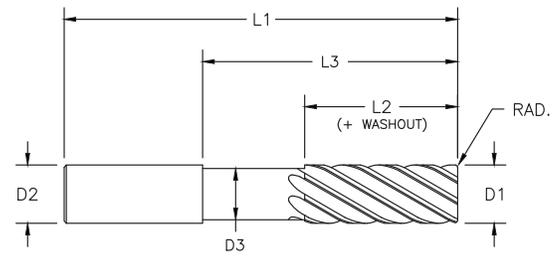
**High Performance End Mills**  
**X9 BALIQ® ALCRONOS Coating (AlCrN)**  
**G9 BALIQ® TISINOS PRO Coating (AlTiSiN)**

**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 →



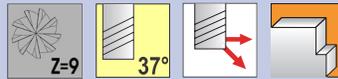
**TOLERANCES**

|           |                                    |
|-----------|------------------------------------|
| <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 - center cutting

h6 shank tolerance

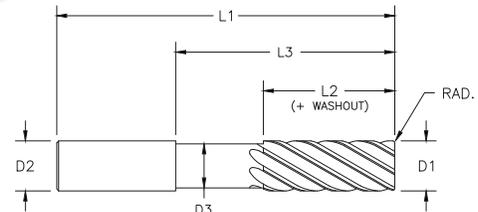
Engineered for High Efficiency Milling

Variable flute grind

Honed edge treatment

Polished fluting

Material and condition specific coatings



| X9<br>EDP# | G9<br>EDP# | <i>d1</i> †<br>Diameter |        | <i>d2</i><br>Shank<br>Diameter | <i>l1</i><br>Overall<br>Length | <i>l2</i><br>Flute<br>Length | <i>r</i><br>Corner<br>Radius | <i>d3</i><br>Neck<br>Diameter | <i>l3</i><br>Reach<br>Length | LIST PRICE |        |
|------------|------------|-------------------------|--------|--------------------------------|--------------------------------|------------------------------|------------------------------|-------------------------------|------------------------------|------------|--------|
|            |            | 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  
X9  
35 →  
MATERIAL HARDNESS (RC)  
0 ←

**S M P K**

## High Performance End Mills

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

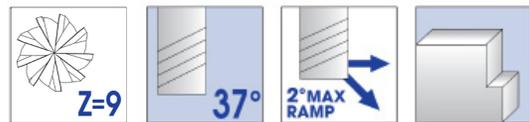
**G9C BALIQ® TISINOS PRO Coating (AlTiSiN)**

### X9C Target Materials:

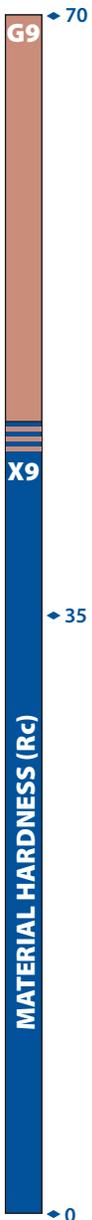
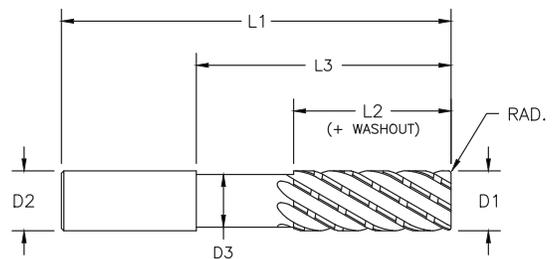
- Stainless Steel (Inox, Austenitic/Martensitic)
- Carbon Tools Steels (Up to 50 HRC)
- Cast Iron

### 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



**X9C**



**G9C**



← View the X9C

View the G9C →

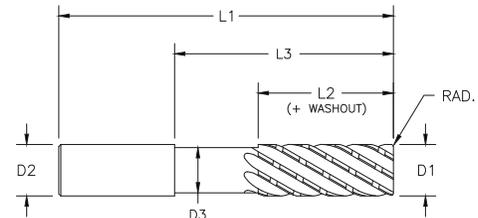


**X9C** Recommended for Low, Medium, and High Carbon Tool Steels (up to 50 HRC), cast iron, and stainless steel (Inox).

**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 - 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<br>EDP# | G9C<br>EDP# | $d1$ †<br>Diameter |        | $d2$<br>Shank<br>Diameter | $l1$<br>Overall<br>Length | $l2$<br>Flute<br>Length | $r$<br>Corner<br>Radius | $d3$<br>Neck<br>Diameter | $l3$<br>Reach<br>Length | LIST PRICE |        |
|-------------|-------------|--------------------|--------|---------------------------|---------------------------|-------------------------|-------------------------|--------------------------|-------------------------|------------|--------|
|             |             | 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

→ 0

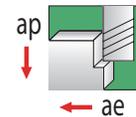
**X9**

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<br>> 40 | 120 - 240<br>100 - 195 | .0019" - .0036"<br>.0014" - .0031" | .0021" - .0043"<br>.0017" - .0038" | .0026" - .0052"<br>.0020" - .0048" | .0038" - .0072"<br>.0028" - .0062" |
| <b>NICKEL BASE ALLOYS</b>  |              |                        |                                    |                                    |                                    |                                    |
| Invar, Kovar, Inconel-625/718, Waspaloy, Rene, Hastelloy, A286   | < 40<br>> 40 | 120 - 240<br>100 - 195 | .0019" - .0036"<br>.0014" - .0031" | .0021" - .0043"<br>.0017" - .0038" | .0026" - .0052"<br>.0020" - .0048" | .0038" - .0072"<br>.0028" - .0062" |
| <b>IRON BASE ALLOYS</b>  |              |                        |                                    |                                    |                                    |                                    |
| Incoloy 800-802, Multimet N-155, Timkin 16-25-6, Carpenter 22-b3 | < 40<br>> 40 | 120 - 240<br>100 - 195 | .0019" - .0036"<br>.0014" - .0031" | .0021" - .0043"<br>.0017" - .0038" | .0026" - .0052"<br>.0020" - .0048" | .0038" - .0072"<br>.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<br>> 40 | 290 - 490<br>225 - 360 | .0019" - .0036"<br>.0014" - .0031" | .0022" - .0043"<br>.0017" - .0039" | .0026" - .0052"<br>.0020" - .0048" | .0038" - .0072"<br>.0028" - .0062" |
| 200 Series, 300 Series   | < 40<br>> 40 | 355 - 555<br>290 - 455 | .0019" - .0041"<br>.0014" - .0031" | .0022" - .0048"<br>.0017" - .0039" | .0026" - .0058"<br>.0020" - .0048" | .0038" - .0082"<br>.0028" - .0062" |
| 304L, 316L, Nitronic 50  | < 40<br>> 40 | 325 - 520<br>225 - 360 | .0019" - .0036"<br>.0014" - .0031" | .0022" - .0043"<br>.0017" - .0039" | .0026" - .0052"<br>.0020" - .0048" | .0038" - .0072"<br>.0028" - .0062" |
| 400 Series   | < 40<br>> 40 | 290 - 555<br>225 - 425 | .0019" - .0038"<br>.0014" - .0034" | .0022" - .0046"<br>.0017" - .0041" | .0026" - .0056"<br>.0020" - .0050" | .0038" - .0076"<br>.0028" - .0068" |
| <b>HIGH STRENGTH TOOL STEELS</b>                                 |              |                        |                                    |                                    |                                    |                                    |
| A2, D2, P20, H13, S7, O1   | < 40<br>> 40 | 290 - 520<br>195 - 425 | .0024" - .0038"<br>.0022" - .0031" | .0026" - .0046"<br>.0024" - .0038" | .0032" - .0056"<br>.0028" - .0048" | .0048" - .0076"<br>.0044" - .0062" |
| <b>MEDIUM ALLOY TOOL STEELS</b>                                  |              |                        |                                    |                                    |                                    |                                    |
| 4140, 4340, 52100, 6150, 8620                                    | < 40<br>> 40 | 455 - 650<br>325 - 490 | .0024" - .0040"<br>.0022" - .0033" | .0026" - .0048"<br>.0024" - .0040" | .0032" - .0058"<br>.0028" - .0048" | .0048" - .0080"<br>.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.**

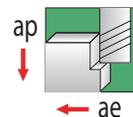
**SPINDLE INTERFACE MUST BE SCRUTINIZED WHEN USING 5/8" DIAMETER AND LARGER END MILLS**

**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.<br>(Vc)             | CHIPLOAD PER TOOTH (Fz)    |                            |                            |                            |
|----------------------------|---|----------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
|                            |   |                      |                            | 12.0mm                     | 16.0mm                     | 20.0mm                     | 25.0mm                     |
| S                          | <b>COBALT BASE ALLOYS</b>   |                      |                            |                            |                            |                            |                            |
|                            | Powdered Metal, Stellite, Hs-21, Haynes 25/188, X-40, L-605                       | < 40<br>> 40         | 37 - 75<br>30 - 60         | .048 - .091<br>.036 - .079 | .053 - .109<br>.043 - .097 | .066 - .132<br>.051 - .122 | .097 - .183<br>.071 - .157 |
|                            | <b>NICKEL BASE ALLOYS</b>   |                      |                            |                            |                            |                            |                            |
|                            | Invar, Kovar, Inconel-625/718, Waspaloy, Rene, Hastelloy, A286                    | < 40<br>> 40         | 37 - 75<br>30 - 60         | .048 - .091<br>.036 - .079 | .053 - .109<br>.043 - .097 | .066 - .132<br>.051 - .122 | .097 - .183<br>.071 - .157 |
|                            | <b>IRON BASE ALLOYS</b>   |                      |                            |                            |                            |                            |                            |
|                            | Incoloy 800-802, Multimet N-155, Timkin 16-25-6, Carpenter 22-b3                  | < 40<br>> 40         | 37 - 75<br>30 - 60         | .048 - .091<br>.036 - .079 | .053 - .109<br>.043 - .097 | .066 - .132<br>.051 - .122 | .097 - .183<br>.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<br>5553 / Beta Titanium |                      | 80 - 150<br>60 - 110       | .053 - .102<br>.053 - .091 | .066 - .122<br>.066 - .109 | .071 - .142<br>.071 - .132 | .107 - .203<br>.107 - .183 |
| M                          | <b>STAINLESS STEELS</b>   |                      |                            |                            |                            |                            |                            |
|                            | 13/8, 15/5, 17-4, pH Types  | < 40<br>> 40         | 90 - 150<br>70 - 110       | .048 - .091<br>.036 - .079 | .056 - .109<br>.043 - .099 | .066 - .132<br>.051 - .122 | .097 - .183<br>.071 - .157 |
|                            | 200 Series, 300 Series  | < 40<br>> 40         | 110 - 170<br>90 - 140      | .048 - .104<br>.036 - .079 | .056 - .122<br>.043 - .099 | .066 - .147<br>.051 - .122 | .097 - .208<br>.071 - .157 |
|                            | 304L, 316L, Nitronic 50   | < 40<br>> 40         | 100 - 160<br>70 - 110      | .048 - .091<br>.036 - .079 | .056 - .109<br>.043 - .099 | .066 - .132<br>.051 - .122 | .097 - .183<br>.071 - .157 |
|                            | 400 Series  | < 40<br>> 40         | 90 - 170<br>70 - 130       | .048 - .097<br>.036 - .086 | .056 - .117<br>.043 - .104 | .066 - .142<br>.051 - .127 | .097 - .193<br>.071 - .173 |
|                            | <b>HIGH STRENGTH TOOL STEELS</b>  |                      |                            |                            |                            |                            |                            |
| A2, D2, P20, H13, S7, O1   | < 40<br>> 40  | 90 - 160<br>60 - 130 | .061 - .097<br>.056 - .079 | .066 - .117<br>.061 - .097 | .081 - .142<br>.071 - .122 | .122 - .193<br>.112 - .157 |                            |
| P                          | <b>MEDIUM ALLOY TOOL STEELS</b>   |                      |                            |                            |                            |                            |                            |
|                            | 4140, 4340, 52100, 6150, 8620   | < 40<br>> 40         | 140 - 200<br>100 - 150     | .061 - .102<br>.056 - .084 | .066 - .122<br>.061 - .102 | .081 - .147<br>.071 - .122 | .122 - .203<br>.112 - .168 |
|                            | <b>CARBON STEELS</b>  |                      |                            |                            |                            |                            |                            |
| 1000's - 1018, 1020, 12L14 | < 40  | 150 - 240            | .061 - .109                | .066 - .127                | .081 - .152                | .122 - .218                |                            |
| K                          | <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

7800 N Alger Road  
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