

Ceramic Inserts

Greenleaf is the industry leader in the development and manufacture of ceramic and coated ceramic inserts in ANSI standard and special geometries.



Greenleaf Corporation is continually upgrading its products.
For the most current information, please visit our web site at:

www.greenleafglobalsupport.com

Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
CN +86-731-89954796 • info@greenleafcorporation.com.cn
www.greenleafglobalsupport.com • www.greenleafcorporation.com

Ceramic Insert Grade Description

CERAMIC

Greenleaf is the industry leader in the development and manufacture of ceramic and coated ceramic inserts in ANSI standard and special geometries. Some of the most prominent include:

WG-300® Whisker-reinforced ceramic with excellent wear and shock resistance at high surface speeds. WG-300 is very effective at machining nickel and cobalt based super-alloys, and other hard materials at metal removal rates up to 10 times higher than carbide.

WG-600® Coated whisker-reinforced ceramic offering longer tool life and better performance over uncoated ceramics due to outstanding thermal properties and shock-resistance at high cutting speeds. Application areas include rough and finish turning, as well as high-performance milling of high-strength alloys, hardened steels and select stainless steels. *U.S. Patent No. 6,447,896 B1.*

WG-700™ New whisker-reinforced Al_2O_3 ceramic substrate featuring improved toughness and a unique high-speed coating. WG-700 is ideal for machining nickel- and cobalt-based super alloys and other difficult-to-machine materials. WG-700 exhibits high metal-removal rates with exceptional tool life. *U.S. Patent No. 6,447,896 B1.*

XSYTIN™-1 New phase-toughened ceramic capable of extreme feed rates. XSYTIN™-1 excels at machining a wide variety of materials including steels, cast and ductile irons, high-temperature alloys and other challenging metals. XSYTIN™-1 is ideal for use in interrupted cuts, scale, abrasive casting materials and milling.

GSN100™ New engineered blend of silicon nitride and proprietary toughening agents that redefines productivity in the machining of cast iron. GSN100 delivers outstanding tool life at high cutting speeds in turning, grooving and milling applications.

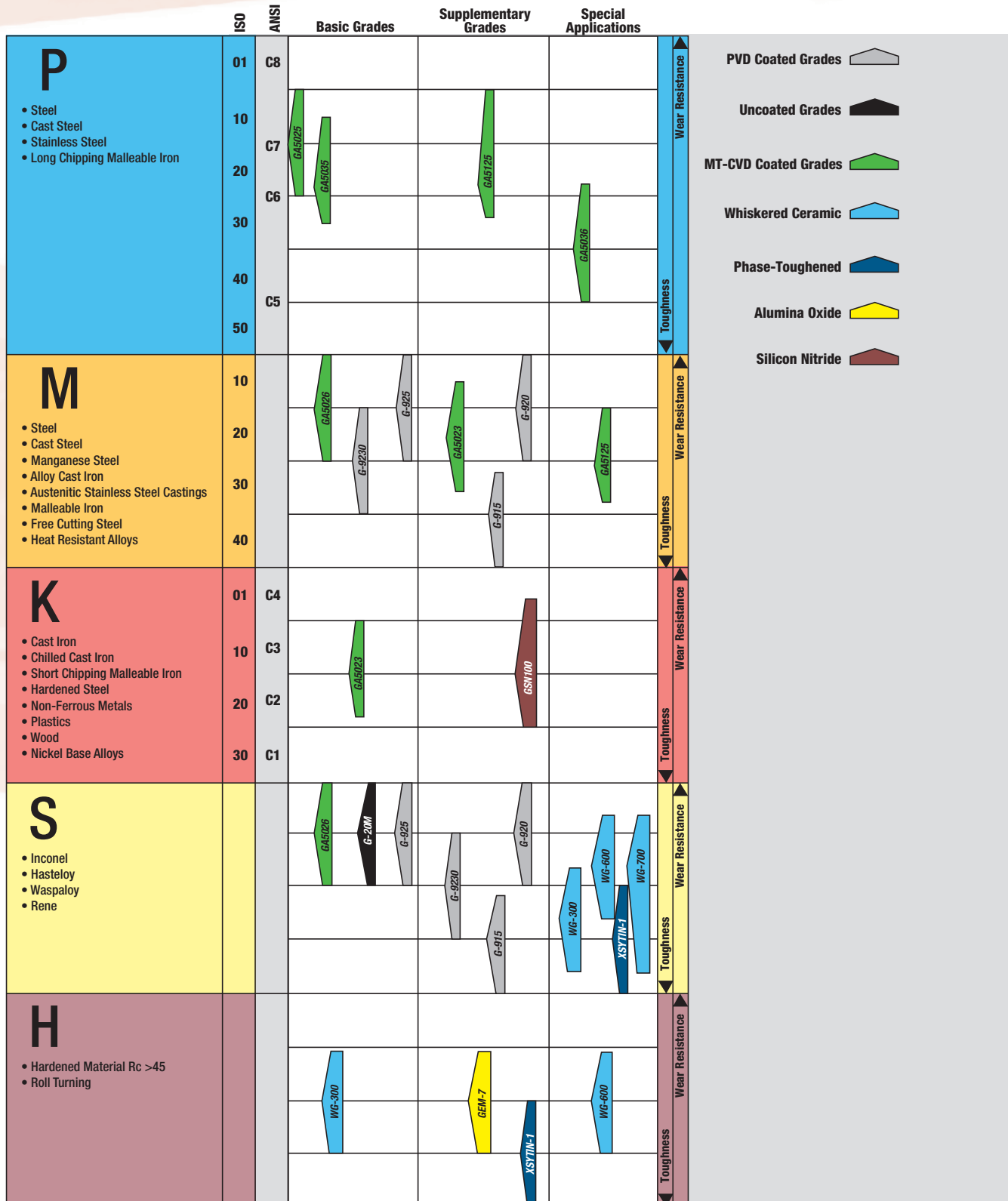
GEM-7™ $Al_2O_3 + TiC$ composite ceramic with a high degree of predictability in roll turning and hard alloy (up to 65 R/c) machining.

GEM-19™ Cold pressed and sintered Al_2O_3 ceramic for economical roughing and finishing of cast iron grades application range on severe interruption or old machinery.

Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
CN +86-731-89954796 • info@greenleafcorporation.com.cn
www.greenleafglobalsupport.com • www.greenleafcorporation.com

Insert Grade Reference for Turning



Greenleaf Sales

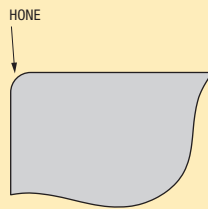
US +814-763-2915 • sales@greenleafcorporation.com

EU +31-45-404-1774 • eurooffice@greenleafcorporation.com

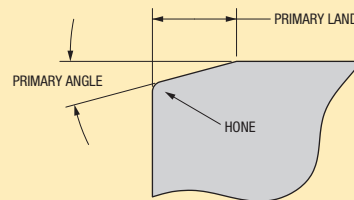
CN +86-731-89954796 • info@greenleafcorporation.com.cn

www.greenleafglobalsupport.com • www.greenleafcorporation.com

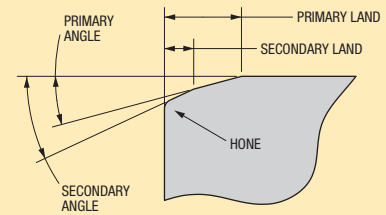
Edge Preparation and Application Guide



HONE



PRIMARY ANGLE



SECONDARY ANGLE

Edge Prep	Hone	Primary Land	Primary Angle	Application
A	0,015 R	–	–	For light finishing and grooving, also added to designated negative lands (i.e. T1, T2, T9).
T1	–	0,07	20°	General purpose for turning and light milling in clean high-temp. alloys and materials <50R/C.
T1A	0,015 R	0,07	20°	Used where more protection is needed than T1 such as in scale and light interruptions, hard turning.
T2	–	0,17	20°	General purpose chamfer for light to medium feed rates, cast-iron machining.
T2A	0,015 R	0,17	20°	Scale applications, light interruptions, weld overlays, finish turning and milling of hardened materials.

See page ATI 19 for other Greenleaf edge preps or call Greenleaf Technical Service for application concerns.

Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
 EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
 CN +86-731-89954796 • info@greenleafcorporation.com.cn
www.greenleafglobalsupport.com • www.greenleafcorporation.com

I.S.O. Identification for Turning and Boring Inserts

A 85° parallelogram
B 82° parallelogram
C 80° diamond
D 55° diamond
H hexagon
K 55° parallelogram
L 90° rectangle
M 86° diamond
O octagon
P pentagon
R round
S square
T triangle
V 35° diamond
W 80° Trigon

Shape

T

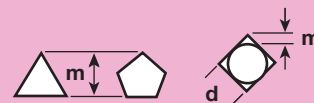
N

M

G

A 3°
B 5°
C 7°
D 15°
E 20°
F 25°
G 30°
N 0°
P 11°

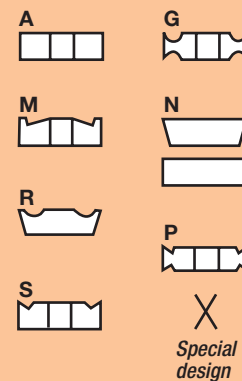
Clearances



Dimensions

	m	s	d
A	0,005 ⁽²⁾	0,025	0,025
B	0,005	0,025	0,013
C	0,013	0,025	0,025
D	0,013	0,025	0,013
E	0,025	0,025	0,025
G	0,025	0,130	0,025
J	0,005 ⁽²⁾	0,025	0,050-0,130
K	0,013	0,025	0,050-0,130
L	0,025	0,025	0,050-0,130
M	0,080-0,180 ⁽³⁾	0,130 ⁽³⁾	0,050-0,130
U	0,130-0,380 ⁽³⁾	0,130 ⁽³⁾	0,080-0,250

Tolerance Class (±mm) ⁽¹⁾



Type

⁽¹⁾ Tolerances given are plus and minus from nominal.

⁽²⁾ These tolerances normally apply to indexable inserts with facets (secondary cutting edges).

⁽³⁾ The tolerance depends on the size and shape of the insert and should be shown in the standards for the corresponding shapes and sizes (see ANSI B94.25).

⁽⁴⁾ Shall only be used when required.

⁽⁵⁾ Dimensions are established prior to supplemental edge or coating modification.

Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com

EU +31-45-404-1774 • eurooffice@greenleafcorporation.com

CN +86-731-89954796 • info@greenleafcorporation.com.cn

www.greenleafglobalsupport.com • www.greenleafcorporation.com

Comparison cutting edge length in mm – IC in inches

	06	09	11	16	22	27	33	44
△								
□ ○				09	12	15	19	25
55°					15	19		
80°					12	16	19	25
35°				16	22			













Integers to be preceded by a 0.
Example: 9,52 mm indicated by 09.

Cutting Edge Length

Unhoned


Honed


Chamfered


Chamfered and Honed

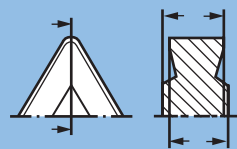

Cutting Edge

22

04

08

E



01	s= 1,59
T1	s= 1,98
02	s= 2,38
03	s= 3,18
T3	s= 3,97
04	s= 4,76
05	s= 5,56
06	s= 6,35
07	s= 7,94
09	s= 9,52
10	s= 10,00
12	s= 12,00

Thickness

Radius in terms of 0.1 mm

00	Round insert
00	sharp point
02	0.2
04	0.4
05	0.5
08	0.8
10	1.0
12	1.2
15	1.5
16	1.6
24	2.4
32	3.2
40	4.0

Cutting Point Configuration

Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
CN +86-731-89954796 • info@greenleafcorporation.com.cn
www.greenleafglobalsupport.com • www.greenleafcorporation.com

A.N.S.I. Identification for Turning and Boring Inserts

	Roll Dim. B	I.C. A	Thickness T
A	0.0002 ⁽²⁾	0.001	0.001
B	0.0002	0.001	0.005
C	0.0005	0.001	0.001
D	0.0005	0.001	0.005
E	0.001	0.001	0.001
F	0.0002 ⁽²⁾	0.0005	0.001
G	0.001	0.001	0.005
H	0.0005	0.0005	0.001
J	0.0002 ⁽²⁾	0.002-0.005	0.001
K	0.0005	0.002-0.005	0.001
L	0.001	0.002-0.005	0.001
M	0.002-0.010 ⁽³⁾	0.002-0.004 ⁽³⁾	0.005
U	0.005-0.012 ⁽³⁾	0.005-0.010 ⁽³⁾	0.005
N	0.002-0.010 ⁽³⁾	0.002-0.004 ⁽³⁾	0.001

Tolerance Class ⁽¹⁾

Regular polygons and diamonds
Number of 1/64ths of an inch in the inscribed circle as per table below:

Example:

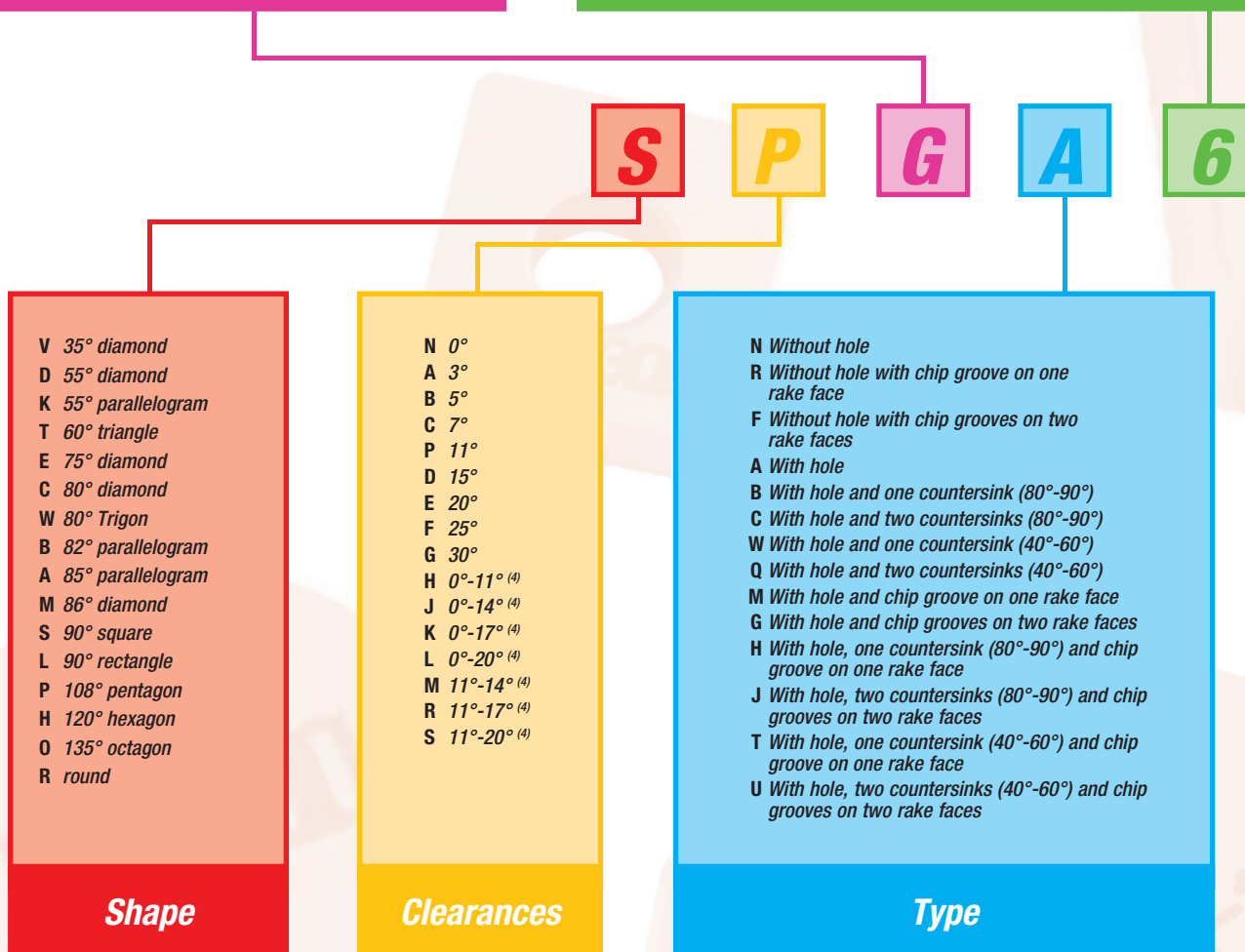
5/32" I.C.	1.2
3/16" I.C.	1.5
7/32" I.C.	1.8
1/4" I.C.	2
5/16" I.C.	2.5
3/8" I.C.	3
1/2" I.C.	4
5/8" I.C.	5
3/4" I.C.	6
7/8" I.C.	7
1" I.C.	8
1-1/4" I.C.	10

Rectangles and parallelograms
Use two digits to size

1st digit: Number of 1/64ths of an inch in width

2nd digit: Number of 1/64ths of an inch in length

Size (I.C.)



Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com

EU +31-45-404-1774 • eurooffice@greenleafcorporation.com

CN +86-731-89954796 • info@greenleafcorporation.com.cn

www.greenleafglobalsupport.com • www.greenleafcorporation.com

Regular polygons, diamonds, rectangles and parallelograms:
Number of $\frac{1}{16}$ ths of an inch in thickness as per table below:

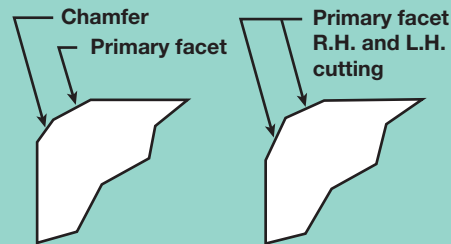
Example:

$\frac{3}{32}$ "	1.5
$\frac{1}{8}$ "	2
$\frac{5}{32}$ "	2.5
$\frac{3}{16}$ "	3
$\frac{7}{32}$ "	3.5
$\frac{1}{4}$ "	4
$\frac{5}{16}$ "	5
$\frac{3}{8}$ "	6
$\frac{7}{16}$ "	7
$\frac{1}{2}$ "	8

Thickness

Only used following a letter in the seventh position.

Number of $\frac{1}{64}$ ths of an inch in the primary facet length.



Special Cutting Point Definition⁽⁵⁾

R Right
L Left

Hand⁽⁵⁾

3

3

A

- 0 Sharp Corner
- 1 $\frac{1}{64}$ " radius
- 2 $\frac{1}{32}$ " radius
- 3 $\frac{3}{64}$ " radius
- 4 $\frac{1}{16}$ " radius
- 5 $\frac{5}{64}$ " radius
- 6 $\frac{3}{32}$ " radius
- 7 $\frac{7}{64}$ " radius
- 8 $\frac{1}{8}$ " radius

- A Square insert with 45° chamfer
- D Square insert with 30° chamfer
- E Square insert with 15° chamfer
- F Square insert with 3° chamfer
- K Square insert with 30° double chamfer
- L Square insert with 15° double chamfer
- M Square insert with 3° double chamfer
- N Truncated triangular insert
- P Flatted corner triangle – 90°

Cutting Point Configuration

- A Honed (0.0005 to less than 0.001")
- B Honed (0.001 to less than 0.002")
- C Honed (0.005 to less than 0.007")
- D Honed (0.007" and over)
- J Polished to 4 microinch AA (rake face only)
- T Chamfered – manufacturer's standard (negative land – rake face only)

Other Conditions⁽⁵⁾

- ⁽¹⁾ Tolerances given are plus and minus from nominal.
- ⁽²⁾ These tolerances normally apply to indexable inserts with facets (secondary cutting edges).
- ⁽³⁾ The tolerance depends on the size and shape of the insert and should be shown in the standards for the corresponding shapes and sizes (see ANSI B94.25).
- ⁽⁴⁾ Secondary facet angle may vary by +1°.
- ⁽⁵⁾ Shall only be used when required.
- ⁽⁶⁾ Dimensions are established prior to supplemental edge or coating modification.

Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
CN +86-731-89954796 • info@greenleafcorporation.com.cn
www.greenleafglobalsupport.com • www.greenleafcorporation.com

Ceramic Insert Usage Reference Guide

Insert Type

Geometry

Insert

Stocking

80°

80° Diamond Inserts
Negative (CNGA)

Shape: 80° Diamond	Part Number	Edge Prep	Whisker	Dimensions (millimeters)	Part Number	Edge Prep	Whisker	Dimensions (millimeters)
				L B R				L B R
CNGA	CNGA-120404	T1	W1	12.70 12.80 4.75 0.38	CNGA-421	T1	W1	12.70 12.80 4.75 0.38
	T1A	T1	W1	12.70 12.80 4.75 0.38		T1A	T1	12.70 12.80 4.75 0.38
	T2	T1	W1	12.70 12.80 4.75 0.38		T2	T1	12.70 12.80 4.75 0.38
	T2A	T1	W1	12.70 12.80 4.75 0.38		T2A	T1	12.70 12.80 4.75 0.38
	A	T1	W1	12.70 12.80 4.75 0.38		A	T1	12.70 12.80 4.75 0.38
CNGA-120408	T1	W1	W1	12.70 12.80 4.75 0.38	CNGA-422	T1	W1	12.70 12.80 4.75 0.38
	T1A	T1	W1	12.70 12.80 4.75 0.38		T1A	T1	12.70 12.80 4.75 0.38
	T2	T1	W1	12.70 12.80 4.75 0.38		T2	T1	12.70 12.80 4.75 0.38
	T2A	T1	W1	12.70 12.80 4.75 0.38		T2A	T1	12.70 12.80 4.75 0.38
	A	T1	W1	12.70 12.80 4.75 0.38		A	T1	12.70 12.80 4.75 0.38
CNGA-120412	T1	W1	W1	12.70 12.80 4.75 0.38	CNGA-423	T1	W1	12.70 12.80 4.75 0.38
	T1A	T1	W1	12.70 12.80 4.75 0.38		T1A	T1	12.70 12.80 4.75 0.38
	T2	T1	W1	12.70 12.80 4.75 0.38		T2	T1	12.70 12.80 4.75 0.38
	T2A	T1	W1	12.70 12.80 4.75 0.38		T2A	T1	12.70 12.80 4.75 0.38
	A	T1	W1	12.70 12.80 4.75 0.38		A	T1	12.70 12.80 4.75 0.38
CNGA-120416	T1	W1	W1	12.70 12.80 4.75 0.38	CNGA-424	T1	W1	12.70 12.80 4.75 0.38
	T1A	T1	W1	12.70 12.80 4.75 0.38		T1A	T1	12.70 12.80 4.75 0.38
	T2	T1	W1	12.70 12.80 4.75 0.38		T2	T1	12.70 12.80 4.75 0.38
	T2A	T1	W1	12.70 12.80 4.75 0.38		T2A	T1	12.70 12.80 4.75 0.38
	A	T1	W1	12.70 12.80 4.75 0.38		A	T1	12.70 12.80 4.75 0.38
CNGA-120712	T1	W1	W1	12.70 12.80 7.82 0.38	CNGA-425	T1	W1	12.70 12.80 7.82 0.38
	T1A	T1	W1	12.70 12.80 7.82 0.38		T1A	T1	12.70 12.80 7.82 0.38
	T2	T1	W1	12.70 12.80 7.82 0.38		T2	T1	12.70 12.80 7.82 0.38
	T2A	T1	W1	12.70 12.80 7.82 0.38		T2A	T1	12.70 12.80 7.82 0.38
	A	T1	W1	12.70 12.80 7.82 0.38		A	T1	12.70 12.80 7.82 0.38
CNGA-120716	T1	W1	W1	12.70 12.80 7.82 0.38	CNGA-426	T1	W1	12.70 12.80 7.82 0.38
	T1A	T1	W1	12.70 12.80 7.82 0.38		T1A	T1	12.70 12.80 7.82 0.38
	T2	T1	W1	12.70 12.80 7.82 0.38		T2	T1	12.70 12.80 7.82 0.38
	T2A	T1	W1	12.70 12.80 7.82 0.38		T2A	T1	12.70 12.80 7.82 0.38
	A	T1	W1	12.70 12.80 7.82 0.38		A	T1	12.70 12.80 7.82 0.38
CNGA-160608	T2A	W1	W1	16.88 16.13 6.35 0.38	CNGA-427	T2A	W1	16.88 16.13 6.35 0.38
	T2A	T2A	W1	16.88 16.13 6.35 0.38		T2A	T2A	16.88 16.13 6.35 0.38
CNGA-160612	T2A	W1	W1	16.88 16.13 6.35 0.38	CNGA-428	T2A	W1	16.88 16.13 6.35 0.38
	T2A	T2A	W1	16.88 16.13 6.35 0.38		T2A	T2A	16.88 16.13 6.35 0.38
CNGA-160616	T2A	W1	W1	16.88 16.13 6.35 0.38	CNGA-429	T2A	W1	16.88 16.13 6.35 0.38
	T2A	T2A	W1	16.88 16.13 6.35 0.38		T2A	T2A	16.88 16.13 6.35 0.38
CNGA-160620	T2A	W1	W1	16.88 16.13 6.35 0.38	CNGA-430	T2A	W1	16.88 16.13 6.35 0.38
	T2A	T2A	W1	16.88 16.13 6.35 0.38		T2A	T2A	16.88 16.13 6.35 0.38
CNGA-160624	T2A	W1	W1	16.88 16.13 6.35 0.38	CNGA-431	T2A	W1	16.88 16.13 6.35 0.38
	T2A	T2A	W1	16.88 16.13 6.35 0.38		T2A	T2A	16.88 16.13 6.35 0.38
CNGA-160628	T2A	W1	W1	16.88 16.13 6.35 0.38	CNGA-432	T2A	W1	16.88 16.13 6.35 0.38
	T2A	T2A	W1	16.88 16.13 6.35 0.38		T2A	T2A	16.88 16.13 6.35 0.38
CNGA-160632	T2A	W1	W1	16.88 16.13 6.35 0.38	CNGA-433	T2A	W1	16.88 16.13 6.35 0.38
	T2A	T2A	W1	16.88 16.13 6.35 0.38		T2A	T2A	16.88 16.13 6.35 0.38
CNGA-160636	T2A	W1	W1	16.88 16.13 6.35 0.38	CNGA-434	T2A	W1	16.88 16.13 6.35 0.38
	T2A	T2A	W1	16.88 16.13 6.35 0.38		T2A	T2A	16.88 16.13 6.35 0.38
CNGA-160640	T2A	W1	W1	16.88 16.13 6.35 0.38	CNGA-435	T2A	W1	16.88 16.13 6.35 0.38
	T2A	T2A	W1	16.88 16.13 6.35 0.38		T2A	T2A	16.88 16.13 6.35 0.38

Ceramic Classification

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Whisker Ceramic Silicon Nitride Alumina TiC AlN

Negative Inserts



80° Diamond
page: T 52



80° Diamond
page: T 53



80° Diamond
Rough Stuff®
page: T 54



55° Diamond
page: T 55



55° Diamond
page: T 56



Round
page: T 57



Round
page: T 58

Negative Inserts *continued*



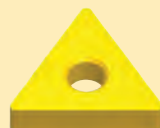
Square
page: T 59



Square
page: T 60



Square
Rough Stuff®
page: T 61



Triangle
page: T 62



Triangle
page: T 63



35° Diamond
page: T 64



Trigon
page: T 65

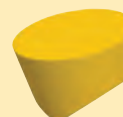
Positive Inserts



80° Diamond
Positive Flat Top
page: T 66



Round
Positive Flat Top
page: T 66



Round
V-Bottom
page: T 67



Square
Positive Flat Top
page: T 68



Triangle
Positive Flat Top
page: T 69



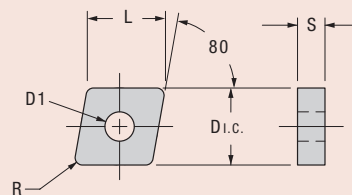
Triangle
page: T 70

Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
CN +86-731-89954796 • info@greenleafcorporation.com.cn
www.greenleafglobalsupport.com • www.greenleafcorporation.com

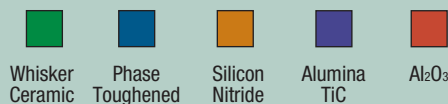
80° Diamond Inserts

Negative (CNGA)



Shape: 80° Diamond	Part Number ISO	Edge Prep	Whisker					Part Number ANSI	Edge Prep	Dimensions (millimeters)				
			WG-300	WG-600	WG-700	XSYTIN-1	GSN100			D.I.C.	L	S	D1	R
CNGA 	CNGA-120404	T1	●	○	●	○	○	CNGA-431	T1	12,70	12,90	4,75	5,16	0,38
		T1A	●	○	●	○	○		T1A	12,70	12,90	4,75	5,16	0,38
		T2	●	○	●	○	○		T2	12,70	12,90	4,75	5,16	0,38
		T2A	●	○	●	○	●		T2A	12,70	12,90	4,75	5,16	0,38
		A	○	○	○	○	○		A	12,70	12,90	4,75	5,16	0,38
	CNGA-120408	T1	●	●	●	○	○	CNGA-432	T1	12,70	12,90	4,75	5,16	0,79
		T1A	●	●	●	○	○		T1A	12,70	12,90	4,75	5,16	0,79
		T2	●	●	●	○	○		T2	12,70	12,90	4,75	5,16	0,79
		T2A	●	○	●	○	●		T2A	12,70	12,90	4,75	5,16	0,79
		A	○	○	○	○	○		A	12,70	12,90	4,75	5,16	0,79
	CNGA-120412	T1	●	○	●	○	○	CNGA-433	T1	12,70	12,90	4,75	5,16	1,19
		T1A	●	●	●	○	○		T1A	12,70	12,90	4,75	5,16	1,19
		T2	●	○	●	○	○		T2	12,70	12,90	4,75	5,16	1,19
		T2A	●	○	●	○	○		T2A	12,70	12,90	4,75	5,16	1,19
		A	○	○	○	●	○		A	12,70	12,90	4,75	5,16	1,19
	CNGA-120416	T1	●	○	●	○	○	CNGA-434	T1	12,70	12,90	4,75	5,16	1,57
		T1A	●	●	●	○	○		T1A	12,70	12,90	4,75	5,16	1,57
		T2	●	○	●	○	○		T2	12,70	12,90	4,75	5,16	1,57
		T2A	●	○	●	○	○		T2A	12,70	12,90	4,75	5,16	1,57
		T3A	○	○	○	○	○		T3A	12,70	12,90	4,75	5,16	1,57
		A	○	○	○	●	○		A	12,70	12,90	4,75	5,16	1,52
	CNGA-120712	T1	●	○	●	○	○	CNGA-453	T1	12,70	12,90	7,92	5,16	1,19
		T2	○	○	○	○	○		T2	12,70	12,90	7,92	5,16	1,19
	CNGA-120716	T2	○	○	○	○	○	CNGA-454	T2	12,70	12,90	7,92	5,16	1,57
	CNGA-160608	T2A	●	○	●	○	○	CNGA-542	T2A	15,88	16,13	6,35	6,35	0,79
	CNGA-160612	T1	●	○	●	○	○	CNGA-543	T1	15,88	16,13	6,35	6,35	1,19
	CNGA-160616	T2A	●	○	●	○	○	CNGA-544	T2A	15,88	16,13	6,35	6,35	1,57
	CNGA-190612	T2A	●	●	●	○	○	CNGA-643	T2A	19,05	19,35	6,35	7,92	1,19
	CNGA-190616	T2A	○	○	○	○	○	CNGA-644	T2A	19,05	19,35	6,35	7,92	1,57
	CNGA-190708	T2A	○	○	○	○	○	CNGA-652	T2A	19,05	19,35	7,92	7,92	0,79
	CNGA-190712	T2A	○	○	○	○	○	CNGA-653	T2A	19,05	19,35	7,92	7,92	1,19
	CNGA-190716	T2A	○	○	○	○	○	CNGA-654	T2A	19,05	19,35	7,92	7,92	1,57

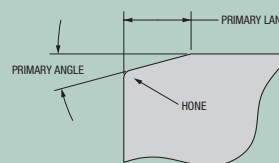
Ceramic Classification



Page T 42 – grade description

WG-300	WG-600	WG-700	XSYTIN-1	GSN100	GEM-7	GEM-19
Whisker	Phase Toughened	Si3N4	Al2O3-TiC	Al2O3		

Additional Edge Preps – page T 45

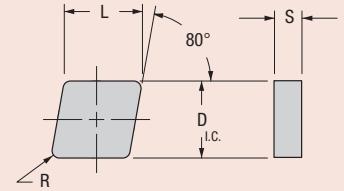


Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
 EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
 CN +86-731-89954796 • info@greenleafcorporation.com.cn
 www.greenleafglobalsupport.com • www.greenleafcorporation.com

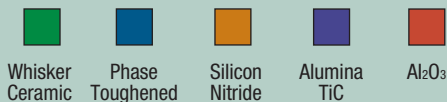


80° Diamond Inserts Negative (CNGN)



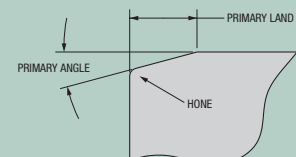
Shape: 80° Diamond	Part Number ISO	Edge Prep	Whisker						Part Number ANSI	Edge Prep	Dimensions (millimeters)			
			WG-300	WG-600	WG-700	XSYTIN-1	GSN100	AlO ₂ -TiC			D I.C.	L	S	R
CNGN 	CNGN-120404	T1	●	○	●	○	○	○	CNGN-431	T1	12,70	12,90	4,75	0,38
	CNGN-120408	T1	●	●	●	○	○	○	CNGN-432	T1	12,70	12,90	4,75	0,79
		T1A	●	○	●	○	○	○		T1A	12,70	12,90	4,75	0,79
		T2	●	○	●	○	○	○		T2	12,70	12,90	4,75	0,79
		T2A	●	○	●	○	○	○		T2A	12,70	12,90	4,75	0,79
		A	○	○	○	○	○	○		A	12,70	12,90	4,75	0,79
	CNGN-120412	T1	●	○	●	○	○	○	CNGN-433	T1	12,70	12,90	4,75	1,19
		T1A	●	○	●	○	○	○		T1A	12,70	12,90	4,75	1,19
		T2	○	○	○	○	●	○		T2	12,70	12,90	4,75	1,19
		T2A	●	○	○	○	○	○		T2A	12,70	12,90	4,75	1,19
		T9	○	○	○	○	○	○		T9	12,70	12,90	4,75	1,19
		A	○	○	○	○	○	○	CNGN-434	T1	12,70	12,90	4,75	1,57
	CNGN-120416	T1	●	●	○	○	○	○		T2	12,70	12,90	4,75	1,57
		T1A	○	○	○	○	○	○		T2A	12,70	12,90	4,75	1,57
		T2	●	○	○	○	○	○	CNGN-451	T1	12,70	12,90	7,92	0,38
		T2A	●	○	○	○	○	○	CNGN-452	T1	12,70	12,90	7,92	0,79
		A	○	○	○	○	○	○		T2	12,70	12,90	7,92	0,79
	CNGN-120704	T1	○	○	○	○	○	○		T2A	12,70	12,90	7,92	0,79
	CNGN-120708	T1	●	○	○	○	○	○	CNGN-453	T1	12,70	12,90	7,92	1,19
		T2	○	○	○	○	○	○		T1A	12,70	12,90	7,92	1,19
		T2A	●	○	○	○	○	○		T2	12,70	12,90	7,92	1,19
	CNGN-120712	T1	●	●	○	○	○	○		T2A	12,70	12,90	7,92	1,19
		T1A	○	○	○	○	○	○	CNGN-454	T1	12,70	12,90	7,92	1,57
		T2	○	○	○	○	○	○		T1A	12,70	12,90	7,92	1,57
		T2A	●	○	○	○	○	○		T2	12,70	12,90	7,92	1,57
		A	○	○	○	○	○	○		T2A	12,70	12,90	7,92	1,57
	CNGN-120716	T1	●	○	○	○	○	○	CNGN-542	T1	15,88	16,13	6,35	0,79
		T1A	○	○	○	○	○	○	CNGN-543	T1	15,88	16,13	6,35	1,19
		T2	○	○	○	○	○	○		T2A	15,88	16,13	6,35	1,19
		T2A	●	○	○	○	○	○	CNGN-642	T1	19,05	19,35	6,35	0,79
		A	○	○	○	○	○	○	CNGN-643	T1	19,05	19,35	6,35	1,19
	CNGN-160608	T1	●	○	○	○	○	○		T2	19,05	19,35	6,35	1,19
	CNGN-160612	T1	●	○	○	○	○	○		T2A	19,05	19,35	6,35	1,19
		T2A	○	○	○	○	○	○	CNGN-644	T2A	19,05	19,35	6,35	1,57
	CNGN-190608	T1	○	○	○	○	○	○	CNGN-658	T2A	19,05	19,35	7,92	3,18
	CNGN-190612	T1	●	○	○	○	○	○						
		T2	○	○	○	○	○	○						
		T2A	●	○	○	○	○	○						
	CNGN-190616	T2A	○	○	○	○	○	○						
	CNGN-190732	T2A	○	○	○	○	○	○						

Ceramic Classification



WG-300	WG-600	WG-700	XSYTIN-1	GSN100	GEM-7	GEM-19
Whisker			Phase Toughened	SiAlN	AlO ₂ -TiC	Al ₂ O ₃

Additional Edge Preps – page T 45



Page T 42 – grade description



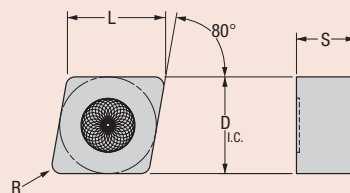
Greenleaf Sales
 US +31-45-404-1774 • sales@greenleafcorporation.com
 EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
 CN +86-731-89954796 • info@greenleafcorporation.com.cn
 www.greenleafglobalsupport.com • www.greenleafcorporation.com

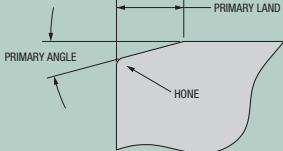
80°



80° Diamond Inserts

Rough Stuff®



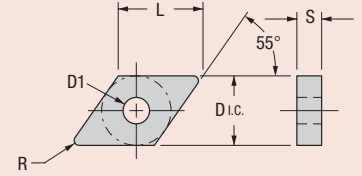
Shape: 80° Diamond	Part Number	Edge Prep	Whisker				Part Number	Edge Prep	Dimensions (millimeters)			
	ISO		WG-300	WG-600	WG-700	GSN100			ANSI	D I.C.	L	S
	CNGX-120708-RS	T2	○	○	○	○	CNGX-452-RS	T2	12,70	12,90	7,92	0,79
		T2A	○	○	○	○		T2A	12,70	12,90	7,92	0,79
	CNGX-120712-RS	T2	○	○	○	○	CNGX-453-RS	T2	12,70	12,90	7,92	1,19
		T2A	○	○	○	○		T2A	12,70	12,90	7,92	1,19
	CNGX-120716-RS	T2	○	○	○	○	CNGX-454-RS	T2	12,70	12,90	7,92	1,57
		T2A	○	○	○	○		T2A	12,70	12,90	7,92	1,57
Ceramic Classification			WG-300	WG-600	WG-700	GSN100	Additional Edge Preps – page T 45					
Whisker Ceramic SiAlN			Whisker									
Page T 42 – grade description												

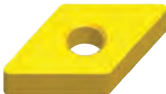
Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
 EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
 CN +86-731-89954796 • info@greenleafcorporation.com.cn
 www.greenleafglobalsupport.com • www.greenleafcorporation.com



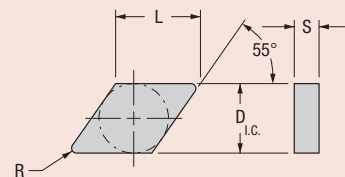
55° Diamond Inserts Negative (DNGA)



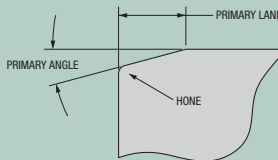
Shape: 55° Diamond	Part Number ISO	Edge Prep	Whisker							Part Number ANSI	Edge Prep	Dimensions (millimeters)				
			WG-300	WG-600	WG-700	XSYTIN-1	GSN100	GEM-7	GEM-19			D I.C.	L	S	D1	R
DNGA 	DNGA-110308	T1	○	○	○	○	○	○	DNGA-322	T1	9,53	11,63	3,18	3,81	0,79	
	DNGA-110312	T1	○	○	○	○	○	○	DNGA-323	T1	9,53	11,63	3,18	3,81	1,19	
	DNGA-110316	T1	○	○	○	○	○	○	DNGA-324	T1	9,53	11,63	3,18	3,81	1,57	
	DNGA-110408	T1	○	○	○	○	○	○	DNGA-332	T1	9,53	11,63	4,75	3,81	0,79	
	DNGA-150404	T1	●	○	○	○	○	○	DNGA-431	T1	12,70	15,49	4,75	5,16	0,38	
		T2	●	○	○	○	○	○		T2	12,70	15,49	4,75	5,16	0,38	
	DNGA-150408	T1	●	○	○	○	○	○	DNGA-432	T1	12,70	15,49	4,75	5,16	0,79	
		T1A	●	○	○	○	○	○		T1A	12,70	15,49	4,75	5,16	0,79	
		T2	●	○	○	○	●	○		T2	12,70	15,49	4,75	5,16	0,79	
		T2A	●	○	○	○	○	●	○		T2A	12,70	15,49	4,75	5,16	0,79
		A	○	○	○	○	○	○	○		A	12,70	15,49	4,75	5,16	0,79
	DNGA-150412	T1	●	○	○	○	○	○	○	DNGA-433	T1	12,70	15,49	4,75	5,16	1,19
		T1A	●	○	○	○	○	○	○		T1A	12,70	15,49	4,75	5,16	1,19
		T2	●	○	○	○	●	○	○		T2	12,70	15,49	4,75	5,16	1,19
		T2A	●	○	○	○	○	●	○		T2A	12,70	15,49	4,75	5,16	1,19
	DNGA-150416	T1	●	○	○	○	○	○	○	DNGA-434	T1	12,70	15,49	4,75	5,16	1,57
		T1A	●	○	○	○	○	○	○		T1A	12,70	15,49	4,75	5,16	1,57
	T2A	●	○	○	○	○	○	○		T2A	12,70	15,49	4,75	5,16	1,57	
DNGA-150612	T1	○	○	○	○	○	○	○	DNGA-443	T1	12,70	15,49	6,35	5,16	1,19	
DNGA-190612	T2A	●	○	○	○	○	○	○	DNGA-543	T2A	15,88	19,38	6,35	6,35	1,19	
Ceramic Classification			WG-300	WG-600	WG-700	XSYTIN-1	GSN100	GEM-7	GEM-19	Additional Edge Preps – page T 45						
Whisker Ceramic Phase Toughened Silicon Nitride Alumina TiC Al₂O₃			Whisker	Phase Toughened	SiAlN	Al ₂ O ₃ -TiC	Al ₂ O ₃	PRIMARY ANGLE PRIMARY LAND HONE								
Page T 42 – grade description																

55° Diamond Inserts

Negative (DNGN)



Shape: 55° Diamond	Part Number ISO	Edge Prep	Whisker							Part Number ANSI	Edge Prep	Dimensions (millimeters)			
			WG-300	WG-600	WG-700	XSYTIN-1	GSN100	GEM-7	GEM-19			D I.C.	L	S	R
DNGN 	DNGN-110308	T1	○	○	○	○	○	○	DNGN-322	T1	9,53	11,63	3,18	0,79	
	DNGN-110312	T1	○	○	○	○	○	○	DNGN-323	T1	9,53	11,63	3,18	1,19	
	DNGN-110316	T1	○	○	○	○	○	○	DNGN-324	T1	9,53	11,63	3,18	1,57	
	DNGN-150408	T1	●	○	●	○	○	○	DNGN-432	T1	12,70	15,49	4,75	0,79	
		T2A	○	○	○	○	○	○		T2A	12,70	15,49	4,75	0,79	
	DNGN-150412	T1	●	○	●	○	○	○	DNGN-433	T1	12,70	15,49	4,75	1,19	
	DNGN-150416	T1	●	○	○	○	○	○	DNGN-434	T1	12,70	15,49	4,75	1,57	
	T2A	○	○	○	○	○	○		T2A	12,70	15,49	4,75	1,57		

Ceramic Classification										Additional Edge Preps – page T 45						
 Whisker Ceramic	 Phase Toughened	 Silicon Nitride	 Alumina TiC	 Al₂O₃	WG-300	WG-600	WG-700	XSYTIN-1	GSN100	GEM-7	GEM-19					
					Whisker	Phase Toughened	Si ₃ N ₄	Al ₂ O ₃ -TiC	Al ₂ O ₃							

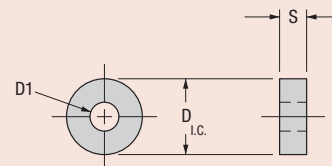
Page T 42 – grade description

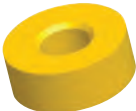
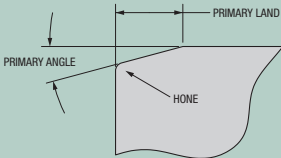
Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
 EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
 CN +86-731-89954796 • info@greenleafcorporation.com.cn
 www.greenleafglobalsupport.com • www.greenleafcorporation.com

 Stocked Standard
 Stocked or Available Upon Request
 Not Recommended

Round Inserts Negative (RNGA)

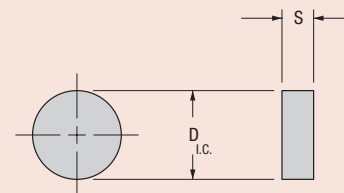


Shape: Round	Part Number	Edge Prep	Whisker							Part Number	Edge Prep	Dimensions (millimeters)				
	ISO		WG-300	WG-600	WG-700	XSYTIN-1	GSN100	GEM-7	Al ₂ O ₃ -TiC			ANSI	D I.C.	S	D1	
RNGA 	RNGA-090300	T1	○	○	○	○	○		○	RNGA-32	T1	9,53	3,18	3,81		
	RNGA-090400	T1	○	○	○	○	○		○	RNGA-33	T1	9,53	4,75	3,81		
	RNGA-120400	T1	○	○	○	○	○		○	RNGA-43	T1	12,70	4,75	5,16		
	RNGA-120700	T1	○	○	○	○	○		○	RNGA-45	T1	12,70	7,92	5,16		
	RNGA-150700	T2A	○	○	○	○	○	○	○	RNGA-55	T2A	15,88	7,92	6,35		
	RNGA-190700	T2A	○	○	○	○	○	○	○	RNGA-65	T2A	19,05	7,92	7,92		
	RNGA-250700	T2A	○	○	○	○	○	○	○	RNGA-85	T2A	25,40	7,92	9,12		
Ceramic Classification										Additional Edge Preps – page T 45						
																
Whisker Ceramic	Phase Toughened	Silicon Nitride	Alumina TiC	Al ₂ O ₃												
			WG-300	WG-600	WG-700	XSYTIN-1	GSN100	GEM-7	Al ₂ O ₃ -TiC							
			Whisker	Phase Toughened	SiN ₄	Al ₂ O ₃										

Page T 42 – grade description



Round Inserts Negative (RNGN)



Shape: Round	Part Number ISO	Edge Prep	Whisker					Part Number ANSI	Edge Prep	Dimensions (millimeters)	
			WG-300	WG-600	WG-700	XSXTIN-1	GSN100			D I.C.	S
RNGN 	RNGN-090300	T1	●	○	○	○	○	RNGN-32	T1	9,53	3,18
		T1A	●	●	●	○	○		T1A	9,53	3,18
		T2A	●	○	○	○	○		T2A	9,53	3,18
		A	○	○	○	●	○		A	9,53	3,18
	RNGN-090400	T1	●	○	○	○	○	RNGN-33	T1	9,53	4,75
		T1A	●	○	●	○	○		T1A	9,53	4,75
		T2A	●	○	●	○	○		T2A	9,53	4,75
	RNGN-120300	T1A	●	○	○	●	○	RNGN-42	T1A	12,70	3,18
		T2A	○	○	○	○	○		T2A	12,70	3,18
		A	○	○	○	●	○		T2A	12,70	3,18
	RNGN-120400	T1	●	○	●	○	○		A	12,70	4,75
		T1A	●	●	●	○	○		T1A	12,70	4,75
		T2	●	○	●	●	○		T2	12,70	4,75
		T2A	●	●	●	○	●		T2A	12,70	4,75
		A	○	○	○	○	○		A	12,70	4,75
	RNGN-120700	T1	●	●	●	●	○	RNGN-45	T1	12,70	7,92
		T1A	●	●	●	○	○		T1A	12,70	7,92
		T2	●	●	●	●	○		T2	12,70	7,92
		T2A	●	●	●	○	●		T2A	12,70	7,92
		T5A	○	○	○	○	○		T5A	12,70	7,92
	RNGN-150700	T1	●	○	○	○	○	RNGN-55	T1	15,88	7,92
		T2A	○	○	○	○	○		T2A	15,88	7,92
	RNGN-190600	T2A	○	○	○	○	○	RNGN-64	T2A	19,05	6,35
	RNGN-190700	T1	●	○	○	●	○	RNGN-65	T1	19,05	7,92
		T1A	○	○	○	○	○		T1A	19,05	7,92
		T2A	●	○	●	○	○		T2A	19,05	7,92
		A	○	○	○	●	○		A	19,05	7,92
	RNGN-250600	T2A	○	○	○	○	○	RNGN-84	T2A	25,40	6,35
	RNGN-250700	T2A	○	○	○	○	○	RNGN-85	T2A	25,40	7,92
	RNGN-250900	T2A	○	○	○	○	○	RNGN-86	T2A	25,40	9,53
	RNGN-310900	T2A	○	○	○	○	○	RNGN-106	T2A	31,75	9,53

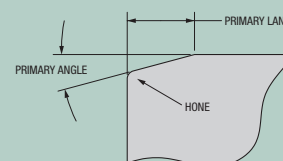
Ceramic Classification



Page T 42 – grade description

WG-300	WG-600	WG-700	XSXTIN-1	GSN100	GEM-7	GEM-19
Whisker	Phase Toughened	SiAlN	Al2O3-TiC	Al2O3		

Additional Edge Preps – page T 45



Greenleaf Sales

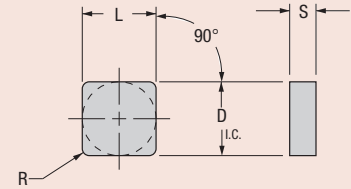
US +814-763-2915 • sales@greenleafcorporation.com
EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
CN +86-731-89954796 • info@greenleafcorporation.com.cn
www.greenleafglobalsupport.com • www.greenleafcorporation.com



CERAMIC INSERTS

Square Inserts

Negative (SNGN)



Shape: Square	Part Number ISO	Edge Prep	Whisker					Part Number ANSI	Edge Prep	Dimensions (millimeters)			
			WG-300	WG-600	WG-700	XSNTIN-1	GSN100			D L.C.	L	S	R
	SNGN-090308	T2A	○	○	○	○	○	SNGN-322	T2A	9,53	9,53	3,18	0,79
	SNGN-090412	T2	○	○	○	○	○	SNGN-333	T2	9,53	9,53	4,75	1,19
	SNGN-120408	T1	●	○	○	○	○	SNGN-432	T1	12,70	12,70	4,75	0,79
		T1A	●	○	○	○	○		T1A	12,70	12,70	4,75	0,79
		T2	○	○	○	○	○		T2	12,70	12,70	4,75	0,79
		T2A	●	○	○	○	○		T2A	12,70	12,70	4,75	0,79
		A	○	○	○	○	○		A	12,70	12,70	4,75	0,79
	SNGN-120412	T1	●	○	●	○	○	SNGN-433	T1	12,70	12,70	4,75	1,19
		T1A	○	○	○	●	●		T1A	12,70	12,70	4,75	1,19
		T2	●	○	●	●	○		T2	12,70	12,70	4,75	1,19
		T2A	●	○	●	●	○		T2A	12,70	12,70	4,75	1,19
		A	○	○	○	●	○		A	12,70	12,70	4,75	1,19
	SNGN-120416	T1	●	○	○	○	○	SNGN-434	T1	12,70	12,70	4,75	1,57
		T1A	○	○	○	●	●		T1A	12,70	12,70	4,75	1,57
		T2	●	○	○	●	○		T2	12,70	12,70	4,75	1,57
		T2A	●	○	○	○	●		T2A	12,70	12,70	4,75	1,57
		A	○	○	○	●	○		A	12,70	12,70	4,75	1,57
	SNGN-120708	T1	●	○	●	○	○	SNGN-452	T1	12,70	12,70	7,92	0,79
		T2	●	○	○	○	○		T2	12,70	12,70	7,92	0,79
	SNGN-120712	T1	●	○	●	○	○	SNGN-453	T1	12,70	12,70	7,92	1,19
		T1A	○	○	○	●	○		T1A	12,70	12,70	7,92	1,19
		T2	●	○	○	●	○		T2	12,70	12,70	7,92	1,19
		T2A	●	○	○	○	○		T2A	12,70	12,70	7,92	1,19
		A	○	○	○	●	○		A	12,70	12,70	7,92	1,19
	SNGN-120716	T1	●	○	○	○	○	SNGN-454	T1	12,70	12,70	7,92	1,57
		T1A	○	○	○	●	○		T1A	12,70	12,70	7,92	1,57
		T2	○	○	○	●	○		T2	12,70	12,70	7,92	1,57
		T2A	●	○	○	○	○		T2A	12,70	12,70	7,92	1,57
		A	○	○	○	●	○		A	12,70	12,70	7,92	1,57
	SNGN-150608	T2A	○	○	○	○	○	SNGN-542	T2A	15,88	15,88	6,35	0,79
	SNGN-150612	T1	●	○	●	○	○	SNGN-543	T1	15,88	15,88	6,35	1,19
		T2A	○	○	○	○	○		T2A	15,88	15,88	6,35	1,19
	SNGN-150616	T1	○	○	○	○	○	SNGN-544	T1	15,88	15,88	6,35	1,57
	SNGN-190663	T2A	○	○	○	○	○	SNGN-6416	T2A	19,05	19,05	6,35	6,35
	SNGN-190608	T2A	○	○	○	○	○	SNGN-642	T2A	19,05	19,05	6,35	0,79
	SNGN-190612	T1	●	○	●	○	○	SNGN-643	T1	19,05	19,05	6,35	1,19
		T2A	●	○	○	○	○		T2A	19,05	19,05	6,35	1,19
		A	○	○	○	●	○		A	19,05	19,05	6,35	1,19

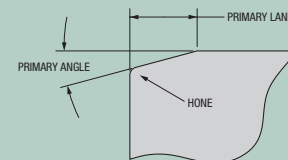
Ceramic Classification



Page T 42 – grade description

WG-300	WG-600	WG-700	XSNTIN-1	GSN100	GEM-7	GEM-19
Whisker	Phase Toughened	Si3N4	Al2O3-TiC	Al2O3		

Additional Edge Preps – page T 45



Continued on next page.

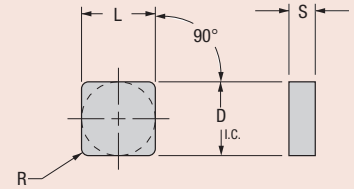
Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
 EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
 CN +86-731-89954796 • info@greenleafcorporation.com.cn
 www.greenleafglobalsupport.com • www.greenleafcorporation.com



Square Inserts

Negative (SNGN) *(continued)*



Shape: Square	Part Number ISO	Edge Prep	Whisker							Part Number ANSI	Edge Prep	Dimensions (millimeters)			
			WG-300	WG-600	WG-700	XSYTIN-1	GSN100	GEM-7	GEM-19			D I.C.	L	S	R
SNGN 	SNGN-190616	T1	●	○	●	●	○	○	○	SNGN-644	T1	19,05	19,05	6,35	1,57
		T1A	●	○	○	○	○	○	○		T1A	19,05	19,05	6,35	1,57
		T2A	●	○	○	○	○	○	○		T2A	19,05	19,05	6,35	1,57
		A	○	○	○	●	○	○	○		A	19,05	19,05	6,35	1,57
	SNGN-190708	T2A	○	○	●	○	○	○	○	SNGN-652	T2A	19,05	19,05	7,92	0,79
	SNGN-190712	T2A	○	○	○	○	○	○	○	SNGN-653	T2A	19,05	19,05	7,92	1,19
	SNGN-190716	T1	●	○	●	●	○		○	SNGN-654	T1	19,05	19,05	7,92	1,57
		T2A	○	○	○	○	○	○	○		T2A	19,05	19,05	7,92	1,57
		A	○	○	○	●	○	○	○		A	19,05	19,05	7,92	1,57
	SNGN-190720	T2A	○	○	○	○	○	○	○	SNGN-655	T2A	19,05	19,05	7,92	1,98
SNGN-190723	A	○	○	○	●	○	○	○	SNGN-656	A	19,05	19,05	7,92	2,39	
SNGN-250923	T2A	○	○	○	○	○	○	○	SNGN-866	T2A	25,40	25,40	9,53	2,39	

Whisker Ceramic

Phase Toughened

Silicon Nitride

Alumina TiC

Al₂O₃

WG-300

WG-600

WG-700

XSYTIN-1

Phase Toughened

GSN100

SiN₄

Al₂O₃-TiC

GEM-7

Al₂O₃

GEM-19

Additional Edge Preps – page T 45

PRIMARY LAND

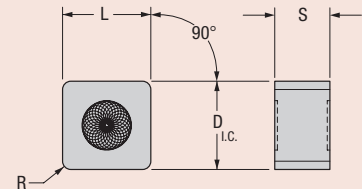
PRIMARY ANGLE

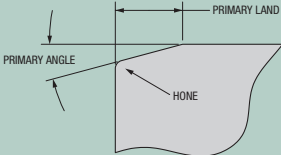
HONE

Page T 42 – grade description

Square Inserts

Rough Stuff®



Shape: Square	Part Number	Edge Prep	Whisker				Part Number	Edge Prep	Dimensions (millimeters)			
	ISO		WG-300	WG-600	WG-700	ANSI			D I.C.	L	S	R
			SiM									
	SNGX-120708-RS	T2	○	○	○	○	SNGX-452-RS	T2	12,70	12,70	7,92	0,79
		T2A	○	○	○	○		T2A	12,70	12,70	7,92	0,79
	SNGX-120712-RS	T2	○	○	○	○	SNGX-453-RS	T2	12,70	12,70	7,92	1,19
		T2A	○	○	○	○		T2A	12,70	12,70	7,92	1,19
	SNGX-120716-RS	T2	○	○	○	○	SNGX-454-RS	T2	12,70	12,70	7,92	1,57
		T2A	○	○	○	○		T2A	12,70	12,70	7,92	1,57
Ceramic Classification			WG-300 WG-600 WG-700 GSN100				Additional Edge Preps - Page T 45					
 Whisker Ceramic  Silicon Nitride			Whisker SiM									
Page T 42 – grade description												

Greenleaf Sales

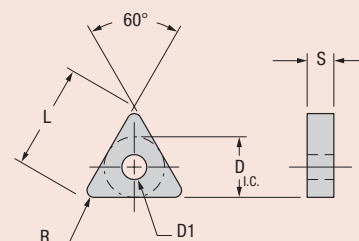
US +814-763-2915 • sales@greenleafcorporation.com
 EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
 CN +86-731-89954796 • info@greenleafcorporation.com.cn
 www.greenleafglobalsupport.com • www.greenleafcorporation.com

Not Recommended
 Stocked or Available Upon Request
 Stocked Standard



Triangle Inserts

Negative (TNGA)



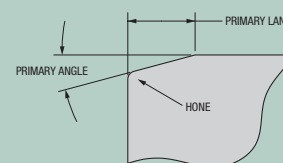
Shape: Triangle	Part Number ISO	Edge Prep	Whisker						Part Number ANSI	Edge Prep	Dimensions (millimeters)				
			WG-300	WG-600	WG-700	XYTIN-1	GSN100	GEM-7			D I.C.	L	S	D1	R
	TNGA-160404	T1	○	○	○	○	○	○	TNGA-331	T1	9,53	16,51	4,75	3,81	0,38
	TNGA-160408	T1	●	○	○	○	○	○	TNGA-332	T1	9,53	16,51	4,75	3,81	0,38
		T2A	○	○	○	○	○	○		T2A	9,53	16,51	4,75	3,81	0,38
	TNGA-160412	T1	○	○	○	○	○	○	TNGA-333	T1	9,53	16,51	4,75	3,81	1,19
	TNGA-160416	T1	○	○	○	○	○	○	TNGA-334	T1	9,53	16,51	4,75	3,81	1,57
	TNGA-220408	T1	●	○	●	○	○	○	TNGA-432	T1	12,70	22,00	4,75	5,16	0,38
		T1A	●	○	○	○	○	○		T1A	12,70	22,00	4,75	5,16	0,38
		T2A	●	○	○	○	○	●		T2A	12,70	22,00	4,75	5,16	0,38
	TNGA-220412	T2A	○	○	○	○	○	○	TNGA-433	T2A	12,70	22,00	4,75	5,16	1,19
	TNGA-220416	T1	●	○	○	○	○	○	TNGA-434	T1	12,70	22,00	4,75	5,16	1,57
		A	○	○	○	○	○	○		A	12,70	22,00	4,75	5,16	1,57
	TNGA-220716	T1	○	○	○	○	○	○	TNGA-454	T1	12,70	22,00	7,92	5,16	1,57

Ceramic Classification

Whisker Ceramic	Phase Toughened	Silicon Nitride	Alumina TiC	Al ₂ O ₃

Page T 42 – grade description

Additional Edge Preps – page T 45

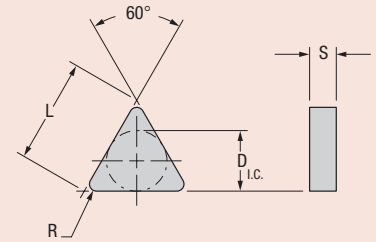


Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
 EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
 CN +86-731-89954796 • info@greenleafcorporation.com.cn
 www.greenleafglobalsupport.com • www.greenleafcorporation.com

	Stocked Standard		Stocked or Available Upon Request		Not Recommended
--	------------------	--	-----------------------------------	--	-----------------

Triangle Inserts Negative (TNGN)



Shape: Triangle	Part Number ISO	Edge Prep	Whisker						Part Number ANSI	Edge Prep	Dimensions (millimeters)			
			WG-300	WG-600	WG-700	XSNTIN-1	GSN100	GEM-7			D I.C.	L	S	R
TNGN 	TNGN-110308	T2A	○	○	○	○	○	○	TNGN-222	T2A	6,35	11,00	3,18	0,79
		A	○	○	○	○	○	○		A	6,35	11,00	3,18	0,79
	TNGN-160304	T1	○	○	○	○	○	○	TNGN-321	T1	9,53	16,51	3,18	0,38
	TNGN-160308	T1	○	○	○	○	○	○	TNGN-322	T1	9,53	16,51	3,18	0,79
		T2	○	○	○	○	○	○		T2	9,53	16,51	3,18	0,79
		T2A	○	○	○	○	○	○		T2A	9,53	16,51	3,18	0,79
	TNGN-160404	T1	○	○	○	○	○	○	TNGN-331	T1	9,53	16,51	4,75	0,38
		T2	○	○	○	○	○	○		T2	9,53	16,51	4,75	0,38
	TNGN-160408	T1	○	○	○	○	○	○	TNGN-332	T1	9,53	16,51	4,75	0,79
		T2	○	○	○	○	○	○		T2	9,53	16,51	4,75	0,79
		T2A	●	○	○	○	○	○		T2A	9,53	16,51	4,75	0,79
	TNGN-160412	T1	○	○	○	○	○	○	TNGN-333	T1	9,53	16,51	4,75	1,19
		T2A	●	○	○	○	○	○		T2A	9,53	16,51	4,75	1,19
	TNGN-160416	T1	○	○	○	○	○	○	TNGN-334	T1	9,53	16,51	4,75	1,57
	TNGN-220404	T1	●	○	○	○	○	○	TNGN-431	T1	12,70	22,00	4,75	0,38
	TNGN-220408	T1	●	○	○	○	○	○	TNGN-432	T1	12,70	22,00	4,75	0,79
		T2A	●	○	○	○	○	●		T2A	12,70	22,00	4,75	0,79
		A	○	○	○	○	○	○		A	12,70	22,00	4,75	0,79
	TNGN-220412	T1	●	○	●	○	○	○	TNGN-433	T1	12,70	22,00	4,75	1,19
	TNGN-220416	T1	●	○	●	○	○	○	TNGN-434	T1	12,70	22,00	4,75	1,57
	TNGN-220432	T2A	○	○	○	○	○	○	TNGN-438	T2A	12,70	22,00	4,75	3,18
	TNGN-220708	T2A	○	○	○	○	○	○	TNGN-452	T2A	12,70	22,00	7,92	0,79
	TNGN-220712	T1	●	○	○	○	○	○	TNGN-453	T1	12,70	22,00	7,92	1,19
		T2A	○	○	○	○	○	○		T2A	12,70	22,00	7,92	1,19
	TNGN-220716	T1	●	○	○	○	○	○	TNGN-454	T1	12,70	22,00	7,92	1,57
		T2A	○	○	○	○	○	○		T2A	12,70	22,00	7,92	1,57
	TNGN-270612	T2A	○	○	○	○	○	○	TNGN-543	T2A	15,88	27,51	6,35	1,19
	TNGN-270616	T1	○	○	○	○	○	○	TNGN-544	T1	15,88	27,51	6,35	1,57
		T2	○	○	○	○	○	○		T2	15,88	27,51	6,35	1,57
	TNGN-270632	T2	○	○	○	○	○	○	TNGN-548	T2	15,88	27,51	6,35	3,18
	TNGN-330924	T2A	○	○	○	○	○	○	TNGN-666	T2A	19,05	32,99	9,53	2,39
	TNGN-440932	T2A	○	○	○	○	○	○	TNGN-868	T2A	25,40	43,99	9,53	3,18

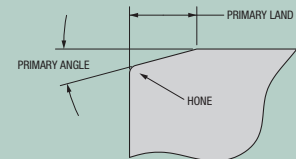
Ceramic Classification



Page T 42 – grade description

WG-300	WG-600	WG-700	XSNTIN-1	GSN100	GEM-7	GEM-19
Whisker	Whisker	Whisker	Phase Toughened	SiN ₄	Al ₂ O ₃ -TiC	Al ₂ O ₃

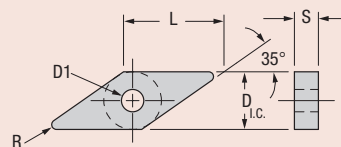
Additional Edge Preps – page T 45

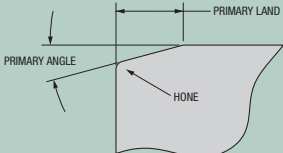


35°



35° Diamond Inserts Negative



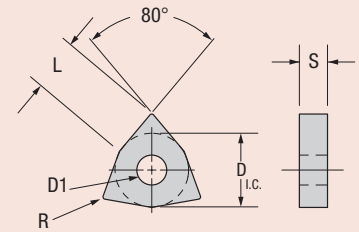
Shape: 35° Diamond	Part Number ISO	Edge Prep	Whisker							Part Number ANSI	Edge Prep	Dimensions (millimeters)				
			WG-300	WG-600	WG-700	XSYTIN-1	GSN100	GEM-7	GEM-19			D I.C.	L	S	D1	R
	VNGA-160408	T1	●	○	●	○	○		○	VNGA-332	T1	9,53	16,61	4,75	3,81	0,79
		T2A	○	○	○	○	○	●	○		T2A	9,53	16,61	4,75	3,81	0,79
	VNGA-160412	T1	●	○	●	○	○		○	VNGA-333	T1	9,53	16,61	4,75	3,81	1,19
	VNGA-220408	T2A	●	○	●	○	○		○	VNGA-432	T2A	12,70	22,15	4,75	5,16	0,79
	VNGA-220424	T1	●	○	●	○	○		○	VNGA-436	T1	12,70	22,15	4,75	5,16	2,39
Ceramic Classification			WG-300	WG-600	WG-700	XSYTIN-1	GSN100	GEM-7	GEM-19	Additional Edge Preps – page T 45						
Whisker Ceramic Phase Toughened Silicon Nitride Alumina TiC Al₂O₃			Whisker	Phase Toughened	Si ₃ N ₄	Al ₂ O ₃ -TiC	Al ₂ O ₃									
Page T 42 – grade description																

Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
 EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
 CN +86-731-89954796 • info@greenleafcorporation.com.cn
 www.greenleafglobalsupport.com • www.greenleafcorporation.com

Stocked Standard
 Stocked or Available Upon Request
 Not Recommended

Trigon Inserts Negative



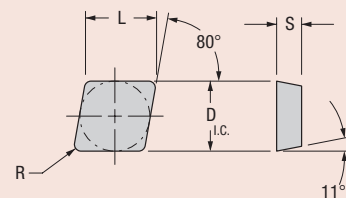
Shape: Trigon	Part Number ISO	Edge Prep	Whisker						Part Number ANSI	Edge Prep	Dimensions (millimeters)				
			WG-300	WG-600	WG-700	XSYTIN-1	GSN100	GEM-7			D I.C.	L	S	D1	R
WNGA 	WNGA-060404	T1	○	○	○	○	○	○	WNGA-331	T1	9,53	6,53	4,75	3,86	0,38
	WNGA-060408	T1	●	●	●	○	○	○	WNGA-332	T1	9,53	6,53	4,75	3,86	0,79
	WNGA-060412	T1	○	○	○	○	○	○	WNGA-333	T1	9,53	6,53	4,75	3,86	1,19
	WNGA-080404	T1	●	○	○	○	○	○	WNGA-431	T1	12,70	8,69	4,75	5,16	0,38
		T1A	○	○	○	○	○	○		T1A	12,70	8,69	4,75	5,16	0,38
	WNGA-080408	T1	●	○	○	○	○	○	WNGA-432	T1	12,70	8,69	4,75	5,16	0,79
		T1A	●	○	○	○	○	○		T1A	12,70	8,69	4,75	5,16	0,79
		T2A	●	○	○	○	○	○		T2A	12,70	8,69	4,75	5,16	0,79
	WNGA-080412	T2	○	○	○	○	●	○	WNGA-433	T2	12,70	8,69	4,75	5,16	1,19
		T2A	○	○	○	○	○	○		T2A	12,70	8,69	4,75	5,16	1,19
Ceramic Classification Whisker Ceramic Phase Toughened Silicon Nitride Alumina TiC Al₂O₃			WG-300	WG-600	WG-700	XSYTIN-1	GSN100	GEM-7	Additional Edge Preps – page T 45 						
Page T 42 – grade description			Whisker			Phase Toughened	SiN ₄	Al ₂ O ₃ -TiC							

80°



80° Diamond Inserts

Positive Flat Top



Shape: 80° Diamond	Part Number ISO	Edge Prep	Whisker		Phase Toughened XSYTIN-1	SiN ₄ GSN100	Al ₂ O ₃ -TiC GEM-7	Al ₂ O ₃ GEM-19	Part Number ANSI	Edge Prep	Dimensions (millimeters)			
			WG-300	WG-600							WG-700	D I.C.	L	S
CPGN 	CPGN-090304	T1	●	○	●	○	○	○	CPGN-321	T1	9,53	9,65	3,18	0,38
	CPGN-090308	T1	●	○	●	○	○	○	CPGN-322	T1	9,53	9,65	3,18	0,79
	CPGN-090312	T1	○	○	○	○	○	○	CPGN-323	T1	9,53	9,65	3,18	1,19
	CPGN-120308	T1	○	○	○	○	○	○	CPGN-422	T1	12,70	12,90	3,18	0,79
	CPGN-120316	T2A	○	○	○	○	○	○	CPGN-424	T2A	12,70	12,90	3,18	1,57
	CPGN-120408	T1	●	○	●	○	○	○	CPGN-432	T1	12,70	12,90	4,75	0,79
	CPGN-120412	T1	●	○	●	○	○	○	CPGN-433	T1	12,70	12,90	4,75	1,19
		T1A	○	○	○	●	○	○		T1A	12,70	12,90	4,75	1,19
		T2	○	○	○	○	○	○		T2	12,70	12,90	4,75	1,19
		T2A	○	○	○	○	●	○	○		T2A	12,70	12,90	4,75
	A	○	○	○	●	○	○	○		A	12,70	12,90	4,75	1,19
	CPGN-120416	T1	●	○	●	○	○	○	CPGN-434	T1	12,70	12,90	4,75	1,57

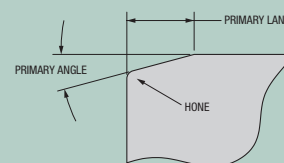
Ceramic Classification



Page T 42 – grade description

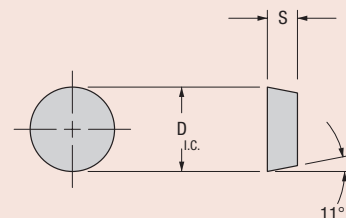
WG-300	WG-600	WG-700	Phase Toughened XSYTIN-1	SiN ₄ GSN100	Al ₂ O ₃ -TiC GEM-7	Al ₂ O ₃ GEM-19
Whisker						

Additional Edge Preps – page T 45



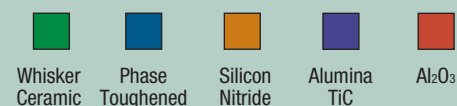
Round Inserts

Positive Flat Top



Shape: Round	Part Number ISO	Edge Prep	Whisker					Part Number ANSI	Edge Prep	Dimensions (millimeters)	
			WG-300	WG-600	WG-700	Phase Toughened XSYTIN-1	SiN ₄ GSN100			D I.C.	S
	RPGN-090300	T1	●	●	●	○	○	RPGN-32	T1	9,53	3,18
		T1A	●	●	●	○	○		T1A	9,53	3,18
		T2A	○	○	○	○	○		T2A	9,53	3,18
		A	○	○	○	●	○		A	9,53	3,18
	RPGN-120400	T1	●	○	●	○	○	RPGN-43	T1	12,70	4,75
		T1A	●	○	●	○	○		T1A	12,70	4,75
		T2	●	○	●	○	○		T2	12,70	4,75
		T2A	●	○	○	○	○		T2A	12,70	4,75
		A	○	○	○	●	○		A	12,70	4,75

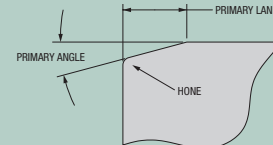
Ceramic Classification



Page T 42 – grade description

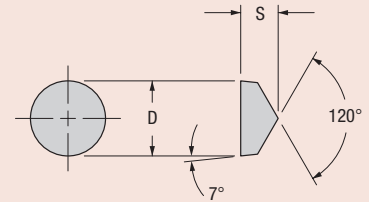
WG-300	WG-600	WG-700	Phase Toughened XSYTIN-1	SiN ₄ GSN100	Al ₂ O ₃ -TiC GEM-7	Al ₂ O ₃ GEM-19
Whisker						

Additional Edge Preps – page T 45



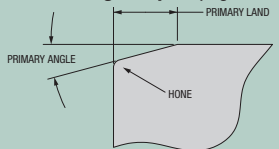


Round V-Bottom Inserts Positive (RCGN-V)

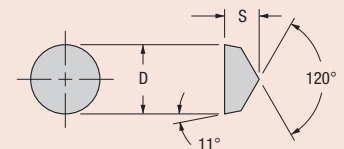


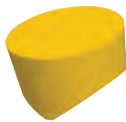
Shape: Round V-Bottom	Part Number ISO	Edge Prep	Whisker						Part Number ANSI	Edge Prep	Dimensions (millimeters)	
			WG-300	WG-600	WG-700	XSYTIN-1	GSN100	GEM-7			D I.C.	S
RCGN 	RCGX-060400	T1	●	●	●	○	○	○	RCGN-2V	T1	6,35	4,75
		T2A	●	○	○	○	○	○		T2A	6,35	4,75
		A	○	○	○	○	○	○		A	6,35	4,75
	RCGX-090700	T1	●	●	●	●	○	○	RCGN-3V	T1	9,53	7,92
		T1A	○	○	○	○	○	○		T1A	9,53	7,92
		T2A	●	●	○	○	○	○		T2A	9,53	7,92
		A	○	○	○	○	○	○		A	9,53	7,92
	RCGX-120700	T1	●	●	●	●	○	○	RCGN-4V	T1	12,70	7,92
		T1A	●	○	○	○	○	○		T1A	12,70	7,92
		T2	●	○	○	○	○	○		T2	12,70	7,92
		T2A	●	●	○	○	○	○		T2A	12,70	7,92
		A	○	○	○	○	○	○		A	12,70	7,92
	RCGX-191200	T2A	○	○	○	○	○	○	RCGN-6V	T2A	19,05	12,70

Ceramic Classification
Whisker Ceramic Phase Toughened Silicon Nitride Alumina TiC Al₂O₃

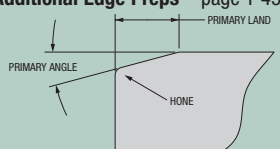
Additional Edge Preps – page T 45


Round V-Bottom Inserts Positive (RPGN-V)



Shape: Round V-Bottom	Part Number ISO	Edge Prep	Whisker						Part Number ANSI	Edge Prep	Dimensions (millimeters)	
			WG-300	WG-600	WG-700	XSYTIN-1	GSN100	GEM-7			D I.C.	S
RPGN 	RPGX-060400	T1	●	●	●	○	○	○	RPGN-2V	T1	6,35	4,75
		T2	○	○	○	○	○	○		T2	6,35	4,75
		T2A	●	○	○	○	○	○		T2A	6,35	4,75
		A	○	○	○	○	○	○		A	6,35	4,75
	RPGX-090700	T1	●	●	●	○	○	○	RPGN-3V	T1	9,53	7,92
		T1A	○	○	○	○	○	○		T1A	9,53	7,92
		T2	○	○	○	○	○	○		T2	9,53	7,92
		T2A	●	●	○	○	○	○		T2A	9,53	7,92
		A	○	○	○	○	○	○		A	9,53	7,92
	RPGX-120700	T1	○	●	●	○	○	○	RPGN-4V	T1	12,70	7,92
		T1A	●	○	○	○	○	○		T1A	12,70	7,92
		T2	○	○	○	○	○	○		T2	12,70	7,92
		T2A	●	●	○	○	○	○		T2A	12,70	7,92
		A	○	○	○	○	○	○		A	12,70	7,92

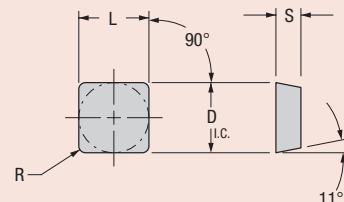
Ceramic Classification
Whisker Ceramic Phase Toughened Silicon Nitride Alumina TiC Al₂O₃

Additional Edge Preps – page T 45


Not Recommended  Stocked or Available Upon Request  Stocked Standard 

Square Inserts

Positive Flat Top



Shape: Square	Part Number ISO	Edge Prep	Whisker						Part Number ANSI	Edge Prep	Dimensions (millimeters)			
			WG-300	WG-600	WG-700	XSYTIN-1	GSN100	GEM-7			D I.C.	L	S	R
SPGN 	SPGN-090308	T1	●	○	○	○	○	○	SPGN-322	T1	9,53	9,53	3,18	0,79
		T1A	○	○	○	●	●	○		T1A	9,53	9,53	3,18	0,79
		A	○	○	○	●	○	○		A	9,53	9,53	3,18	0,79
	SPGN-120308	T1	●	○	○	○	○	○	SPGN-422	T1	12,70	12,70	3,18	0,79
		T2A	○	○	○	○	○	○		T2A	12,70	12,70	3,18	0,79
	SPGN-120312	T1	○	○	○	○	○	○	SPGN-423	T1	12,70	12,70	3,18	1,19
		A	○	○	○	○	○	○		A	12,70	12,70	3,18	1,19
	SPGN-120408	T1	●	○	●	○	○	○	SPGN-432	T1	12,70	12,70	4,75	0,79
		T1A	○	○	●	●	○	○		T1A	12,70	12,70	4,75	0,79
		T2	○	○	○	●	○	○		T2	12,70	12,70	4,75	0,79
		T2A	●	○	○	○	○	○		T2A	12,70	12,70	4,75	0,79
		A	○	○	○	●	○	○		A	12,70	12,70	4,75	0,79
	SPGN-120412	T1	●	○	●	○	○	○	SPGN-433	T1	12,70	12,70	4,75	1,19
		T1A	○	○	●	●	○	○		T1A	12,70	12,70	4,75	1,19
		T2	○	○	○	●	○	○		T2	12,70	12,70	4,75	1,19
		T2A	○	○	○	○	○	○		T2A	12,70	12,70	4,75	1,19
		A	○	○	○	●	○	○		A	12,70	12,70	4,75	1,19
	SPGN-120416	T1	●	○	●	○	○	○	SPGN-434	T1	12,70	12,70	4,75	1,57
		T2	○	○	○	○	○	○		T2	12,70	12,70	4,75	1,57
		T2A	●	○	○	○	●	○		T2A	12,70	12,70	4,75	1,57
	SPGN-190408	T2A	○	○	○	○	○	○	SPGN-632	T2A	19,05	19,05	4,75	0,79
	SPGN-190412	T2A	○	○	○	○	○	○	SPGN-633	T2A	19,05	19,05	4,75	1,19
	SPGN-190416	T2A	○	○	○	○	○	○	SPGN-634	T2A	19,05	19,05	4,75	1,57
	SPGN-190608	T1A	○	○	○	○	○	○	SPGN-642	T1A	19,05	19,05	6,35	0,79

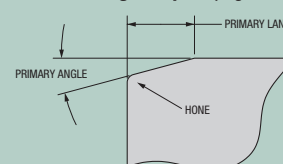
Ceramic Classification

				
Whisker Ceramic	Phase Toughened	Silicon Nitride	Alumina TiC	Al ₂ O ₃

Page T 42 – grade description

WG-300	WG-600	WG-700	XSYTIN-1	GSN100	GEM-7	GEM-19
Whisker	Phase Toughened	Si ₃ N ₄	Al ₂ O ₃ -TiC	Al ₂ O ₃	Al ₂ O ₃	Al ₂ O ₃

Additional Edge Preps – page T 45



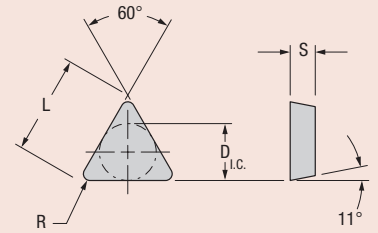
Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
 EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
 CN +86-731-89954796 • info@greenleafcorporation.com.cn
 www.greenleafglobalsupport.com • www.greenleafcorporation.com

	Stocked Standard		Stocked or Available Upon Request		Not Recommended
--	------------------	---	-----------------------------------	---	-----------------

Triangle Inserts

Positive Flat Top



Shape: Triangle	Part Number ISO	Edge Prep	Whisker						Part Number ANSI	Edge Prep	Dimensions (millimeters)			
			WG-300	WG-600	WG-700	XSYTIN-1	GSN100	GEM-7			D I.C.	L	S	R
	TPGN-110304	T1	●	○	●	○	○	○	TPGN-221	T1	6,35	11,00	3,18	0,38
	TPGN-110308	T1	●	○	●	○	○	○	TPGN-222	T1	6,35	11,00	3,18	0,79
		T1A	●	○	○	○	○	○		T1A	6,35	11,00	3,18	0,79
		T2A	●	○	○	○	○	○		T2A	6,35	11,00	3,18	0,79
	TPGN-160304	T1	●	○	●	○	○	○	TPGN-321	T1	9,53	16,51	3,18	0,38
		T2A	○	○	○	○	○	○		T2A	9,53	16,51	3,18	0,38
	TPGN-160308	T1	●	○	●	○	○	○	TPGN-322	T1	9,53	16,51	3,18	0,79
		T1A	○	○	○	○	○	○		T1A	9,53	16,51	3,18	0,79
		T2A	●	○	○	○	●	●		T2A	9,53	16,51	3,18	0,79
		A	○	○	○	○	○	○		A	9,53	16,51	3,18	0,79
	TPGN-160312	T1	●	○	●	○	○	○	TPGN-323	T1	9,53	16,51	3,18	1,19
		T1A	○	○	○	○	○	●		T1A	9,53	16,51	3,18	1,19
		A	○	○	○	○	○	○		A	9,53	16,51	3,18	1,19
	TPGN-160316	T1	●	○	○	○	○	○	TPGN-324	T1	9,53	16,51	3,18	1,57
	TPGN-220404	T1	●	○	●	○	○	○	TPGN-431	T1	12,70	22,00	4,75	0,38
	TPGN-220408	T1	●	○	●	○	○	○	TPGN-432	T1	12,70	22,00	4,75	0,79
		T2A	○	○	○	○	○	○		T2A	12,70	22,00	4,75	0,79
	TPGN-220412	T1	●	○	●	○	○	○	TPGN-433	T1	12,70	22,00	4,75	1,19
	TPGN-220416	T1	●	○	●	○	○	○	TPGN-434	T1	12,70	22,00	4,75	1,57

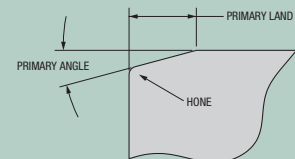
Ceramic Classification



Page T 42 – grade description

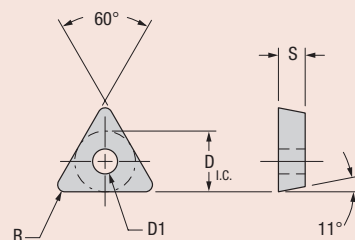
WG-300	WG-600	WG-700	XSYTIN-1	GSN100	GEM-7	GEM-19
Whisker			Phase Toughened	SiN4	Al2O3-TiC	Al2O3

Additional Edge Preps – page T 45





Triangle Inserts Positive (TP)



Shape: Triangle	Part Number ISO	Edge Prep	Whisker							Part Number ANSI	Edge Prep	Dimensions (millimeters)			
			WG-300	WG-600	WG-700	XSYTIN-1	GSN100	GEM-7	GEM-19			D I.C.	S	D1	R
	TP-41	A	●	○	○	○	○	○	○	TP-41	A	6,35	2,36	3,48	0,38
	TP-42	A	○	○	○	○	○	○	○	TP-42	A	6,35	2,36	3,48	0,79
	TP-62	A	○	○	○	○	○	○	○	TP-62	A	9,53	3,18	4,14	0,79
	TP-64	A	○	○	○	○	○	○	○	TP-64	A	9,53	3,18	4,14	1,57
	TP-82	A	○	○	○	○	○	○	○	TP-82	A	12,70	4,75	5,16	0,79

Ceramic Classification

 Whisker Ceramic

 Phase Toughened

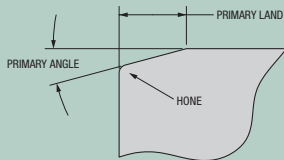
 Silicon Nitride

 Alumina TiC

 Al₂O₃

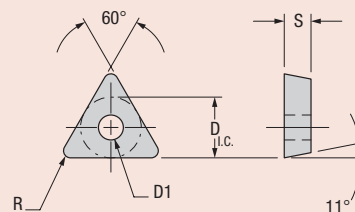
WG-300	WG-600	WG-700	XSYTIN-1	GSN100	GEM-7	GEM-19
Whisker	Whisker	Whisker	Phase Toughened	SiAlN	Al ₂ O ₃ -TiC	Al ₂ O ₃

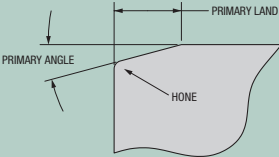
Additional Edge Preps – page T 45



Page T 42 – grade description

Triangle Inserts Positive (TPGA)



Shape: Triangle	Part Number	Edge Prep	Whisker							Part Number	Edge Prep	Dimensions (millimeters)				
	ISO		WG-300	WG-600	WG-700	XSYTIN-1	GSN100	GEM-7	GEM-19			ANSI	D	S	D1	R
			Phase Toughened	SiAlN	Al ₂ O ₃ -TiC	Al ₂ O ₃										
	TPGA-160304	T1	○	○	○	○	○	○	○	TPGA-321	T1	9,53	3,18	3,81	0,38	
		T1A	○	○	○	○	○	○	○		T1A	9,53	3,18	3,81	0,38	
	TPGA-160308	T1A	○	○	○	○	○	○	○	TPGA-322	T1A	9,53	3,18	3,81	0,38	
Ceramic Classification			WG-300	WG-600	WG-700	XSYTIN-1	GSN100	GEM-7	GEM-19	Additional Edge Preps – page T 45						
					Whisker	Phase Toughened	SiAlN	Al ₂ O ₃ -TiC	Al ₂ O ₃							
Whisker Ceramic	Phase Toughened	Silicon Nitride	Alumina TiC	Al ₂ O ₃												
Page T 42 – grade description																

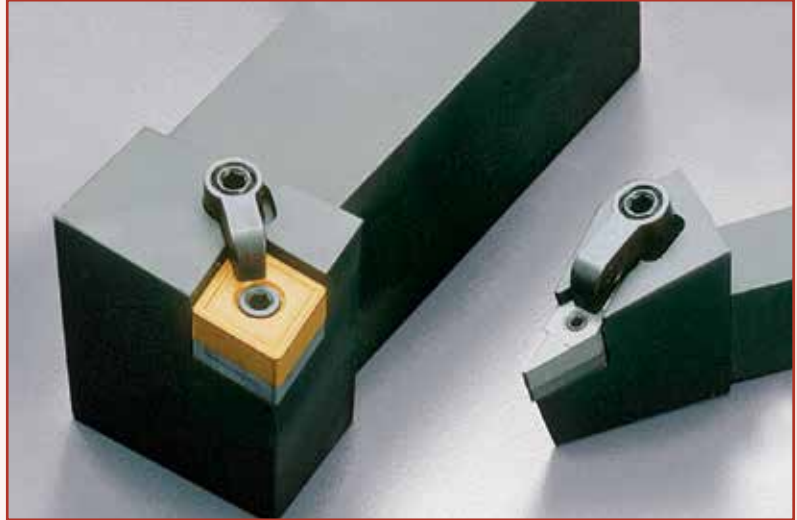
Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
 EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
 CN +86-731-89954796 • info@greenleafcorporation.com.cn
 www.greenleafglobalsupport.com • www.greenleafcorporation.com

 Stocked Standard
 Stocked or Available Upon Request
 Not Recommended

Industry-Standard Toolholders

Greenleaf manufactures a complete line of industry-standard toolholders in conformance with ANSI specifications in 4140 and 4150 alloy steel, hardened up to 42 Rc and oxide coated.



Greenleaf Tune-Up Kits

A Tune-Up Kit consists of all the standard hardware to refurbish a particular toolholder, boring bar, or milling cutter. A toolholder will have a readily visible, laser-inscribed Tune-Up Kit number on it for ease in ordering. This number will prevent any confusion created by searching a catalog for hardware, and it will help reduce downtime.

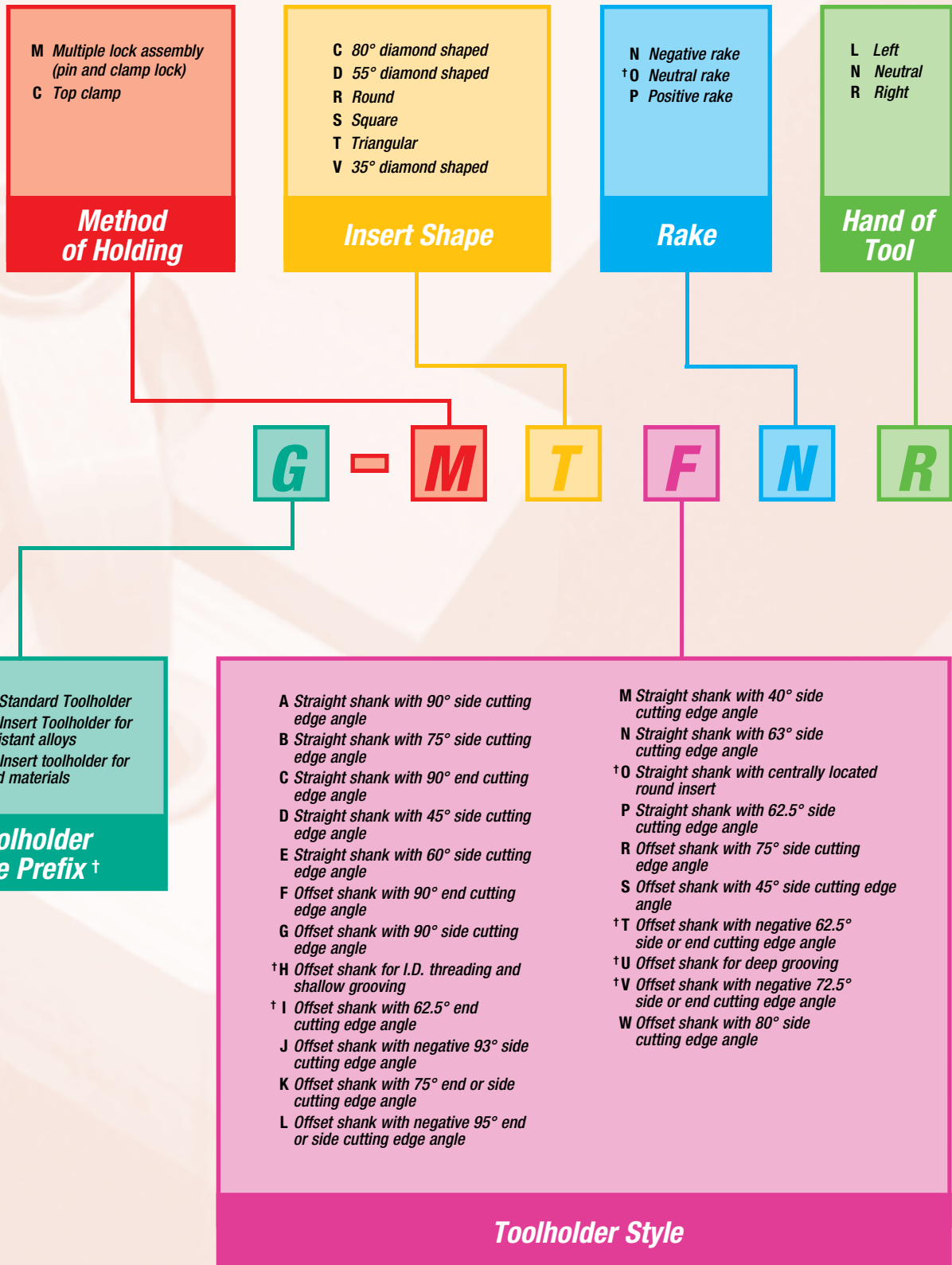
*Greenleaf Corporation is continually upgrading its products.
For the most current information, please visit our web site at:*

www.greenleafglobalsupport.com

Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
CN +86-731-89954796 • info@greenleafcorporation.com.cn
www.greenleafglobalsupport.com • www.greenleafcorporation.com

Toolholder Identification System



† Greenleaf standard.

Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
 EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
 CN +86-731-89954796 • info@greenleafcorporation.com.cn
 www.greenleafglobalsupport.com • www.greenleafcorporation.com



<i>Heavy Turning Introduction</i>	<i>HT 03</i>
<i>Grade Descriptions</i>	<i>HT 04-05</i>
<i>Edge Preparations</i>	<i>HT 06</i>
<i>Chipform Application Range</i>	<i>HT 07</i>
<i>Pictorial Index</i>	<i>HT 08-09</i>
Heavy Turning Inserts	
<i>Carbide</i>	<i>HT 10-20</i>
<i>Ceramic</i>	<i>HT 21-25</i>
<i>Roll Turning</i>	<i>HT 26-32</i>
<i>Heavy Turning Tooling Options</i>	<i>HT 34-35</i>

**Greenleaf Sales**

US +814-763-2915 • sales@greenleafcorporation.com
EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
CN +86-731-89954796 • info@greenleafcorporation.com.cn
www.greenleafglobalsupport.com • www.greenleafcorporation.com

Heavy Turning Inserts

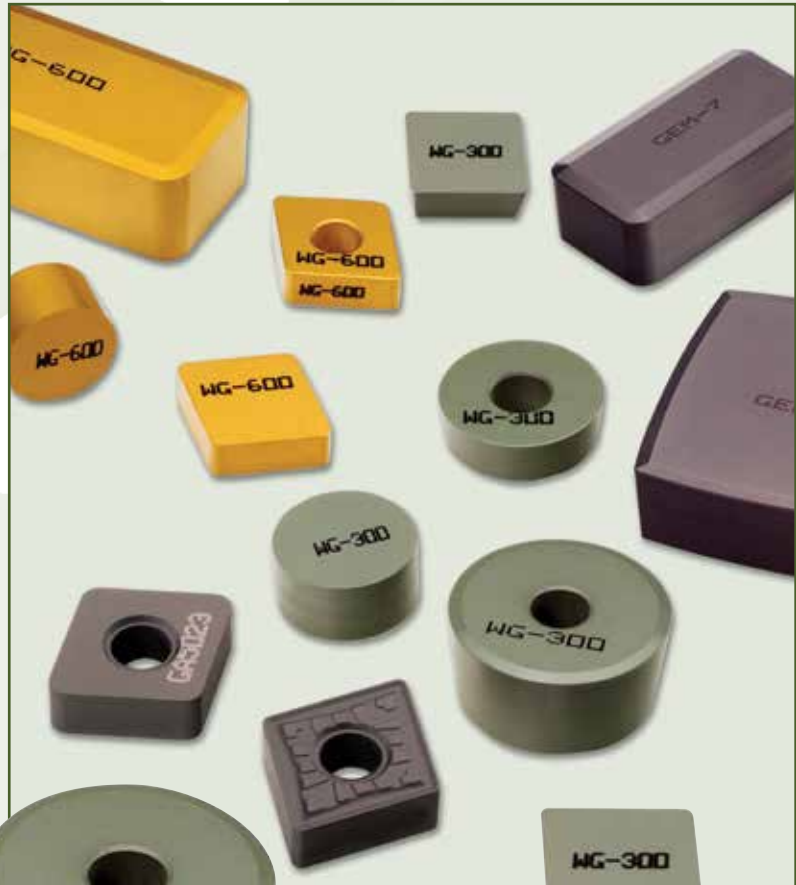
The manufacture of rolls for use in steel making is an area where machinability has been decreased significantly by the introduction of alloyed materials, especially chromium content. In addition, the use of forged rolls is increasing, and centrifugally cast products with high hardness levels and surface contamination are another challenge.

Ceramic cutting tools such as Greenleaf GEM-7™ composite material and WG-300® whiskered material are finding an important place in heavy turning when combined with rigid, well-designed holding systems.

Greenleaf has extensive experience in the design and manufacture of heavy-turning tooling systems. For more than thirty years, we have supplied O.E.M. packages to many of the largest lathe manufacturers – both domestic and overseas.

We will be pleased to quote tooling systems for any type of machine to effectively use ceramic or carbide inserts. Most of the options regularly manufactured are outlined on page HT 34.

Call a Greenleaf heavy-turning specialist at 1-814-763-2915 to discuss your particular needs.



Greenleaf Corporation is continually upgrading its products.
For the most current information, please visit our web site at:

www.greenleafglobalsupport.com

Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
CN +86-731-89954796 • info@greenleafcorporation.com.cn
www.greenleafglobalsupport.com • www.greenleafcorporation.com

CARBIDE

Greenleaf offers a comprehensive line of carbide inserts in grades ranging from sub-micron C-1 through C-8 classifications. An industry pioneer in coated carbide, Greenleaf offers a variety of uncoated, MT-CVD coated and PVD-coated grades. Carbide inserts are available in ANSI standard geometries with multi-purpose chip-breakers for heavy roughing through finishing.

COATED – MT-CVD

GA5023 A high-speed performance grade for turning and milling cast iron. GA5023 features an advanced MT-CVD coating specifically developed for abrasive wear resistance. Application ranges from roughing to finishing on most cast iron materials including gray iron, ductile, nodular and other alloyed irons. The high wear and shock resistance of GA5023 allows machining at high speeds and a variety of feeds.

GA5035 A high-performance MT-CVD coated grade for turning all types of steels, and selected stainless steels. GA5035 can be used in rough, semi-finish, and finish turning situations requiring resistance to heat deformation, thermal shock, and abrasion. GA5035 should be applied at high speeds and a range of feeds.

GA5036 A high-performance MT-CVD coated grade for milling steels at high speed. GA5036 should be used when milling forged and cast steels and selected ductile irons. GA5036 has a unique combination of toughness and heat resistance making it suitable for heavy- and light-duty milling at high cutting speeds.

GA5125 New high-performance MT-CVD coated carbide mill-ing grade especially suited for manganese steel. GA5125 is also applicable on chrome-moly steel, tool steel and similar high alloy steels. GA5125 provides excellent resistance to abrasion, crater wear, thermal shock, deformation and edge build-up. GA5125 should be applied at high speeds with moderate feed rates.

COATED – PVD

G-915 Multi-layer PVD-coated grade, excellent for cut off, milling and turning high-temp alloys, stainless steel, and low carbon steels. The multi-layer PVD coating adds heat and abrasion resistance to the tough, shock-resistant substrate. G-915 should be run at moderate speeds and moderate to high feeds in milling and interrupted turning applications.

G-935 Multi-layer PVD-coated grade for steel milling and turning applications requiring additional resistance to mechanical and thermal shock. The multi-layered PVD coating increases the speed capability and wear resistance in tough milling and interrupted turning applications.

CARBIDE

UNCOATED

G-20M A sub-micron C-2 carbide grade suited for use in turning and milling titanium and nickel-based super-alloys. G-20M has the strength and edge wear characteristics to resist notching when turning high-strength materials.

G-50 Heavy roughing grade for steel and steel castings under difficult conditions, and ferritic stainless steels in most applications. G-50 is tough enough to enable the use of positive rakes for turning.

G-74 Roughing or finishing grade for steel and steel cast-ings. G-74 has higher shock resistance than G-70, and should be applied at high speeds and moderate to heavy feeds. Well suited for turning of steel rolls.

Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
CN +86-731-89954796 • info@greenleafcorporation.com.cn
www.greenleafglobalsupport.com • www.greenleafcorporation.com

CERAMIC

Greenleaf is the industry leader in the development and manufacture of ceramic and coated ceramic inserts in ANSI standard and special geometries. Some of the most prominent include:

WG-300® Whisker-reinforced ceramic with excellent wear and shock resistance at high surface speeds. WG-300 is very effective at machining nickel and cobalt based super-alloys, and other hard materials at metal removal rates up to 10 times higher than carbide.

WG-600® Coated whisker-reinforced ceramic offering longer tool life and better performance over uncoated ceramics due to outstanding thermal properties and shock-resistance at high cutting speeds. Application areas include rough and finish turning, as well as high-performance milling of high-strength alloys, hardened steels and select stainless steels. *U.S. Patent No. 6,447,896 B1.*

WG-700™ New whisker-reinforced Al_2O_3 ceramic substrate featuring improved toughness and a unique high-speed coating. WG-700 is ideal for machining nickel- and cobalt-based super alloys and other difficult-to-machine materials. WG-700 exhibits high metal-removal rates with exceptional tool life.

U.S. Patent No. 6,447,896 B1

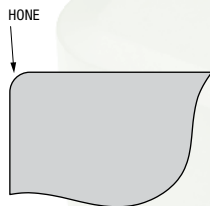
XSytin™-1 New phase-toughened ceramic capable of extreme feed rates. XSytin™-1 excels at machining a wide variety of materials including steels, cast and ductile irons, high-temperature alloys and other challenging metals. XSytin™-1 is ideal for use in interrupted cuts, scale, abrasive casting materials and milling.

GSN100™ New engineered blend of silicon nitride and proprietary toughening agents that redefines productivity in the machining of cast iron. GSN100 delivers outstanding tool life at high cutting speeds in turning, grooving and milling applications.

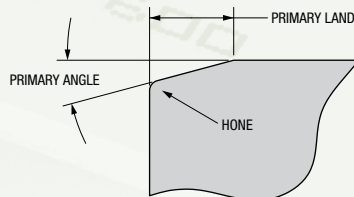
GEM-7™ Al_2O_3 + TiC composite ceramic with a high degree of predictability in roll turning and hard alloy (up to 65 R/c) machining.

Greenleaf Sales

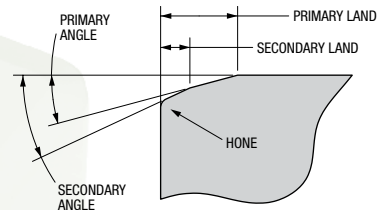
US +814-763-2915 • sales@greenleafcorporation.com
EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
CN +86-731-89954796 • info@greenleafcorporation.com.cn
www.greenleafglobalsupport.com • www.greenleafcorporation.com



HONE



PRIMARY ANGLE

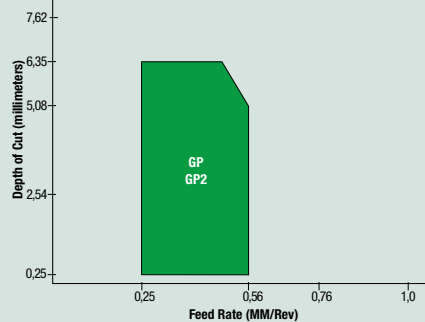
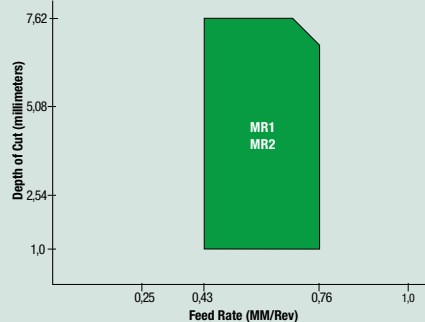
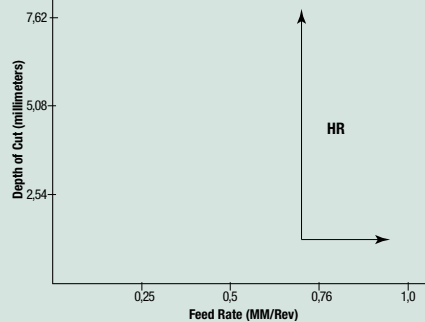


SECONDARY ANGLE

Edge Prep	Hone	Primary Land	Primary Angle	Secondary Land	Secondary Angle	Application
T2A	0,015R	0,17	20°			Scale applications, light interruptions, weld overlays, finish turning and milling of hardened materials.
T4A	0,015R	1,90	10°	0,17	25°	Heavy machining <19mm IC - Roll turning, 3V, 4V, CDH-22, CDH-33.
T4B	0,035R	1,90	10°	0,17	25°	Heavy machining <19mm IC - Roll turning, 3V, 4V, CDH-22, CDH-33.
T10B	0,035R	2,41	15°	0,17	30°	Heavy machining, iron and steel roll turning >19mm IC, CDH-43, CDH-53.

Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
CN +86-731-89954796 • info@greenleafcorporation.com.cn
www.greenleafglobalsupport.com • www.greenleafcorporation.com

GENERAL PURPOSE	GP and GP2  General purpose chipbreaker. Feed rates up to 0,56/rev and 6,35 depth of cut.	
MEDIUM ROUGHING	MR and MR2  Used for medium roughing of all material. Feeds up to 0,71/rev and depths up to 7,62.	
HEAVY ROUGHING	HR <i>single sided</i>  Heavy roughing for all materials. Feeds above 0,58/rev. One-sided chipbreaker for heaviest feeds (MM). <i>Example: CNMM-190612 HR</i>	

Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
 EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
 CN +86-731-89954796 • info@greenleafcorporation.com.cn
www.greenleafglobalsupport.com • www.greenleafcorporation.com

Carbide Inserts – Negative



80° Diamond
Chip Control
GP2, MR, HR – single
sided
page: HT 10



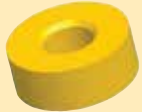
80° Diamond
Flat Top
page: HT 11



80° Diamond
Flat Top
page: HT 11



Round
Chip Control
MR, MR – single sided
page: HT 12



Round
Flat Top
page: HT 13



Round
Flat Top
page: HT 13



Square
Chip Control
GP2, MR,
HR – single sided
page: HT 14

Carbide Inserts – Negative *continued*



Square
Flat Top
page: HT 15



Square
Flat Top
page: HT 16



Triangle
Chip Control
MR
page: HT 17



Triangle
Flat Top
page: HT 17



Triangle
Flat Top
TNGN, TNUN
page: HT 18

Carbide Inserts – Positive



Triangle
Flat Top
page: HT 19



Square
Flat Top
page: HT 20

Ceramic Inserts – Negative



80° Diamond
page: HT 21



Round
page: HT 22



Square
page: HT 23



Triangle
page: HT 24

Ceramic Inserts – Positive



Square
page: HT 25

Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
CN +86-731-89954796 • info@greenleafcorporation.com.cn
www.greenleafglobalsupport.com • www.greenleafcorporation.com

Roll Turning



Roll Turning
page: HT 26



Roll Turning
page: HT 27



Roll Turning
page: HT 28



Roll Turning
page: HT 29



Round
V-Bottom
page: HT 30



Round
V-Bottom
page: HT 31



Square
Negative
page: HT 32

Greenleaf Sales

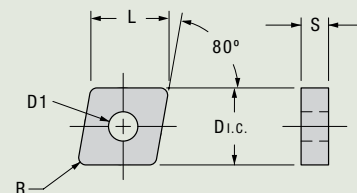
US +814-763-2915 • sales@greenleafcorporation.com
EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
CN +86-731-89954796 • info@greenleafcorporation.com.cn
www.greenleafglobalsupport.com • www.greenleafcorporation.com

80°



80° Diamond Inserts

Chip Control



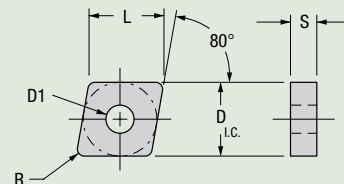
		Steel						S. Steel	Cast Iron	H-T A.	Part Number	Dimensions (millimeters)				
		P25	P25	P35	M20	M35	K15	S				D I.C.	L	S	D1	R
Shape: 80° Diamond		GA5035	GA5125	GA5036	GA5023	G-915	GA5023	G-915	G-20M		ANSI					
GENERAL PURPOSE	GP	CNMG-190612-GP									CNMG-643-GP	19,05	19,33	6,35	7,92	1,19
MEDIUM ROUGHING	MR	CNMG-190608-MR									CNMG-642-MR	19,05	19,33	6,35	7,92	0,79
											CNMG-643-MR	19,05	19,33	6,35	7,92	1,19
											CNMG-644-MR	19,05	19,33	6,35	7,92	1,57
HEAVY ROUGHING	HR – single sided	CNMM-190612-HR									CNMM-643-HR	19,05	19,33	6,35	7,92	1,19
Carbide Coatings		GA5035	GA5125	GA5036	GA5023	G-915	GA5023	G-915	G-20M							
		P25	P25	P35	M20	M35	K15	S								
		Steel			S. Steel	Cast Iron		H-T A.								
MT-CVD Coated PVD Coated Uncoated																

Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
 EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
 CN +86-731-89954796 • info@greenleafcorporation.com.cn
 www.greenleafglobalsupport.com • www.greenleafcorporation.com

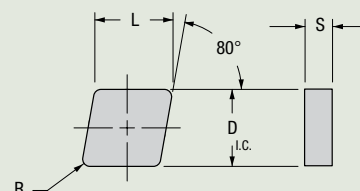


80° Diamond Inserts Flat Top (CNMA)



Shape: 80° Diamond	Part Number	Steel S. Steel Cast Iron H-T A.						Part Number	Dimensions (millimeters)				
		P25	P25	P35	M20	M35	K15						
		GA5035	GA5125	GA5036	GA5023	G-915	GA5023		D I.C.	L	S	D1	R
	CNMA-190608	○	○	○	○	○	○	CNMA-642	19,05	19,33	6,35	7,92	0,79
	CNMA-190612	○	○	○	○	○	○	CNMA-643	19,05	19,33	6,35	7,92	1,19
	CNMA-190616	○	○	○	○	○	○	CNMA-644	19,05	19,33	6,35	7,92	1,57
	CNMA-250924	○	○	○	○	○	○	CNMA-866	25,40	25,78	9,53	9,12	2,36
Carbide Coatings MT-CVD Coated PVD Coated Uncoated		GA5035	GA5125	GA5036	GA5023	G-915	GA5023						
		P25	P25	P35	M20	M35	K15						
		Steel	S. Steel	Cast Iron	H-T	A.							

80° Diamond Inserts Flat Top (CNGN)

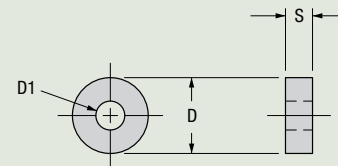


Shape: 80° Diamond	Part Number	Steel S. Steel Cast Iron H-T A.						Part Number	Dimensions (millimeters)			
		P25	P25	P35	M20	M35	K15					
		GA5035	GA5125	GA5036	GA5023	G-915	GA5023		D I.C.	L	S	R
	CNGN-190408	○	○	○	○	○	○	CNGN-632	19,05	19,33	4,75	0,79
	CNGN-190412	○	○	○	○	○	○	CNGN-633	19,05	19,33	4,75	1,19
	CNGN-190416	○	○	○	○	○	○	CNGN-634	19,05	19,33	4,75	1,57
	CNGN-190612	○	○	○	○	○	○	CNGN-643	19,05	19,33	6,35	1,19
	CNGN-190616	○	○	○	○	○	○	CNGN-644	19,05	19,33	6,35	1,57
Carbide Coatings MT-CVD Coated PVD Coated Uncoated		GA5035	GA5125	GA5036	GA5023	G-915	GA5023					
		P25	P25	P35	M20	M35	K15					
		Steel	S. Steel	Cast Iron	H-T	A.						



Round Inserts

Chip Control



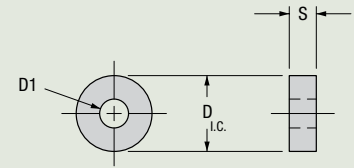
		SteelS. SteelCast IronH-T A.													
		Part Number								Dimensions (millimeters)					
Shape: Round		ISO								ANSI					
MEDIUM ROUGHING	MR	P25		P25		P35		M20		M35		K15		S	
		GA5035	GA5125	GA5036	GA5023	G-915	GA5023	G-915	G-20M						
													</		

Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
 EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
 CN +86-731-89954796 • info@greenleafcorporation.com.cn
 www.greenleafglobalsupport.com • www.greenleafcorporation.com

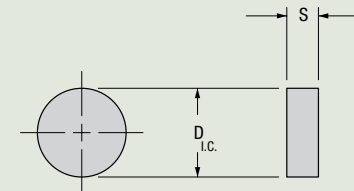


Round Inserts Flat Top (RNMA)



Shape: Round	Part Number	Steel		S. Steel		Cast Iron	H-T A.	Part Number	Dimensions (millimeters)			
		P25	P25	P35	M20	M35	K15		S	D I.C.	S	D1
		GA5035	GA5125	GA5036	GA5023	G-915	GA5023		G-915	G-20M		
	ISO	☐	☐	☐	☐	☐	☐	☐	ANSI			
	RNMA-190600	☐	☐	☐	☐	☐	☐	☐	RNMA-64	19,05	6,35	7,92
	RNMA-250900	☐	☐	☐	☐	☐	☐	☐	RNMA-86	25,40	9,53	9,12
Carbide Coatings ☐ MT-CVD Coated ☐ PVD Coated ☐ Uncoated		GA5035	GA5125	GA5036	GA5023	G-915	GA5023	G-915	G-20M			
		P25	P25	P35	M20	M35	K15	S				
		Steel	S. Steel	Cast Iron	H-T A.							

Round Inserts Flat Top (RNGN)



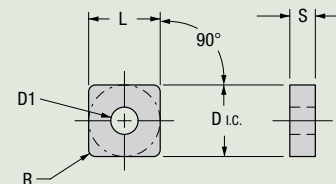
		Steel	S. Steel	Cast Iron	H-T A.							
Shape: Round	Part Number	P25	P25	P35	M20	M35	K15	S	Part Number	Dimensions (millimeters)		
	ISO	GA5035	GA5125	GA5036	GA5023	G-915	GA5023	G-915		G-20M	D I.C.	S
	RNGN-190400	○	○	○	○	○	○	○	○	RNGN-63	19,05	4,75
	RNGN-250600	○	○	○	○	○	○	○	○	RNGN-84	25,40	6,35

90°



Square Inserts

Chip Control



		Steel		S. Steel		Cast Iron	H-T A.			Dimensions (millimeters)					
		P25	P25	P35	M20	M35	K15	S			D I.C.	L	S	D1	R
Shape: Square		GA5035	GA5125	GA5036	GA5023	G-915	GA5023	G-915	G-20M	Part Number					
ISO										ANSI					
GENERAL PURPOSE	GP2	●	○	●	○	●	○	●	○	SNMG-643-GP2	19,05	19,05	6,35	7,92	1,19
	SNMG-190612-GP2	○	○	○	○	○	○	○	○	SNMG-644-GP2	19,05	19,05	6,35	7,92	1,57
	SNMG-190616-GP2	○	○	○	○	○	○	○	○						
MEDIUM ROUGHING	MR	●	○	●	○	●	○	●	○	SNMG-643-MR	19,05	19,05	6,35	7,92	1,19
	SNMG-190612-MR	○	○	●	○	○	○	○	●	SNMG-644-MR	19,05	19,05	6,35	7,92	1,57
	SNMG-190616-MR	○	○	○	○	○	○	○	○	SNMG-866-MR	25,40	25,40	9,53	9,12	2,36
	SNMG-250924-MR	○	○	○	○	○	○	○	○						
HEAVY ROUGHING	HR – single sided	○	○	○	○	○	○	○	○	SNMM-643-HR	19,05	19,05	6,35	7,92	1,19
	SNMM-190612-HR	○	○	○	○	○	○	○	○	SNMM-644-HR	19,05	19,05	6,35	7,92	1,57
	SNMM-190616-HR	○	○	○	○	○	○	○	○						
Carbide Coatings		GA5035	GA5125	GA5036	GA5023	G-915	GA5023	G-915	G-20M						
		P25	P25	P35	M20	M35	K15	S							
		Steel			S. Steel	Cast Iron		H-T A.							
		MT-CVD Coated	PVD Coated		Uncoated										

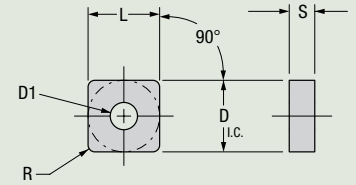
Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
 EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
 CN +86-731-89954796 • info@greenleafcorporation.com.cn
 www.greenleafglobalsupport.com • www.greenleafcorporation.com



Square Inserts

Flat Top (SNMA)



Shape: Square		Part Number		Steel		S. Steel		Cast Iron	H-T A.	Part Number		Dimensions (millimeters)					
				P25	P25	P35	M20	M35	K15			S	D I.C.	L	S	D1	R
				GA5035	GA5125	GA5036	GA5023	G-915	GA5023			G-915	G-20M				
	SNMA-190612	○	○	○	○	○	○	○	○	SNMA-643	19,05	19,05	6,35	7,92	1,19		
	SNMA-190616	○	○	○	○	○	○	○	○	SNMA-644	19,05	19,05	6,35	7,92	1,57		
	SNMA-250916	○	○	○	○	○	○	○	○	SNMA-864	25,40	25,40	9,53	9,12	1,57		
	SNMA-250924	○	○	○	○	○	○	○	○	SNMA-866	25,40	25,40	9,53	9,12	2,36		
Carbide Coatings MT-CVD Coated PVD Coated Uncoated		GA5035	GA5125	GA5036	GA5023	G-915	GA5023	G-915	G-20M								
		P25	P25	P35	M20	M35	K15	S									
		Steel	S. Steel	Cast Iron	H-T A.												

Stocked or Available Upon Request

Stocked Standard

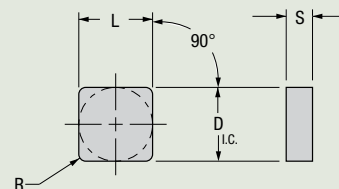
Greenleaf Sales
 US +814-763-2915 • sales@greenleafcorporation.com
 EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
 CN +86-731-89954796 • info@greenleafcorporation.com.cn
 www.greenleafglobalsupport.com • www.greenleafcorporation.com

90°



Square Inserts

Flat Top (SNGN/SNUN)



		Steel			S. Steel		Cast Iron	H-T A.						
Shape: Square	Part Number ISO	P25	P25	P35	M20	M35	K15	S	Part Number ANSI	Dimensions (millimeters)				
		GA5035	GA5125	GA5036	GA5023	G-915	GA5023	G-915		G-20M	D.t.c.	L	S	R
	SNGN-190412	○	○	○	○	○	○	○	○	SNGN-633	19,05	19,05	4,75	1,19
	SNGN-190416	○	○	○	○	○	○	○	○	SNGN-634	19,05	19,05	4,75	1,57
	SNGN-190432	○	○	○	○	○	○	○	○	SNGN-638	19,05	19,05	4,75	3,18
	SNGN-190612	○	●	○	○	○	○	○	○	SNGN-643	19,05	19,05	6,35	1,19
	SNGN-190616	○	●	○	○	○	○	○	○	SNGN-644	19,05	19,05	6,35	1,57
	SNGN-190624	○	○	○	○	○	○	○	○	SNGN-646	19,05	19,05	6,35	2,36
	SNGN-250616	○	○	○	○	○	○	○	○	SNGN-844	25,40	25,40	6,35	1,57
	SNGN-250716	○	○	○	○	○	○	○	○	SNGN-854	25,40	25,40	7,92	1,57
	SNGN-310648	○	○	○	○	○	○	○	○	SNGN-10412	31,75	31,75	6,35	4,75
	SNGN-310924	○	○	○	○	○	○	○	○	SNGN-1066	31,75	31,75	9,53	2,36
	SNGN-310932	○	○	○	○	○	○	○	○	SNGN-1068	31,75	31,75	9,53	3,18
	SNGN-381232	○	○	○	○	○	○	○	○	SNGN-1288	38,10	38,10	12,70	3,18
	SNUN-190412	○	○	○	○	○	○	○	○	SNUN-633	19,05	19,05	4,75	1,19
	SNUN-190416	○	○	○	○	○	○	○	○	SNUN-634	19,05	19,05	4,75	1,57
	SNUN-250616	○	○	○	○	○	○	○	○	SNUN-844	25,40	25,40	6,35	1,57
	SNUN-250632	○	○	○	○	○	○	○	○	SNUN-848	25,40	25,40	6,35	3,18
	SNUN-250716	○	○	○	○	○	○	○	○	SNUN-854	25,40	25,40	7,92	1,57
	SNUN-310924	○	○	○	○	○	○	○	○	SNUN-1066	31,75	31,75	9,53	2,36
	SNUN-310932	○	○	○	○	○	○	○	○	SNUN-1068	31,75	31,75	9,53	3,18
	SNUN-381232	○	○	○	○	○	○	○	○	SNUN-1288	38,10	38,10	12,70	3,18
Carbide Coatings MT-CVD Coated PVD Coated Uncoated		GA5035	GA5125	GA5036	GA5023	G-915	GA5023	G-915	G-20M					
		P25	P25	P35	M20	M35	K15	S						
		Steel		S. Steel		Cast Iron	H-T A.							

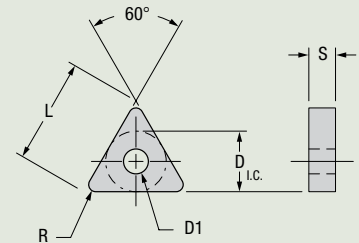
Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
 EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
 CN +86-731-89954796 • info@greenleafcorporation.com.cn
 www.greenleafglobalsupport.com • www.greenleafcorporation.com



Triangle Inserts

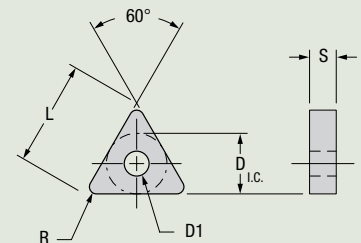
Chip Control



		Steel		S. Steel		Cast Iron		H-T A.		R		D1				
		P25	P25	P35	M20	M35	K15	S		Part Number		Dimensions (millimeters)				
Shape: Triangle		ISO								ANSI		D I.C.	L	S	D1	R
MEDIUM ROUGHING	MR	TNMG-330924-MR	GA5035	GA5125	GA5036	GA5023	G-915	GA5023	G-915	G-20M	TNMG-666-MR	19,05	32,99	9,53	7,92	2,39
			●	○	○	○	○	○	○	○						
Carbide Coatings																
 MT-CVD Coated																
 PVD Coated																
 Uncoated																
		P25	P25	P35	M20	M35	K15	S								
		Steel	S. Steel		Cast Iron		H-T A.									

Triangle Inserts

Flat Top (TNMA)



										Steel		S. Steel		Cast Iron	H-T A.	R										D1			
Shape: Triangle		Part Number		ISO		P25		P35		M20		M35		K15		S		Part Number		Dimensions (millimeters)									
						GA5035	GA5125	GA5036	GA5023	G-915		GA5023	G-915		G-20M		D I.C.			L	S	D1	R						
		TNMA-330608		○	○	○	○	○	○	○	○	○	○	○	○	○	○	TNMA-642		19,05	32,99	6,35	7,92	0,79					
		TNMA-330612		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	TNMA-643		19,05	32,99	6,35	7,92	1,19				
		TNMA-330616		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	TNMA-644		19,05	32,99	6,35	7,92	1,57				
		TNMA-330916		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	TNMA-664		19,05	32,99	9,53	7,92	1,57				
		TNMA-330924		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	TNMA-666		19,05	32,99	9,53	7,92	2,36				
		TNMA-330932		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	TNMA-668		19,05	32,99	9,53	7,92	3,18				
Carbide Coatings MT-CVD Coated PVD Coated Uncoated		GA5035		GA5125	GA5036	GA5023	G-915		GA5023	G-915		G-20M		Part Number		Dimensions (millimeters)													
		P25	P35	M20	M35	K15	S	D I.C.	L	S	D1	R																	
		Steel		S. Steel		Cast Iron	H-T A.		Part Number		Dimensions (millimeters)																		
		Steel		S. Steel		Cast Iron	H-T A.				Part Number		Dimensions (millimeters)																
		Steel		S. Steel		Cast Iron	H-T A.		Part Number				Dimensions (millimeters)																
		Steel		S. Steel		Cast Iron	H-T A.				Part Number		Dimensions (millimeters)																

Greenleaf Sales

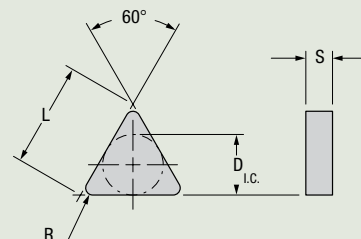
US +814-763-2915 • sales@greenleafcorporation.com
 EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
 CN +86-731-89954796 • info@greenleafcorporation.com.cn
 www.greenleafglobalsupport.com • www.greenleafcorporation.com

Stocked or Available Upon Request Stocked Standard



Triangle Inserts

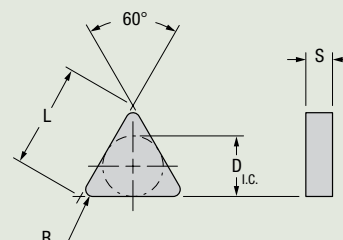
Flat Top (TNGN)



		Steel		S. Steel	Cast Iron	H-T A.		R						
Shape: Triangle	Part Number	P25	P25	P35	M20	M35	K15	S	Part Number	Dimensions (millimeters)				
	ISO	GA5035	GA5125	GA5036	GA5023	G-915	GA5023	G-915		G-20M	D I.C.	L	S	R
	TNGN-330716	○	○	○	○	○	○	○	○	TNGN-654	19,05	32,99	7,92	1,57
	TNGN-330724	○	○	○	○	○	○	○	○	TNGN-656	19,05	32,99	7,92	2,36
	TNGN-330916	○	○	○	○	○	○	○	○	TNGN-664	19,05	32,99	9,53	1,57
	TNGN-330924	○	○	○	○	○	○	○	○	TNGN-666	19,05	32,99	9,53	2,36
	TNGN-330932	○	○	○	○	○	○	○	○	TNGN-668	19,05	32,99	9,53	3,18
	TNGN-381124	○	○	○	○	○	○	○	○	TNGN-776	22,23	38,51	11,10	2,36
	TNGN-381132	○	○	○	○	○	○	○	○	TNGN-778	22,23	38,51	11,10	3,18
	TNGN-381140	○	○	○	○	○	○	○	○	TNGN-7710	22,23	38,51	11,10	3,96
TNGN-441132	○	○	○	○	○	○	○	○	TNGN-878	25,40	43,99	11,10	3,18	
Carbide Coatings MT-CVD Coated PVD Coated Uncoated		GA5035	GA5125	GA5036	GA5023	G-915	GA5023	G-915	G-20M					
		P25	P25	P35	M20	M35	K15	S						
		Steel	S. Steel	Cast Iron	H-T A.									

Triangle Inserts

Flat Top (TNUN)



		Steel		S. Steel	Cast Iron	H-T A.		R						
Shape: Triangle	Part Number	P25	P25	P35	M20	M35	K15	S	Part Number	Dimensions (millimeters)				
	ISO	GA5035	GA5125	GA5036	GA5023	G-915	GA5023	G-915		G-20M	D I.C.	L	S	R
	TNUN-330716	○	○	○	○	○	○	○	○	TNUN-654	19,05	32,99	7,92	1,57
	TNUN-330724	○	○	○	○	○	○	○	○	TNUN-656	19,05	32,99	7,92	2,36
	TNUN-330916	○	○	○	○	○	○	○	○	TNUN-664	19,05	32,99	9,53	1,57
	TNUN-330924	○	○	○	○	○	○	○	○	TNUN-666	19,05	32,99	9,53	2,36
	TNUN-330932	○	○	○	○	○	○	○	○	TNUN-668	19,05	32,99	9,53	3,18
	TNUN-381124	○	○	○	○	○	○	○	○	TNUN-776	22,23	38,51	11,10	2,36
	TNUN-381132	○	○	○	○	○	○	○	○	TNUN-778	22,23	38,51	11,10	3,18
	TNUN-381140	○	○	○	○	○	○	○	○	TNUN-7710	22,23	38,51	11,10	3,96
TNUN-441132	○	○	○	○	○	○	○	○	TNUN-878	25,40	43,99	11,10	3,18	
Carbide Coatings		GA5035	GA5125	GA5036	GA5023	G-915	GA5023	G-915	G-20M					
 MT-CVD Coated	 PVD Coated	 Uncoated	P25	P25	P35	M20	M35	K15	S					
		Steel		S. Steel		Cast Iron		H-T A.						

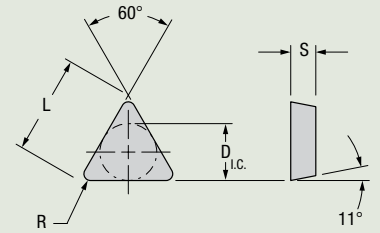
Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
 EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
 CN +86-731-89954796 • info@greenleafcorporation.com.cn
 www.greenleafglobalsupport.com • www.greenleafcorporation.com



Triangle Inserts

Flat Top (TPGN/TPUN)



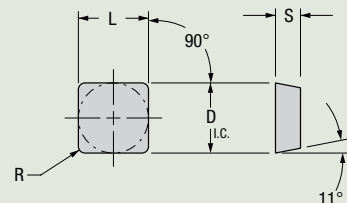
Shape: Triangle	Part Number	Steel				S. Steel		Cast Iron	H-T A.	Part Number	Dimensions (millimeters)			
		P25	P25	P35	M20	M35	K15	S			D I.C.	L	S	R
	TPGN-330924	GA5035	GA5125	GA5036	GA5023	G-915	GA5023	G-915	G-20M	TPGN-666	19,05	32,99	9,53	2,36
	TPUN-330916									TPUN-664	19,05	32,99	9,53	1,57
	TPUN-330924									TPUN-666	19,05	32,99	9,53	2,36
Carbide Coatings		GA5035	GA5125	GA5036	GA5023	G-915	GA5023	G-915	G-20M					
MT-CVD Coated PVD Coated Uncoated		P25	P25	P35	M20	M35	K15	S						
		Steel			S. Steel		Cast Iron		H-T A.					

90°



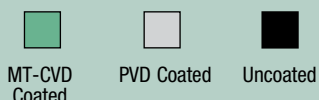
Square Inserts

Flat Top



										11 ⁶					
Shape: Square	Part Number ISO	Steel		S. Steel		Cast Iron	H-T A.		Part Number ANSI	Dimensions (millimeters)					
		P25	P25	P35	M20	M35	K15	S		D I.C.	L	S	R		
		GA5035	GA5125	GA5036	GA5023	G-915	GA5023	G-915		G-20M					
	SPGN-190412	○	○	●	○	○	○	○	○	SPGN-633	19,05	19,05	4,75	1,19	
	SPGN-190416	○	●	●	○	○	○	○	○	SPGN-634	19,05	19,05	4,75	1,57	
	SPGN-190424	○	○	○	○	○	○	○	○	SPGN-636	19,05	19,05	4,75	2,36	
	SPGN-190432	○	○	○	○	○	○	○	○	SPGN-638	19,05	19,05	4,75	3,18	
	SPUN-190412	○	○	○	○	○	○	○	○	SPUN-633	19,05	19,05	4,75	1,19	
	SPUN-190416	○	○	○	○	○	○	○	○	SPUN-634	19,05	19,05	4,75	1,57	
	SPUN-190612	○	○	○	○	○	○	○	○	SPUN-643	19,05	19,05	6,35	1,19	
	SPUN-190616	○	○	○	○	○	○	○	○	SPUN-644	19,05	19,05	6,35	1,57	
	SPUN-250916	○	○	○	○	○	○	○	○	SPUN-864	25,40	25,40	9,53	1,57	
	SPUN-250924	○	○	○	○	○	○	○	○	SPUN-866	25,40	25,40	9,53	2,36	
	SPUN-250932	○	○	○	○	○	○	○	○	SPUN-868	25,40	25,40	9,53	3,18	
	SPUN-310932	○	○	○	○	○	○	○	○	SPUN-1068	31,75	31,75	9,53	3,18	
SPUN-381232	○	○	○	○	○	○	○	○	SPUN-1288	38,10	38,10	12,70	3,18		
Carbide Coatings MT-CVD Coated PVD Coated Uncoated		GA5035	GA5125	GA5036	GA5023	G-915	GA5023	G-915	G-20M						
		P25	P25	P35	M20	M35	K15	S							
		Steel		S. Steel		Cast Iron	H-T A.								

Carbide Coatings



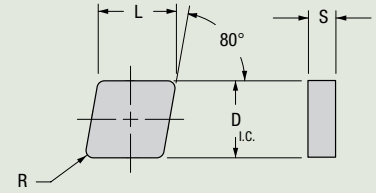
Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
 EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
 CN +86-731-89954796 • info@greenleafcorporation.com.cn
 www.greenleafglobalsupport.com • www.greenleafcorporation.com



80° Diamond Inserts

Negative



Shape: 80° Diamond	Part Number ISO	Edge Prep	Whisker						Part Number ANSI	Edge Prep	Dimensions (millimeters)			
			WG-300	WG-600	WG-700	XSYTIN-1	GSN100	GEM-7			D I.C.	L	S	R
	CNGN-190608	T2A	○	○	○	○	○	○	CNGN-642	T2A	19,05	19,33	6,35	0,79
	CNGN-190612	T4A	○	○	○	○	○	○	CNGN-643	T4A	19,05	19,33	6,35	1,19
		T2A	○	○	●	○	○	○		T2A	19,05	19,33	6,35	1,19
	CNGN-190616	T2A	○	○	○	○	○	○	CNGN-644	T2A	19,05	19,33	6,35	1,57

Ceramic Classification

 Whisker Ceramic

 Phase Toughened

 Silicon Nitride

 Alumina TiC

Whisker

Phase Toughened

Si₃N₄

Al₂O₃-TiC

WG-300

WG-600

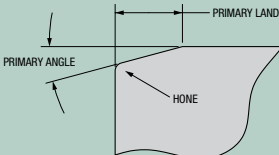
WG-700

XSYTIN-1

GSN100

GEM-7

Edge Prep Descriptions – HT 06



Page HT 05 – grade descriptions

If edge prep is not shown, call Greenleaf Technical Service for assistance.

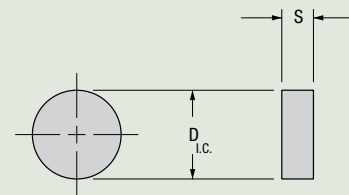
Inserts and Steel Products Only	Inserts Only	Steel Products
10 Business Days or Less ☐	Stocked or Available Upon Request ☐	Stocked Standard ☐

Greenleaf Sales
 US +814-763-2915 • sales@greenleafcorporation.com
 EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
 CN +86-731-89954796 • info@greenleafcorporation.com.cn
 www.greenleafglobalsupport.com • www.greenleafcorporation.com



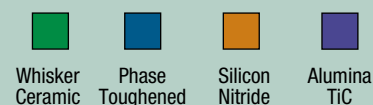
Round Inserts

Negative



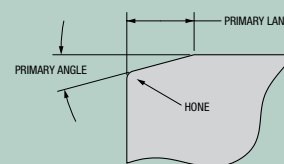
Shape: Round	Part Number ISO	Edge Prep	Whisker				Part Number ANSI	Edge Prep	Dimensions (millimeters)	
			WG-300	WG-600	WG-700	XSYTIN-1			D L.C.	S
	RNGN-190600	T2A	○	○	○	○	RNGN-64	T2A	19,05	6,35
	RNGN-190700	T2A	●	○	●	○	RNGN-65	T2A	19,05	7,92
		T10B	○	○	○	○		T10B	19,05	7,92
	RNGN-250600	T2A	○	○	○	○	RNGN-84	T2A	25,40	6,35
	RNGN-250700	T2A	○	○	○	○	RNGN-85	T2A	25,40	7,92
	RNGN-250900	T2A	○	○	○	○	RNGN-86	T2A	25,40	9,53
	RNGN-310900	T4B	○	○	○	○	RNGN-106	T4B	31,75	9,53
		T10B	○	○	○	○		T10B	31,75	9,53

Ceramic Classification



Page HT 05 – grade descriptions

Edge Prep Descriptions – HT 06



If edge prep is not shown, call Greenleaf Technical Service for assistance.

Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
 EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
 CN +86-731-89954796 • info@greenleafcorporation.com.cn
 www.greenleafglobalsupport.com • www.greenleafcorporation.com



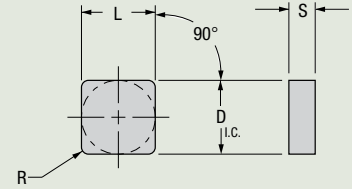
Stocked Standard

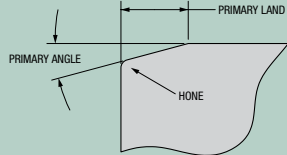


Stocked
or Available
Upon Request

Square Inserts

Negative



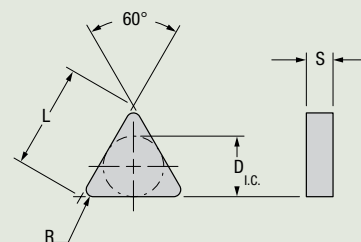
Shape: Square	Part Number	Edge Prep	Whisker						Part Number	Edge Prep	Dimensions (millimeters)			
	ISO		WG-300	WG-600	WG-700	XSYTIN-1	GSN100	GEM-7			D I.C.	L	S	R
	ANSI													
	SNGN-190608	T2A	○	○	○	○	○	○	SNGN-642	T2A	19,05	19,05	6,35	0,79
	SNGN-190612	T2A	●	○	○	○	○	○	SNGN-643	T2A	19,05	19,05	6,35	1,19
	SNGN-190616	T2A	●	○	○	○	○	○	SNGN-644	T2A	19,05	19,05	6,35	1,57
	SNGN-190712	T2A	○	○	○	○	○	○	SNGN-653	T2A	19,05	19,05	7,92	1,19
	SNGN-190716	T10B	○	○	○	○	○	○	SNGN-654	T10B	19,05	19,05	7,92	1,57
	SNGN-190720	T2A	○	○	○	○	○	○	SNGN-655	T2A	19,05	19,05	7,92	1,98
	SNGN-250924	T10B	○	○	○	○	○	○	SNGN-866	T10B	25,40	25,40	9,53	2,39
Ceramic Classification			WG-300	WG-600	WG-700	XSYTIN-1	GSN100	GEM-7	Edge Prep Descriptions – HT 06					
Whisker Ceramic Phase Toughened Silicon Nitride Alumina TiC			Whisker	Phase Toughened	Si ₃ N ₄	Al ₂ O ₃ -TiC								
Page HT 05 – grade descriptions														

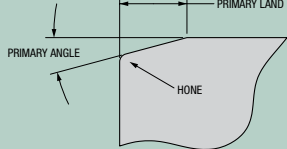
If edge prep is not shown, call Greenleaf Technical Service for assistance.



Triangle Inserts

Negative



Shape: Triangle	Part Number ISO	Edge Prep	Whisker					Part Number ANSI	Edge Prep	Dimensions (millimeters)			
			WG-300	WG-600	WG-700	XSYTIN-1	GSN100			D I.C.	L	S	R
	TNGN-330924	T4B	○	○	○	○	○	TNGN-666	T4B	19,05	32,99	9,53	2,39
	TNGN-440932	T10B	○	○	○	○	○	TNGN-868	T10B	25,40	43,99	9,53	3,18
Ceramic Classification  Whisker Ceramic  Phase Toughened  Silicon Nitride  Alumina TiC			Whisker WG-300 WG-600 WG-700 XSYTIN-1 Phase Toughened GSN100 Si₃N₄ Al₂O₃-TiC					Edge Prep Descriptions – page HT 06 					

Page HT 05 – grade descriptions

If edge prep is not shown, call Greenleaf Technical Service for assistance.

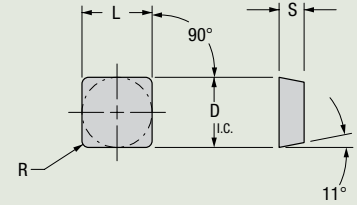
Greenleaf Sales

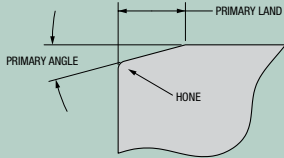
US +814-763-2915 • sales@greenleafcorporation.com
 EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
 CN +86-731-89954796 • info@greenleafcorporation.com.cn
 www.greenleafglobalsupport.com • www.greenleafcorporation.com



Square Inserts

Positive

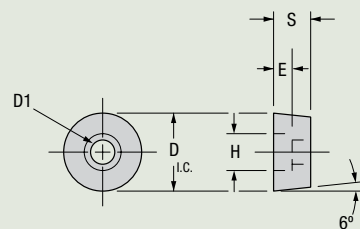


Shape: Square	Part Number ISO	Edge Prep	Whisker					Part Number ANSI	Edge Prep	Dimensions (mimlimeters)			
			WG-300	WG-600	WG-700	XYTIN-1	GSN100			D I.C.	L	S	R
	SPGN-190412	T2A	○	○	○	○	○	SPGN-633	T2A	19,05	19,05	4,75	1,19
	SPGN-190416	T2A	○	○	○	○	○	SPGN-634	T2A	19,05	19,05	4,75	1,57
	SPGN-190608	T2A	○	○	○	○	○	SPGN-642	T2A	19,05	19,05	6,35	0,79
Ceramic Classification  Whisker Ceramic  Phase Toughened  Silicon Nitride  Alumina TiC			WG-300	WG-600	WG-700	XYTIN-1	GSN100	Edge Prep Descriptions – HT 06 					
Page HT 05 – grade descriptions			Whisker			Phase Toughened	Si ₃ N ₄						
							Al ₂ O ₃ -TiC						

If edge prep is not shown, call Greenleaf Technical Service for assistance.



Roll Turning Inserts



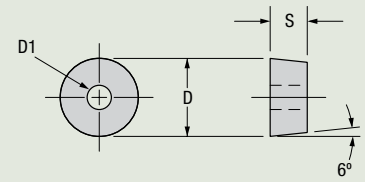
Shape: CDH	Part Number ISO					Part Number ANSI	Dimensions (millimeters)				
		GA5035	G-935	G-50	G-74		D I.C.	S	H	D1	E
	CDH-42	○	○	○	○	CDH-42	25,40	12,70	10,31	6,73	6,35
	CDH-43	○	○	○	○	CDH-43	25,40	19,05	10,31	6,73	12,70
	CDH-51.5	○	○	○	○	CDH-51.5	31,75	9,53	15,06	9,91	9,53
	CDH-53	○	○	○	○	CDH-53	31,75	19,05	15,06	9,91	9,53
Carbide Coatings		GA5035	G-935	G-50	G-74						
MT-CVD Coated PVD Coated Uncoated											

Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
CN +86-731-89954796 • info@greenleafcorporation.com.cn
www.greenleafglobalsupport.com • www.greenleafcorporation.com



Roll Turning Inserts



Shape: C-CDH	Part Number ISO	Edge Prep	Whisker						Part Number ANSI	Edge Prep	Dimensions (millimeters)		
			WG-300	WG-600	WG-700	XSYTIN-1	GSN100	GEM-7			D I.C.	S	D1
	C-CDH-21	T4B	○	○	○	○	○	○	C-CDH-21	T4B	12,70	6,35	3,18
		T10B	○	○	○	○	○	○		T10B	12,70	6,35	3,18
	C-CDH-22	T4B	○	○	○	○	○	○	C-CDH-22	T4B	12,70	12,70	3,18
		T10B	○	○	○	○	○	○		T10B	12,70	12,70	3,18
	C-CDH-31	T4B	○	○	○	○	○	○	C-CDH-31	T4B	19,05	6,35	6,73
		T10B	○	○	○	○	○	○		T10B	19,05	6,35	6,73
	C-CDH-31.5	T4B	○	○	○	○	○	○	C-CDH-31.5	T4B	19,05	9,53	6,73
		T10B	○	○	○	○	○	○		T10B	19,05	9,53	6,73
	C-CDH-42	T4B	○	○	○	○	○	○	C-CDH-42	T4B	25,40	12,70	6,73
		T10B	●	○	○	○	○	●		T10B	25,40	12,70	6,73
	C-CDH-43	T4B	○	○	○	○	○	○	C-CDH-43	T4B	25,40	19,05	6,73
		T10B	○	○	○	○	○	○		T10B	25,40	19,05	6,73
	C-CDH-51.5	T4B	○	○	○	○	○	○	C-CDH-51.5	T4B	31,75	9,53	9,91
		T10B	○	○	○	○	○	○		T10B	31,75	9,53	9,91
	C-CDH-53	T4B	○	○	○	○	○	○	C-CDH-53	T4B	31,75	19,05	9,91
		T10B	○	○	○	○	○	●		T10B	31,75	19,05	9,91

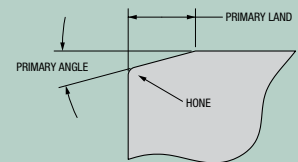
Ceramic Classification

			
Whisker Ceramic	Phase Toughened	Silicon Nitride	Alumina TiC

Page HT 05 – grade descriptions

WG-300	WG-600	WG-700	XSYTIN-1	GSN100	GEM-7
Whisker	Phase Toughened	Si ₃ N ₄	Al ₂ O ₃ -TiC	GEM-7	

Edge Prep Descriptions – HT 06

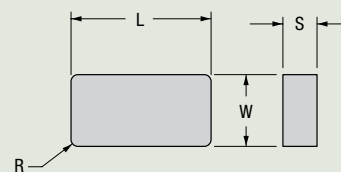


If edge prep is not shown, call Greenleaf Technical Service for assistance.

90°



Roll Turning Inserts



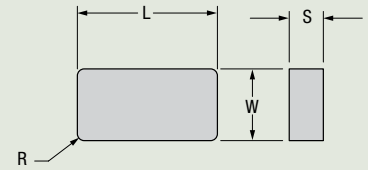
Shape: LNUN	Part Number ISO					Part Number ANSI	Dimensions (millimeters)			
		GA5035	G-935	G-50	G-74		W	L	S	R
	LNUN-4442	○	○	○	○	LNUN-4442	12,70	25,40	6,35	0,79
	LNUN-4444	○	○	○	○	LNUN-4444	12,70	25,40	6,35	1,57
	LNUN-4452	○	○	○	○	LNUN-4452	12,70	25,40	7,92	0,79
	LNUN-4454	○	○	○	○	LNUN-4454	12,70	25,40	7,92	1,57
	LNUN-5444	○	○	○	○	LNUN-5444	15,88	25,40	6,35	1,57
	LNUN-5464	○	○	○	○	LNUN-5464	15,88	25,40	9,53	1,57
	LNUN-5564	○	○	○	○	LNUN-5564	15,88	31,75	9,53	1,57
	LNUN-6568	○	○	○	○	LNUN-6568	19,05	31,75	9,53	3,18
	LNUN-6684	○	○	○	○	LNUN-6684	19,05	38,10	12,70	1,57
	LNUN-6688	○	○	●	○	LNUN-6688	19,05	38,10	12,70	3,18
	LNUN-66812	○	○	○	○	LNUN-66812	19,05	38,10	12,70	4,75
	LNUN-68812	○	○	○	○	LNUN-68812	19,05	50,80	12,70	4,75
Carbide Coatings		GA5035	G-935	G-50	G-74					
MT-CVD Coated PVD Coated Uncoated										

Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
 EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
 CN +86-731-89954796 • info@greenleafcorporation.com.cn
 www.greenleafglobalsupport.com • www.greenleafcorporation.com



Roll Turning Inserts



Shape: LNMN	Part Number ISO	Edge Prep	Whisker						Part Number ANSI	Edge Prep	Dimensions (millimeters)			
			WG-300	WG-600	WG-700	Phase Toughened XSYTIN-1	Si ₃ N ₄ GSN100	Al ₂ O ₃ -TiC GEM-7			W	L	S	R
	LNMN-4442	T4B	○	○	○	○	○	○	LNMN-4442	T4B	12,70	25,40	6,35	0,79
		T10B	○	○	○	○	○	○		T10B	12,70	25,40	6,35	0,79
	LNMN-4444	T4B	○	○	○	○	○	○	LNMN-4444	T4B	12,70	25,40	6,35	1,57
		T10B	○	○	○	○	○	○		T10B	12,70	25,40	6,35	1,57
	LNMN-4452	T4B	○	○	○	○	○	○	LNMN-4452	T4B	12,70	25,40	7,92	0,79
		T10B	○	○	○	○	○	○		T10B	12,70	25,40	7,92	0,79
	LNMN-4454	T4B	○	○	○	○	○	○	LNMN-4454	T4B	12,70	25,40	7,92	1,57
		T10B	○	○	○	○	○	○		T10B	12,70	25,40	7,92	1,57
	LNMN-5444	T4B	○	○	○	○	○	○	LNMN-5444	T4B	15,88	25,40	6,35	1,57
		T10B	○	○	○	○	○	○		T10B	15,88	25,40	6,35	1,57
	LNMN-5464	T4B	○	○	○	○	○	○	LNMN-5464	T4B	15,88	25,40	9,53	1,57
		T10B	○	○	○	○	○	●		T10B	15,88	25,40	9,53	1,57
	LNMN-5564	T4B	○	○	○	○	○	○	LNMN-5564	T4B	15,88	31,75	9,53	1,57
		T10B	○	○	○	○	○	○		T10B	15,88	31,75	9,53	1,57
	LNMN-6568	T4B	○	○	○	○	○	○	LNMN-6568	T4B	19,05	31,75	9,53	3,18
		T10B	○	○	○	○	○	○		T10B	19,05	31,75	9,53	3,18
	LNMN-6684	T4B	○	○	○	○	○	○	LNMN-6684	T4B	19,05	38,10	12,70	1,57
		T10B	○	○	○	○	○	○		T10B	19,05	38,10	12,70	1,57
	LNMN-6688	T4B	○	○	●	○	○	○	LNMN-6688	T4B	19,05	38,10	12,70	3,18
		T10B	●	●	●	○	○	●		T10B	19,05	38,10	12,70	3,18
	LNMN-66812	T4B	○	○	○	○	○	○	LNMN-66812	T4B	19,05	38,10	12,70	4,75
		T10B	○	○	○	○	○	○		T10B	19,05	38,10	12,70	4,75

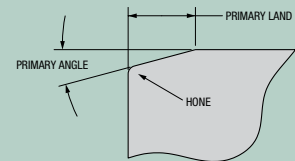
Ceramic Classification

			
Whisker Ceramic	Phase Toughened	Silicon Nitride	Alumina TiC

Page HT 05 – grade descriptions

WG-300	WG-600	WG-700	Phase Toughened XSYTIN-1	Si ₃ N ₄ GSN100	Al ₂ O ₃ -TiC GEM-7
Whisker					

Edge Prep Descriptions – HT 06



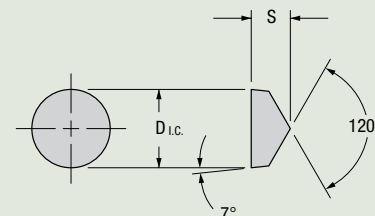
If edge prep is not shown, call Greenleaf Technical Service for assistance.

Stocked or Available Upon Request  Stocked Standard 

Greenleaf Sales
 US +814-763-2915 • sales@greenleafcorporation.com
 EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
 CN +86-731-89954796 • info@greenleafcorporation.com.cn
 www.greenleafglobalsupport.com • www.greenleafcorporation.com

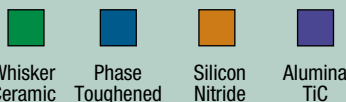


Round V-Bottom Inserts



Shape: Round V-Bottom	Part Number ISO	Edge Prep	Whisker						Part Number ANSI	Edge Prep	Dimensions (millimeters)	
			WG-300	WG-600	WG-700	XYTIN-1	GSN100	GEM-7			D I.C.	S
	RCGX-060400	T2A	○	○	○	○	○	●	RCGN-2V	T2A	6,35	4,75
	RCGX-090700	T2A	●	○	○	○	○	●	RCGN-3V	T2A	9,53	7,92
		T4B	●	○	○	○	○	○		T5B	9,53	7,92
	RCGX-120700	T2A	●	●	●	○	○	●	RCGN-4V	T2A	12,70	7,92
		T4A	○	○	○	○	○	●		T4A	12,70	7,92
		T5A	●	○	○	○	○	●		T5A	12,70	7,92
		T5B	●	○	○	○	○	●		T5B	12,70	7,92
	RCGX-151000	T2A	○	○	○	○	○	○	RCGN-5V	T2A	15,88	10,01
	RCGX-191000	T2A	○	○	○	○	○	○	RCGX-106	T2A	19,05	10,01
	RCGX-191200	T2A	○	○	○	○	○	○	RCGN-6V	T2A	19,05	12,70

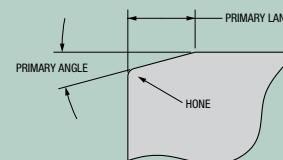
Ceramic Classification



Page HT 05 – grade descriptions

WG-300	WG-600	WG-700	XYTIN-1	GSN100	GEM-7
Whisker	Phase Toughened	Si ₃ N ₄	Al ₂ O ₃ -TiC		

Edge Prep Descriptions – HT 06



Page HT 34 – toolholders:

If edge prep is not shown, call Greenleaf Technical Service for assistance.

Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com

EU +31-45-404-1774 • eurooffice@greenleafcorporation.com

CN +86-731-89954796 • info@greenleafcorporation.com.cn

www.greenleafglobalsupport.com • www.greenleafcorporation.com

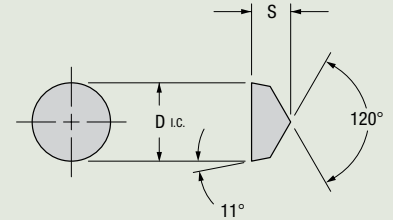


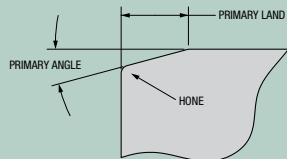
Stocked Standard



Stocked
or Available
Upon Request

Round V-Bottom Inserts



Shape: Round V-Bottom	Part Number ISO	Edge Prep	Whisker						Part Number ANSI	Edge Prep	Dimensions (millimeters)	
			WG-300	WG-600	WG-700	XSNTIN-1	GSN100	Al ₂ O ₃ -TIC			D I.C.	S
	RPGX-060400	T2A	●	○	●	○	○	○	RPGN-2V	T2A	6,35	4,75
	RPGX-090700	T2A	●	●	●	○	○	○	RPGN-3V	T2A	9,53	7,92
		T4B	○	○	○	○	○	○		T4B	9,53	7,92
	RPGX-120700	T2A	●	●	○	○	○	○	RPGN-4V	T2A	12,70	7,92
		T4B	○	○	○	○	○	○		T4B	12,70	7,92
Ceramic Classification			WG-300 WG-600 WG-700 XSNTIN-1 GSN100 GEM-7						Edge Prep Descriptions – HT 06			
Whisker Ceramic Phase Toughened Silicon Nitride Alumina TiC			Whisker Phase Toughened Si₃N₄ Al₂O₃-TiC									

Page HT 05 – grade descriptions

If edge prep is not shown, call Greenleaf Technical Service for assistance.

Stocked
or Available
Upon Request

Stocked Standard

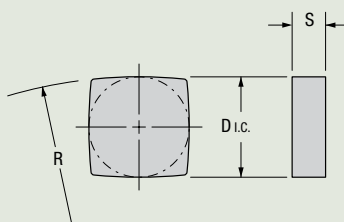
Greenleaf Sales
 US +814-763-2915 • sales@greenleafcorporation.com
 EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
 CN +86-731-89954796 • info@greenleafcorporation.com.cn
 www.greenleafglobalsupport.com • www.greenleafcorporation.com

90°



Square Inserts

Negative



Shape: Square	Part Number ISO	Edge Prep	Whisker						Part Number ANSI	Edge Prep	Dimensions (millimeters)		
			WG-300	WG-600	WG-700	XSYTIN-1	GSN100	GEM-7			D I.C.	S	R
	SNGN-128-R4.5	T4B	○	○	○	○	○	○	SNGN-128-R4.5	T4B	38,10	12,70	114,30

Ceramic Classification

Whisker Ceramic

Phase Toughened

Silicon Nitride

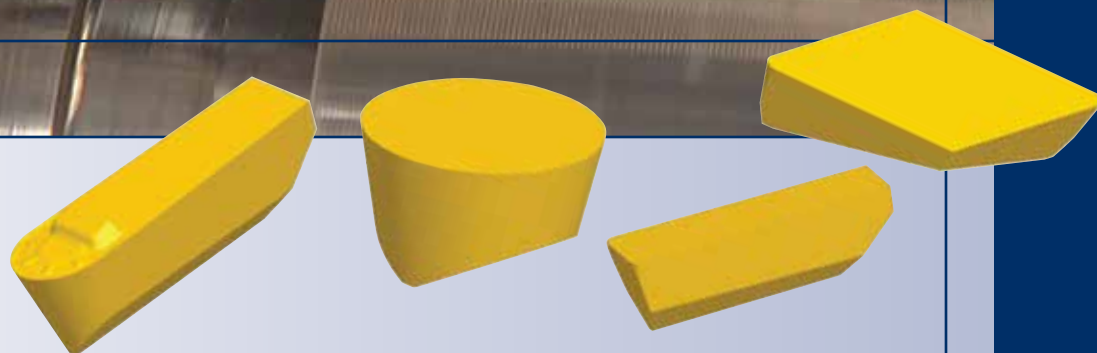
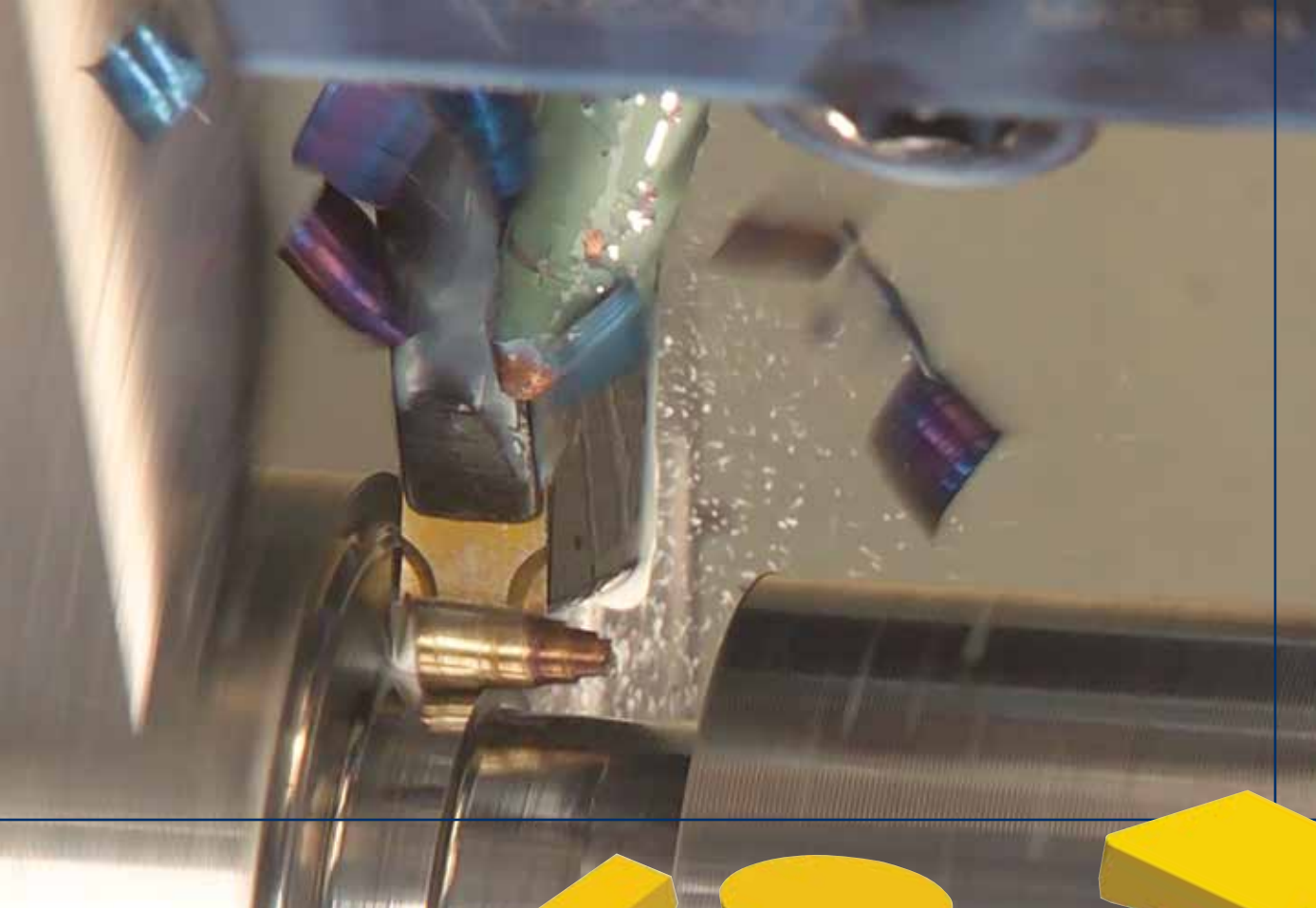
Alumina TiC

Al₂O₃

Page HT 05 – grade descriptions

Edge Prep Descriptions – HT 06

If edge prep is not shown, call Greenleaf Technical Service for assistance.



<i>Grooving, Profiling and</i>	<i>GP 02-03</i>
<i>Cut-Off Inserts</i>	
<i>Grade Descriptions</i>	<i>GP 04</i>
<i>Insert Grade Reference</i>	<i>GP 05</i>
<i>Pictorial Index</i>	<i>GP 07</i>
<i>Inserts</i>	<i>GP 08-18</i>
<i>Toolholders and Bars</i>	<i>GP 19-38</i>
<i>Support Blades and Holders</i>	<i>GP 39-55</i>

Greenleaf Sales**US** +814-763-2915 • sales@greenleafcorporation.com**EU** +31-45-404-1774 • eurooffice@greenleafcorporation.com**CN** +86-731-89954796 • info@greenleafcorporation.com.cnwww.greenleafglobalsupport.com • www.greenleafcorporation.com

Grooving, Profiling and Cut-Off Inserts

Greenleaf offers one of the most comprehensive lines of grooving, profiling and cut-off inserts in the industry. Every application on the shop floor can use this unique tooling system that accommodates both ceramic and carbide inserts.

Our advanced MT-CVD coated and PVD-coated grades have the strength and wear resistance needed for higher cutting speeds and longer tool life.

Greenleaf is the industry leader in the development and manufacture of ceramic and coated ceramic inserts including WG-600®, the only commercially available, second generation, coated ceramic-composite cutting tool using whisker reinforcement. WG-600 is one of seven prominent advanced-ceramic grades that continue to increase productivity in industry.



*Greenleaf Corporation is continually upgrading its products.
For the most current information, please visit our web site at:*

www.greenleafglobalsupport.com

Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
CN +86-731-89954796 • info@greenleafcorporation.com.cn
www.greenleafglobalsupport.com • www.greenleafcorporation.com

CARBIDE

Greenleaf offers a comprehensive line of carbide inserts in grades ranging from sub-micron C-1 through C-8 classifications. An industry pioneer in coated carbide, Greenleaf offers a variety of uncoated, MT-CVD coated and PVD-coated grades. Carbide inserts are available in ANSI standard geometries with multi-purpose chipbreakers for heavy roughing through finishing.

COATED – MT-CVD

GA5025 A high-speed MT-CVD coated grade for turning, light roughing and finishing of carbon and alloy steels, as well as selected stainless steels.

GA5026 A high-speed grade developed for turning nickel- and cobalt-based super-alloys, stainless steels, and refractory metals. The advanced MT-CVD coating over a micro-grain substrate offers high wear resistance. GA5026 has exceptional resistance to the notching and deformation common to machining high strength materials. Apply at high speeds and light feeds in turning and selected milling applications.

GA5035 A high-performance MT-CVD coated grade for turning all types of steels, and selected stainless steels. GA5035 can be used in rough, semi-finish, and finish turning situations requiring resistance to heat deformation, thermal shock, and abrasion. GA5035 should be applied at high speeds and a range of feeds.

GA5125 New high-performance MT-CVD coated carbide milling grade especially suited for manganese steel. GA5125 is also applicable on chrome-moly steel, tool steel and similar high alloy steels. GA5125 provides excellent resistance to abrasion, crater wear, thermal shock, deformation and edge build-up. GA5125 should be applied at high speeds with moderate feed rates.

COATED – PVD

G-915 Multi-layer PVD-coated grade, excellent for cut off, milling and turning high-temp alloys, stainless steel, and low carbon steels. The multi-layer PVD coating adds heat and abrasion resistance to the tough, shock-resistant substrate. G-915 should be run at moderate speeds and moderate to high feeds in milling and interrupted turning applications.

G-920 PVD-coated grade for turning and milling high-strength materials such as high-temp alloys, titanium and stainless steel. G-920 is also an excellent grade for aluminum and refractory metals. This grade has the resistance to deformation and notching required for higher speeds than G-910.

G-925 Multi-layer PVD-coated grade specifically designed for machining abrasive and difficult-to-machine materials. Typical applications include high-temp alloys, titanium and other refractory metals, stainless steel, and many cast irons. G-925 exhibits excellent resistance to notching and deformation. Apply at moderate to high speeds and moderate feeds.

G-935 Multi-layer PVD-coated grade for steel milling and turning applications requiring additional resistance to mechanical and thermal shock. The multi-layered PVD coating increases the speed capability and wear resistance in tough milling and interrupted turning applications.

UNCOATED

G-20M A sub-micron C-2 carbide grade suited for use in turning and milling titanium and nickel-based super-alloys. G-20M has the strength and edge wear characteristics to resist notching when turning high-strength materials.

CERAMIC

Greenleaf is the industry leader in the development and manufacture of ceramic and coated ceramic inserts in ANSI standard and special geometries. Some of the most prominent include:

WG-300® Whisker-reinforced ceramic with excellent wear and shock resistance at high surface speeds. WG-300 is very effective at machining nickel and cobalt based super-alloys, and other hard materials at metal removal rates up to 10 times higher than carbide.

WG-600® Coated whisker-reinforced ceramic offering longer tool life and better performance over uncoated ceramics due to outstanding thermal properties and shock-resistance at high cutting speeds. Application areas include rough and finish turning, as well as high-performance milling of high-strength alloys, hardened steels and select stainless steels.

U.S. Patent No. 6,447,896 B1.

WG-700™ New whisker-reinforced Al_2O_3 ceramic substrate featuring improved toughness and a unique high-speed coating. WG-700 is ideal for machining nickel- and cobalt-based super alloys and other difficult-to-machine materials. WG-700 exhibits high metal-removal rates with exceptional tool life. *U.S. Patent No. 6,447,896 B1*

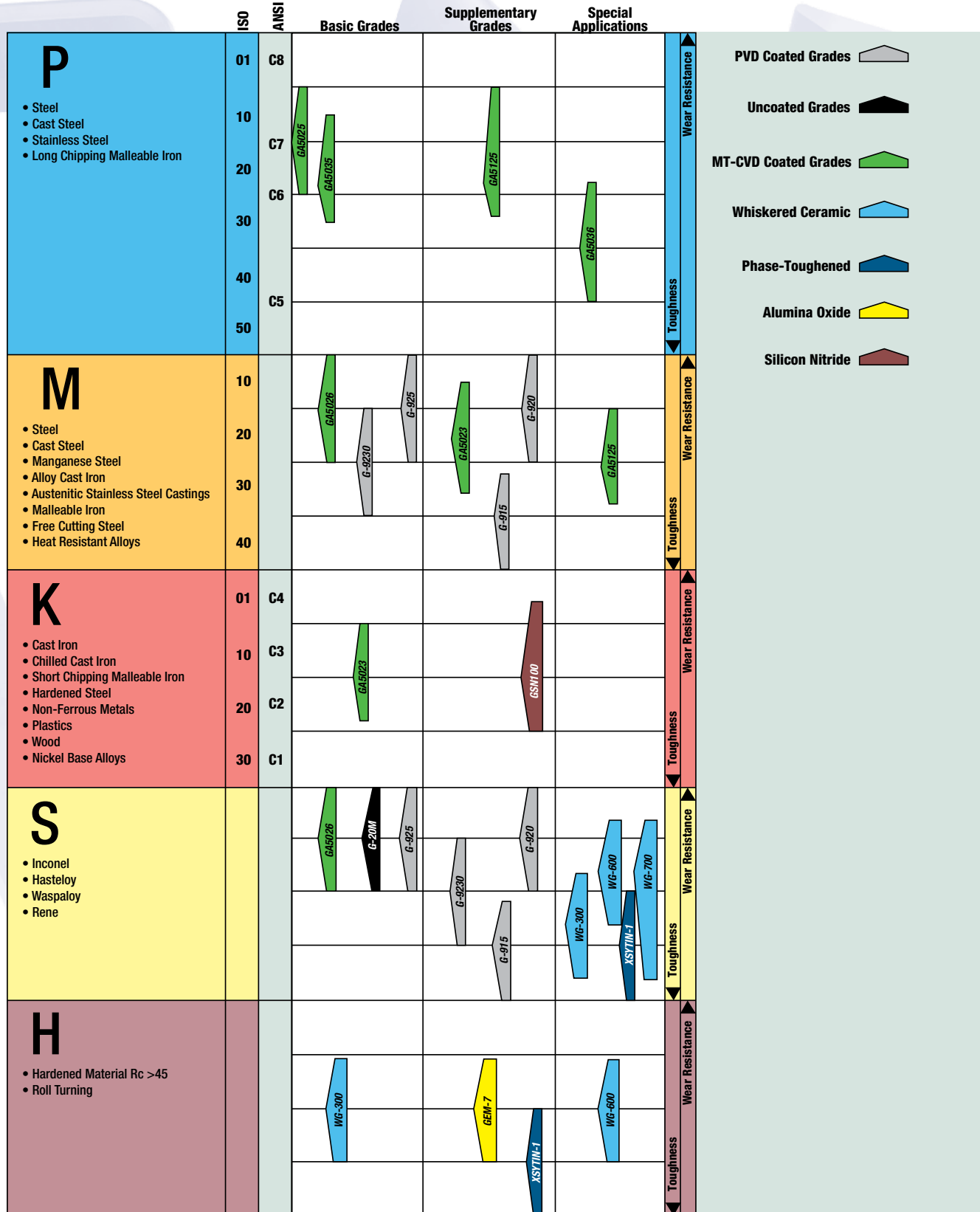
XSYTIN™-1 New phase-toughened ceramic capable of extreme feed rates. XSYTIN™-1 excels at machining a wide variety of materials including steels, cast and ductile irons, high-temperature alloys and other challenging metals. XSYTIN™-1 is ideal for use in interrupted cuts, scale, abrasive casting materials and milling.

GSN100™ New engineered blend of silicon nitride and proprietary toughening agents that redefines productivity in the machining of cast iron. GSN100 delivers outstanding tool life at high cutting speeds in turning, grooving and milling applications.

GEM-7™ Al_2O_3 + TiC composite ceramic with a high degree of predictability in roll turning and hard alloy (up to 65 R/c) machining.

GEM-19™ Cold pressed and sintered Al_2O_3 ceramic for economical roughing and finishing of cast iron grades application range on severe interruption or old machinery.

Insert Grade Reference for Grooving, Profiling and Cut Off

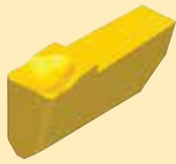




Greenleaf Sales

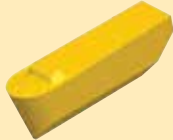
US +814-763-2915 • sales@greenleafcorporation.com
EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
CN +86-731-89954796 • info@greenleafcorporation.com.cn
www.greenleafglobalsupport.com • www.greenleafcorporation.com

Greenleaf Cut-Off System

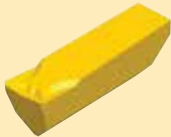


COS
page: GP 08

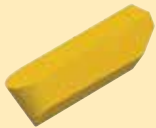
Single-Ended Groovers



Full Nose
page: GP 09



Flat Nose
page: GP 09



WG-Style Full Nose
page: GP 10



WG-Style Flat Nose
page: GP 11

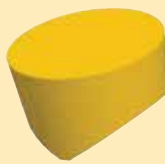


WGC Full Nose
page: GP 12

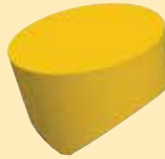


WGC Flat Nose
page: GP 13

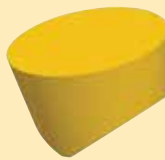
V-Bottom Round Inserts



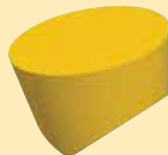
RCGX
Positive: Carbide
page: GP 14



RCGX
Positive: Ceramic
page: GP 14



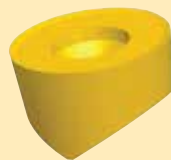
RPGX
Positive: Carbide
page: GP 15



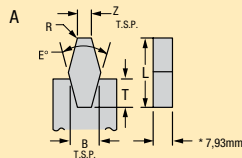
RPGX
Positive: Ceramic
page: GP 15



RCGR/RPGR
Positive Chipform
V-Bottom
page: GP 16



RCGT/RPGT
Positive Chipform
V-Bottom
page: GP 17

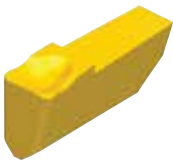


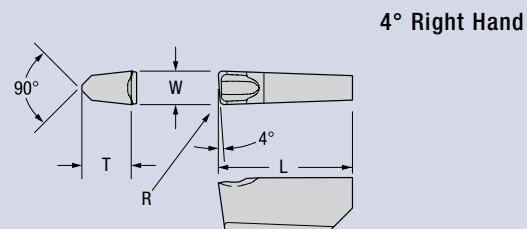
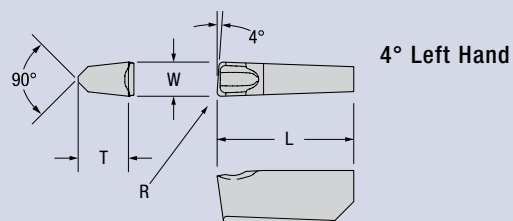
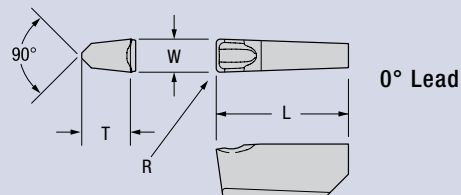
Pulley and Poly Groove Inserts
page: GP 18

Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
CN +86-731-89954796 • info@greenleafcorporation.com.cn
www.greenleafglobalsupport.com • www.greenleafcorporation.com

Greenleaf Cut-Off System

Shape: Groove/Turn	Part Number	G-915	Part Number	Dimensions (millimeters)			
	ISO		ANSI	W	L	T	R
	COS-4094-0	●	COS-4094-0	2,39	12,70	4,75	0,25
	COS-4125-0	●	COS-4125-0	3,18	12,70	4,75	0,25
	COS-4187-0	●	COS-4187-0	4,75	12,70	4,75	0,25
	COS-4094-4L	●	COS-4094-4L	2,39	12,70	4,75	0,25
	COS-4125-4L	●	COS-4125-4L	3,18	12,70	4,75	0,25
	COS-4187-4L	●	COS-4187-4L	4,75	12,70	4,75	0,25
	COS-4094-4R	●	COS-4094-4R	2,39	12,70	4,75	0,25
	COS-4125-4R	●	COS-4125-4R	3,18	12,70	4,75	0,25
	COS-4187-4R	●	COS-4187-4R	4,75	12,70	4,75	0,25
Carbide Coatings  PVD Coated		G-915					



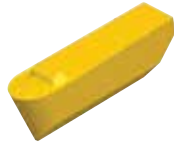
See pages GP29, GP32, GP34, GP35, GP43 and GP44 for toolholders.

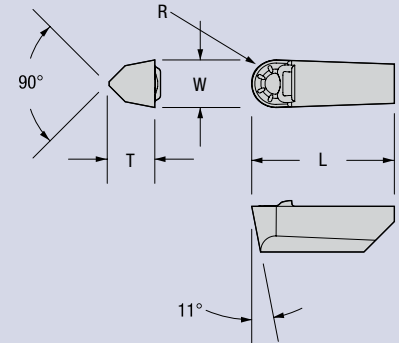
Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
 EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
 CN +86-731-89954796 • info@greenleafcorporation.com.cn
 www.greenleafglobalsupport.com • www.greenleafcorporation.com



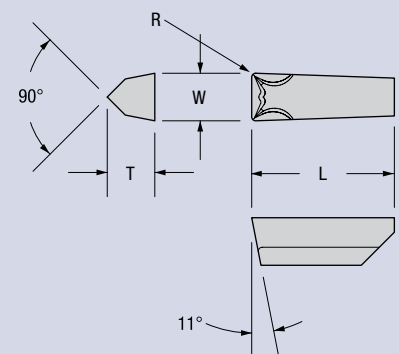
Full Nose Grooving Inserts

Shape: Groove/Turn	Part Number	GA5026	GA5035	G-935	G-925	G-915	Part Number	Dimensions (millimeters)			
	ISO						ANSI	W	L	T	R
	GTS-4125	●	●	●	●	●	GTS-4125	3,18	12,70	4,75	1,59
	GTS-4187	●	●	●	●	●	GTS-4187	4,75	12,70	4,75	2,37
	GTS-6250	●	●	○	●	●	GTS-6250	6,35	19,05	6,35	3,18
Carbide Coatings		GA5026	GA5035	G-935	G-925	G-915					
 MT-CVD Coated  PVD Coated  Uncoated											



Flat Nose Grooving Inserts

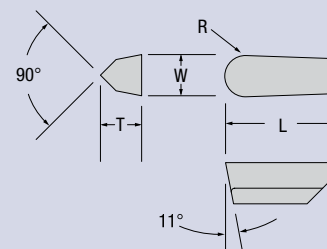
Shape: Groove/Turn	Part Number	GA5026	GA5035	G-935	G-915	Part Number	Dimensions (millimeters)			
	ISO					ANSI	W	L	T	R
	GTS-4125-1	●	●	●	●	GTS-4125-1	3,18	12,70	4,75	0,38
	GTS-4125-2	●	●	●	●	GTS-4125-2	3,18	12,70	4,75	0,79
	GTS-4187-1	●	●	●	●	GTS-4187-1	4,75	12,70	4,75	0,38
	GTS-4187-2	●	●	●	●	GTS-4187-2	4,75	12,70	4,75	0,79
	GTS-6250-1	●	●	●	●	GTS-6250-1	6,35	19,05	6,35	0,38
	GTS-6250-2	●	●	●	●	GTS-6250-2	6,35	19,05	6,35	0,79
Carbide Coatings		GA5026	GA5035	G-935	G-915					
 MT-CVD Coated  PVD Coated  Uncoated										



Stocked or Available Upon Request  
 Stocked Standard  

Greenleaf Sales
 US +814-763-2915 • sales@greenleafcorporation.com
 EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
 CN +86-731-89954796 • info@greenleafcorporation.com.cn
 www.greenleafglobalsupport.com • www.greenleafcorporation.com

WG-Style, Full Nose Grooving Inserts



Shape: Groover	Part Number ISO	Whisker						Part Number ANSI	Dimensions (millimeters)			
		WG-300	WG-600	WG-700	XSYTIN-1	GSN100	GEM-19		W	L	T	R
					Phase Toughened	Si ₃ N ₄	Al ₂ O ₃					
	WG-4094	●	○	●	○	○	○	WG-4094	2,39	12,70	4,75	1,19
	WG-4125	●	●	●	○	○	○	WG-4125	3,18	12,70	4,75	1,59
	WG-4156	●	●	●	○	○	○	WG-4156	3,96	12,70	4,75	1,98
	WG-4187	●	●	●	○	○	○	WG-4187	4,75	12,70	4,75	2,37
	WG-6218	●	●	●	○	○	○	WG-6218	5,54	19,05	6,35	2,77
	WG-6250	●	●	●	○	○	○	WG-6250	6,35	19,05	6,35	3,18
	WG-6281	●	○	○	○	○	○	WG-6281	7,14	19,05	6,35	3,57
	WG-8312	●	○	●	○	○	○	WG-8312	7,93	25,40	8,56	3,96
	WG-8344	○	○	○	○	○	○	WG-8344	8,74	25,40	8,56	4,37
WG-8375	●	○	○	○	○	○	WG-8375	9,53	25,40	8,56	4,76	
Ceramic Classification												
												
Whisker Ceramic	Phase Toughened	Silicon Nitride	Alumina TiC	Al ₂ O ₃								
Page GP 04 – grade description												

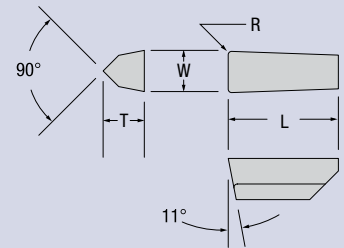
* The standard edge prep for WG groovers is "A" hone (0,012–0,025mm).

Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
 EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
 CN +86-731-89954796 • info@greenleafcorporation.com.cn
 www.greenleafglobalsupport.com • www.greenleafcorporation.com



WG-Style, Flat Nose Grooving Inserts



Shape: Groover	Part Number ISO	Whisker					Part Number ANSI	Dimensions (millimeters)			
		WG-300	WG-600	WG-700	XSYTIN-1	Phase Toughened		W	L	T	R
	WG-4094-1	●	○	●	○	○	WG-4094-1	2,39	12,70	4,75	0,38
	WG-4094-2	○	○	○	○	○	WG-4094-2	2,39	12,70	4,75	0,79
	WG-4125-1	○	○	●	○	○	WG-4125-1	3,18	12,70	4,75	0,38
	WG-4125-2	●	○	●	○	○	WG-4125-2	3,18	12,70	4,75	0,79
	WG-4156-1	●	○	●	○	○	WG-4156-1	3,96	12,70	4,75	0,38
	WG-4156-2	●	○	●	○	○	WG-4156-2	3,96	12,70	4,75	0,79
	WG-4156-3	●	○	●	○	○	WG-4156-3	3,96	12,70	4,75	1,17
	WG-4187-1	●	○	●	○	○	WG-4187-1	4,75	12,70	4,75	0,38
	WG-4187-2	●	○	●	○	○	WG-4187-2	4,75	12,70	4,75	0,79
	WG-6218-1	●	○	●	○	○	WG-6218-1	5,54	19,05	6,35	0,38
	WG-6218-2	●	○	●	○	○	WG-6218-2	5,54	19,05	6,35	0,79
	WG-6250-1	●	●	●	○	○	WG-6250-1	6,35	19,05	6,35	0,38
	WG-6250-2	●	●	●	○	○	WG-6250-2	6,35	19,05	6,35	0,79
	WG-6250-3	●	●	●	○	○	WG-6250-3	6,35	19,05	6,35	1,17
	WG-6250-4	●	●	●	○	○	WG-6250-4	6,35	19,05	6,35	1,57
	WG-6281-1	●	○	○	○	○	WG-6281-1	7,14	19,05	6,35	0,38
	WG-6281-2	○	○	○	○	○	WG-6281-2	7,14	19,05	6,35	0,79
	WG-6281-3	○	○	○	○	○	WG-6281-3	7,14	19,05	6,35	1,17
	WG-8312-1	●	○	●	○	○	WG-8312-1	7,92	25,40	8,56	0,38
	WG-8312-2	●	○	●	○	○	WG-8312-2	7,92	25,40	8,56	0,79
	WG-8312-3	●	○	●	○	○	WG-8312-3	7,92	25,40	8,56	1,17
	WG-8312-4	○	○	○	○	○	WG-8312-4	7,92	25,40	8,56	1,57
	WG-8344-1	○	○	○	○	○	WG-8344-1	8,74	25,40	8,56	0,38
	WG-8344-2	○	○	○	○	○	WG-8344-2	8,74	25,40	8,56	0,79
	WG-8344-3	○	○	○	○	○	WG-8344-3	8,74	25,40	8,56	1,17
	WG-8344-4	○	○	○	○	○	WG-8344-4	8,74	25,40	8,56	1,57
	WG-8375-1	○	○	○	○	○	WG-8375-1	9,53	25,40	8,56	0,38
	WG-8375-2	●	○	●	○	○	WG-8375-2	9,53	25,40	8,56	0,79
	WG-8375-3	○	○	○	○	○	WG-8375-3	9,53	25,40	8,56	1,17
	WG-8375-4	●	○	○	○	○	WG-8375-4	9,53	25,40	8,56	1,57

Ceramic Classification

Whisker Ceramic

Phase Toughened

Silicon Nitride

Alumina TiC

Al₂O₃

WG-300

WG-600

WG-700

XSYTIN-1

Phase Toughened

GSN100

Si₃N₄

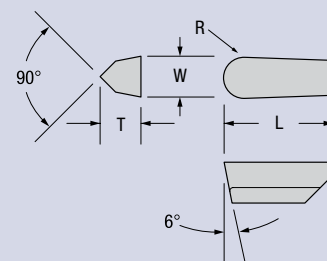
GEM-19

Al₂O₃

Page GP 04 – grade description

* The standard edge prep for WG groovers is "A" hone (0,012–0,025mm).

WGC Full Nose Grooving Inserts



Shape: Groover	Part Number ISO	Whisker						Part Number ANSI	Dimensions (millimeters)			
		WG-300	WG-600	WG-700	XSYTIN-1	GSN100	GEM-7		W	L	T	R
	WGC-4094	○	○	○	○	○	○	WGC-4094	2,39	12,70	4,75	1,19
	WGC-4125	○	○	○	○	○	○	WGC-4125	3,18	12,70	4,75	1,59
	WGC-4156	○	○	○	○	○	○	WGC-4156	3,96	12,70	4,75	1,98
	WGC-4187	○	○	○	○	○	○	WGC-4187	4,75	12,70	4,75	2,37
	WGC-6218	○	○	○	○	○	○	WGC-6218	5,54	19,05	6,35	2,77
	WGC-6250	○	○	○	○	○	●	WGC-6250	6,35	19,05	6,35	3,18
	WGC-6281	○	○	○	○	○	○	WGC-6281	7,14	19,05	6,35	3,57
	WGC-8312	○	○	○	○	○	○	WGC-8312	7,93	25,40	8,56	3,96
	WGC-8344	○	○	○	○	○	○	WGC-8344	8,74	25,40	8,56	4,37
	WGC-8375	○	○	○	○	○	○	WGC-8375	9,53	25,40	8,56	4,76
Ceramic Classification		WG-300	WG-600	WG-700	XSYTIN-1	GSN100	GEM-7	GEM-19				
■ Whisker Ceramic ■ Phase Toughened ■ Silicon Nitride ■ Alumina TiC ■ Al₂O₃		Whisker			Phase Toughened	SiN ₄	Al ₂ O ₃ -TiC	Al ₂ O ₃				

Page GP 04 – grade description

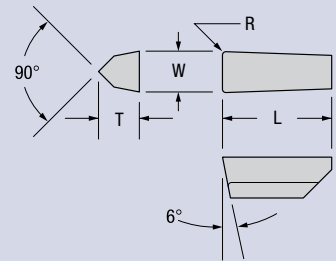
* WGC style inserts come standard with a "T1A" edge prep (0,05–0,10mm x 20 degrees and 0,012–0,025mm hone).

Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
CN +86-731-89954796 • info@greenleafcorporation.com.cn
www.greenleafglobalsupport.com • www.greenleafcorporation.com



WGC Flat Nose Grooving Inserts



Shape: Groover	Part Number ISO	Whisker						Part Number ANSI	Dimensions (millimeters)			
		WG-300	WG-600	WG-700	XSYTIN-1	GSN100	Al ₂ O ₃ -TiC		W	L	T	R
	WGC-4094-1	○	○	○	○	○	○	WGC-4094-1	2,39	12,70	4,75	0,38
	WGC-4094-2	○	○	○	○	○	○	WGC-4094-2	2,39	12,70	4,75	0,79
	WGC-4125-1	○	○	○	○	○	●	WGC-4125-1	3,18	12,70	4,75	0,38
	WGC-4125-2	○	○	○	○	○	○	WGC-4125-2	3,18	12,70	4,75	0,79
	WGC-4156-1	○	○	○	○	○	○	WGC-4156-1	3,96	12,70	4,75	0,38
	WGC-4156-2	○	○	○	○	○	○	WGC-4156-2	3,96	12,70	4,75	0,79
	WGC-4187-1	○	○	○	○	○	○	WGC-4187-1	4,75	12,70	4,75	0,38
	WGC-4187-2	○	○	○	○	○	○	WGC-4187-2	4,75	12,70	4,75	0,79
	WGC-6218-1	○	○	○	○	○	○	WGC-6218-1	5,54	19,05	6,35	0,38
	WGC-6218-2	○	○	○	○	○	○	WGC-6218-2	5,54	19,05	6,35	0,79
	WGC-6250-1	○	○	○	○	○	○	WGC-6250-1	6,35	19,05	6,35	0,38
	WGC-6250-2	○	○	○	○	○	○	WGC-6250-2	6,35	19,05	6,35	0,79
	WGC-6250-3	○	○	○	○	○	○	WGC-6250-3	6,35	19,05	6,35	1,17
	WGC-6281-1	○	○	○	○	○	○	WGC-6281-1	7,14	19,05	6,35	0,38
	WGC-6281-2	○	○	○	○	○	○	WGC-6281-2	7,14	19,05	6,35	0,79
	WGC-6281-3	○	○	○	○	○	○	WGC-6281-3	7,14	19,05	6,35	1,17
	WGC-8312-1	○	○	○	○	○	○	WGC-8312-1	7,92	25,40	8,56	0,38
	WGC-8312-2	○	○	○	○	○	○	WGC-8312-2	7,92	25,40	8,56	0,79
	WGC-8312-3	○	○	○	○	○	○	WGC-8312-3	7,92	25,40	8,56	1,17
	WGC-8312-4	○	○	○	○	○	○	WGC-8312-4	7,92	25,40	8,56	1,57
	WGC-8344-1	○	○	○	○	○	○	WGC-8344-1	8,74	25,40	8,56	0,38
	WGC-8344-2	○	○	○	○	○	○	WGC-8344-2	8,74	25,40	8,56	0,79
	WGC-8344-3	○	○	○	○	○	○	WGC-8344-3	8,74	25,40	8,56	1,17
	WGC-8344-4	○	○	○	○	○	○	WGC-8344-4	8,74	25,40	8,56	1,57
	WGC-8375-1	○	○	○	○	○	○	WGC-8375-1	9,53	25,40	8,56	0,38
	WGC-8375-2	○	○	○	○	○	○	WGC-8375-2	9,53	25,40	8,56	0,79
	WGC-8375-3	○	○	○	○	○	○	WGC-8375-3	9,53	25,40	8,56	1,17
	WGC-8375-4	○	○	○	○	○	○	WGC-8375-4	9,53	25,40	8,56	1,57

Ceramic Classification

Whisker Ceramic

Phase Toughened

Silicon Nitride

Alumina TiC

Al₂O₃

WG-300

WG-600

WG-700

XSYTIN-1

GSN100

Al₂O₃-TiC

GEM-7

GEM-19

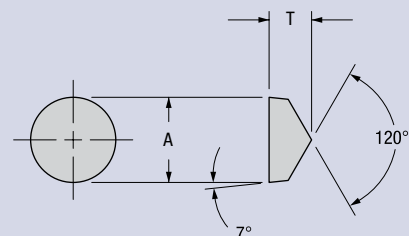
Page GP 04 – grade description

* WGC style inserts come standard with a "T1A" edge prep (0,05–0,10mm x 20° and 0,012–0,025mm hone).



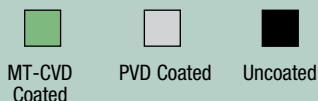
Round: Positive V-Bottom Inserts (RCGX)

Carbide



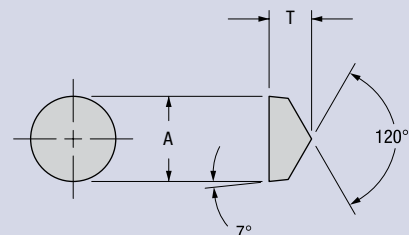
		Steel		Stainless Steel			Cast Iron	High-Temp Alloys											
Shape: Round V-Bottom	Part Number ISO	P15	P25	P25	P35	M15	M15	M15	M20	M35	K15	S			Part Number ANSI	Dimensions (millimeters)			
		GA5025	GA5035	GA5125	GA5036	GA5026	G-925	G-920	GA5023	G-915	GA5023	GA5026	G-925	G-920		G-915	G-20M	A	T
	RCGX-060400	○	○	○	○	○	○	○	○	○	○	○	○	○	RCGN-2V	6,35	4,75		
	RCGX-060600	○	○	○	○	○	○	○	○	○	○	○	○	○	RCGX-102	6,35	6,35		
	RCGX-090700	○	○	○	○	●	●	○	○	○	○	●	●	○	○	●	9,53	7,92	
	RCGX-120700	○	○	○	○	●	●	○	○	○	○	●	●	○	○	●	12,70	7,92	
		GA5025	GA5035	GA5125	GA5036	GA5026	G-925	G-920	GA5023	G-915	GA5023	GA5026	G-925	G-920	G-915	G-20M			
		P15	P25	P25	P35	M15	M15	M15	M20	M35	K15	S							
		Steel				Stainless Steel				Cast Iron	High-Temp Alloys								
Carbide Coatings																			
 MT-CVD Coated		 PVD Coated		 Uncoated															

Carbide Coatings



Round: Positive V-Bottom Inserts (RCGX)

Ceramic



Shape: Round V-Bottom	Part Number ISO	Edge Prep*								Part Number ANSI	Edge Prep*	Dimensions (millimeters)	
			Whisker			Phase Toughened	SiN ₄	Al ₂ O ₃ -TiC	Al ₂ O ₃			A	T
			WG-300	WG-600	WG-700								
	RCGX-060400	T1	●	●	●	●	○	○	RCGN-2V	T1	6,35	4,75	
		T2A	●	○	○	○	○	●		○	T2A	6,35	4,75
	RCGX-090700	T1	●	●	●	●	●	○	RCGN-3V	T1	9,53	7,92	
		T1A	○	○	○	○	○	○		○	T1A	9,53	7,92
	RCGX-120700	T2A	●	○	○	○	○	●	○	T2A	9,53	7,92	
		T1	●	●	●	●	●	○	RCGN-4V	T1	12,70	7,92	
		T1A	●	●	●	○	○	○		○	T1A	12,70	7,92
		T2	●	○	●	○	○	○		○	T2	12,70	7,92
T2A	●	●	●	○	○	○	●	○		T2A	12,70	7,92	

Ceramic Classification

●

Whisker Ceramic

■

Phase Toughened

■

Silicon Nitride

■

Alumina TiC

■

Al₂O₃

WG-300

Whisker

WG-600

WG-700

XSYTIN-1

Phase Toughened

GSN100

SiN₄

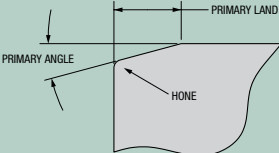
GEM-7

Al₂O₃-TiC

GEM-19

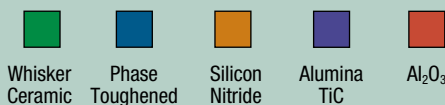
Al₂O₃

Additional Edge Preps

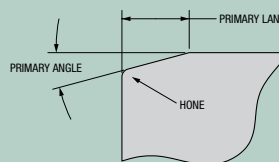


Page GP 04 – grade description

Ceramic Classification



Additional Edge Preps



Page GP 04 – grade description

* If edge prep is not shown, call Greenleaf technical service for assistance.

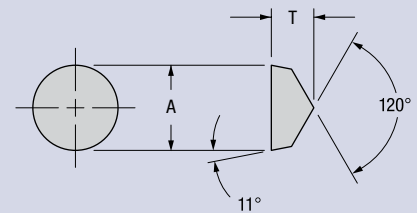
Greenleaf Sales

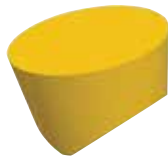
US +814-763-2915 • sales@greenleafcorporation.com
EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
CN +86-731-89954796 • info@greenleafcorporation.com.cn
www.greenleafglobalsupport.com • www.greenleafcorporation.com



Round: Positive V-Bottom Inserts (RPGX)

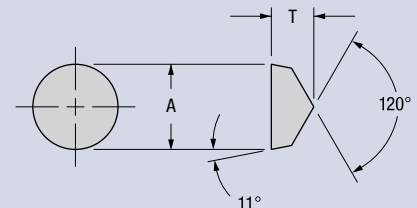
Carbide



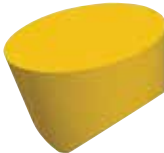
Shape: Round V-Bottom		Part Number ISO	Steel		Stainless Steel				Cast Iron	High-Temp Alloys				Part Number ANSI	Dimensions (millimeters)				
			P15	P25	P25	P35	M15	M15	M15	M20	M35	K15	S						
			GA5025	GA5035	GA5125	GA5036	GA5026	G-925	G-920	GA5023	G-915	GA5023	GA5026				G-925	G-920	G-915
	RPGX-060400	●	○	○	○	●	●	●	○	○	○	●	●	●	○	●	RPGN-2V	6,35	4,75
	RPGX-090700	●	○	○	○	●	●	●	○	○	○	○	●	●	○	○	RPGN-3V	9,53	7,92
	RPGX-120700	○	○	○	○	●	●	●	○	○	○	○	●	●	○	○	RPGN-4V	12,70	7,92
Carbide Coatings MT-CVD Coated PVD Coated Uncoated		GA5025	GA5035	GA5125	GA5036		GA5026	G-925	G-920	GA5023	G-915	GA5023	GA5026	G-925	G-920	G-915	G-20M		
		P15	P25	P25	P35		M15	M15	M15	M20	M35	K15	S						
		Steel					Stainless Steel				Cast Iron	High-Temp Alloys							

Round: Positive V-Bottom Inserts (RPGX)

Ceramic



Shape: Round V-Bottom	Part Number ISO	Edge Prep*	Whisker			Phase Toughened 1	SiN ₄	Al ₂ O ₃ -TiC	Al ₂ O ₃	Part Number ANSI	Edge Prep*	Dimensions (millimeters)					
			WG-300	WG-600	WG-700							XSYTN-1	GSN100	GEM-7	GEM-19	A	T

	RPGX-060400	T1	●	●	●	○	○	○	○	RPGN-2V	T1	6,35	4,75
		T2	○	○	○	○	●	○	○		T2	6,35	4,75
		T2A	●	○	●	○	○	○	○		T2A	6,35	4,75
	RPGX-090700	T1	●	●	●	●	○	○	○	RPGN-3V	T1	9,53	7,92
		T1A	○	○	○	○	●	○	○		T1A	9,53	7,92
		T2	○	○	○	○	●	○	○		T2	9,53	7,92
	RPGX-120700	T1	●	○	●	●	○	○	○	RPGN-4V	T1	12,70	7,92
		T2	○	○	○	○	●	○	○		T2	12,70	7,92

Ceramic Classification

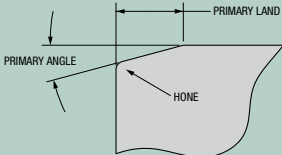
● Whisker Ceramic

■ Phase Toughened

■ Silicon Nitride

■ Alumina TiC

■ Al₂O₃

WG-300	WG-600	WG-700	XSYTN-1	GSN100	GEM-7	GEM-19	Additional Edge Preps	
Whisker			Phase Toughened	SiN ₄	Al ₂ O ₃ -TiC	Al ₂ O ₃		
								

Page GP 04 – grade description

* If edge prep is not shown, call Greenleaf technical service for assistance.

Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com

EU +31-45-404-1774 • eurooffice@greenleafcorporation.com

CN +86-731-89954796 • info@greenleafcorporation.com.cn

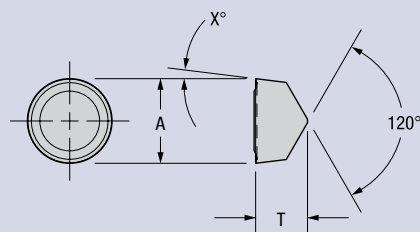
www.greenleafglobalsupport.com • www.greenleafcorporation.com

Not Recommended  Stocked or Available Upon Request  Stocked Standard 



Round Inserts (RCGR-V/RPGX-V)

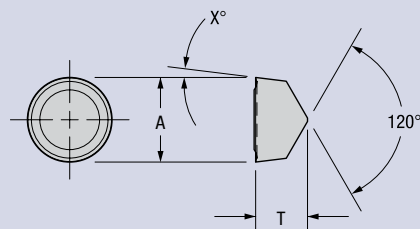
Positive Chipform V-Bottom
Carbide



Shape: Round V-Bottom		Part Number ISO	Steel		Stainless Steel			Cast Iron	High-Temp Alloys					Part Number ANSI	Dimensions (millimeters)						
			P15	P25	P25	P35	M15	M15	M15	M20	M35	K15	S					A	T	X	
			GA5025	GA5035	GA5125	GA5036	GA5026	G-925	G-920	GA5023	G-915	GA5023	GA5026		G-925	G-920	G-915				G-20M
	RCGR-060400V-TF					○	○	○				○	○	○		●	RCGR-2V-TF	6,35	4,75	7°	
	RCGR-090700V-TF					○	○	●				○	○	●		○	RCGR-3V-TF	9,53	7,92	7°	
	RCGR-120700V-TF					○	○	○				○	○	○		○	RCGR-4V-TF	12,70	7,92	7°	
	RPGX-060400V-TF					○	●	○				○	●	○		●	RPGR-2V-TF	6,35	4,75	11°	
	RPGX-090700V-TF					●	●	●				●	●	●		●	RPGR-3V-TF	9,53	7,92	11°	
	RPGX-120700V-TF					●	●	●				●	●	●		○	RPGR-4V-TF	12,70	7,92	11°	
Carbide Coatings		Part Number ANSI	Steel		Stainless Steel			Cast Iron	High-Temp Alloys					A T X							
			P15	P25	P25	P35	M15	M15	M15	M20	M35	K15	S								
			GA5025	GA5035	GA5125	GA5036	GA5026	G-925	G-920	GA5023	G-915	GA5023	GA5026				G-925	G-920	G-915	G-20M	
MT-CVD Coated PVD Coated Uncoated		Steel		Stainless Steel			Cast Iron	High-Temp Alloys													

Round Inserts (RCGR-V/RPGR-V)

Positive Chipform V-Bottom
Ceramic



Shape: Round V-Bottom	Part Number ISO	Edge Prep *	Whisker					Phase Toughened	SiN ₄	Al ₂ O ₃ -TiC	Al ₂ O ₃	Part Number ANSI	Edge Prep *	Dimensions (millimeters)		
			WG-300	WG-600	WG-700	XSYTIN-1	GSN100							A	T	X
	RCGR-060400V-GF1	A	○	○	○	○						RCGR-2V-GF1	A	6,35	4,75	7°
	RCGR-090700V-GF1	A	○	○	○	○						RCGR-3V-GF1	A	9,53	7,92	7°
	RCGR-120700V-GF1	A	●	○	○	○						RCGR-4V-GF1	A	12,70	7,92	7°
	RPGR-060400V-GF1	A	○	○	○	○						RPGR-2V-GF1	A	6,35	4,75	11°
	RPGR-090700V-GF1	A	○	○	○	○						RPGR-3V-GF1	A	9,53	7,92	11°
Ceramic Classification																
			WG-300	WG-600	WG-700	XSYTIN-1	GSN100									
			Whisker					Phase Toughened	SiN ₄	Al ₂ O ₃ -TiC	Al ₂ O ₃					
			Whisker Ceramic		Phase Toughened		Silicon Nitride		Alumina TiC		Al ₂ O ₃					

Page GP 04 – grade description

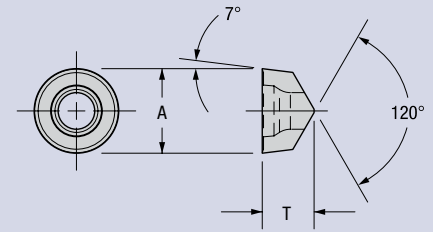
Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
CN +86-731-89954796 • info@greenleafcorporation.com.cn
www.greenleafglobalsupport.com • www.greenleafcorporation.com

● Stocked Standard
○ Stocked or Available Upon Request
□ Not Recommended

Round Inserts (RCGT-V)

Positive Chipform V-Bottom
Carbide



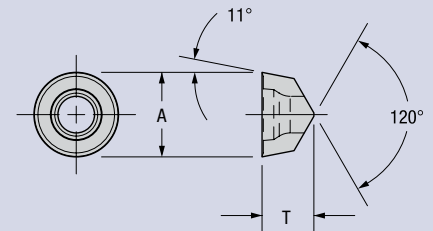
Shape: Round V-Bottom		Part Number ISO	Steel				Stainless Steel				Cast Iron	High-Temp Alloys				Part Number ANSI	Dimensions (millimeters) A I.C. T	
			P15	P25	P25	P35	M15	M15	M15	M20	M35	K15	S					
			GA5025	GA5035	GA5125	GA5036	GA5026	G-925	G-920	GA5023	G-915	GA5023	GA5026	G-925	G-920		G-915	G-20M
	RCGT-060400V-TF					○	○	○			○	○	○	○	●	RCGT-2V-TF	6,35	4,75
	RCGT-090700V-TF					○	●	○			○	●	○	○	○	RCGT-3V-TF	9,53	7,92
	RCGT-120700V-TF					○	●	○			○	●	○	○	●	RCGT-4V-TF	12,70	7,92

Carbide Coatings		
		
MT-CVD Coated	PVD Coated	Uncoated

P15	P25	P25	P35	M15	M15	M15	M20	M35	K15	S				
GA5025	GA5035	GA5125	GA5036	GA5026	G-925	G-920	GA5023	G-915	GA5023	GA5026	G-925	G-920	G-915	G-20M
Steel			Stainless Steel			Cast Iron	High-Temp Alloys							

Round Inserts (RPGT-V)

Positive Chipform V-Bottom
Carbide



Shape: Round V-Bottom		Part Number ISO	Steel		Stainless Steel				Cast Iron	High-Temp Alloys				Part Number ANSI	Dimensions (millimeters)			
			P15	P25	P25	P35	M15	M15	M15	M20	M35	K15	S					
			GA5025	GA5035	GA5125	GA5036	GA5026	G-925	G-920	GA5023	G-915	GA5023	GA5026		G-925	G-920	G-915	G-20M
	RPGT-060400V-TF					○	●	●			○	●	●		○	RPGT-2V-TF	6,35	4,75
	RPGT-090700V-TF					●	○	○			●	○	○		●	RPGT-3V-TF	9,53	7,92
	RPGT-120700V-TF					○	○	○			○	○	○		○	RPGT-4V-TF	12,70	7,92
Carbide Coatings MT-CVD Coated PVD Coated Uncoated		P15	P25	P25	P35	M15	M15	M15	M20	M35	K15	S						
		GA5025	GA5035	GA5125	GA5036	GA5026	G-925	G-920	GA5023	G-915	GA5023	GA5026	G-925	G-920	G-915	G-20M		
		Steel		Stainless Steel				Cast Iron	High-Temp Alloys									

Not Recommended  Stocked or Available Upon Request  Stocked Standard 

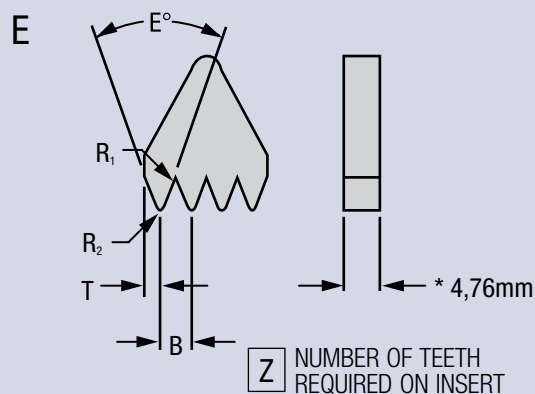
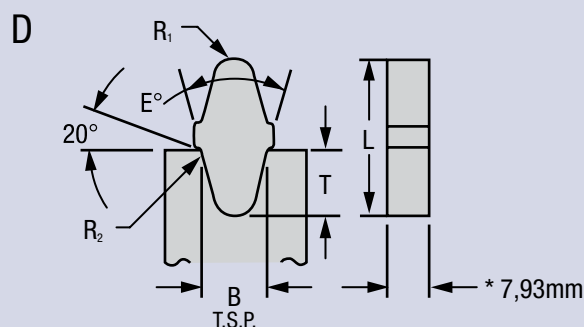
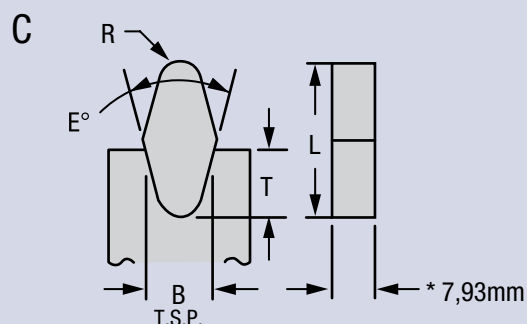
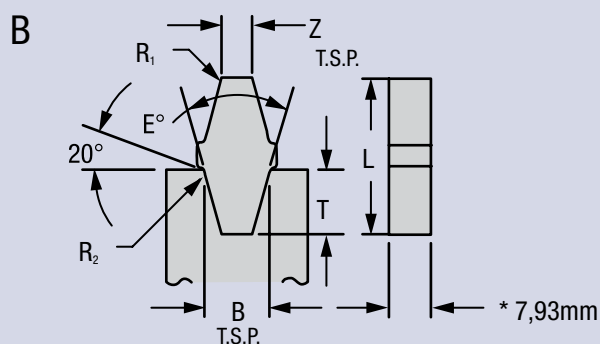
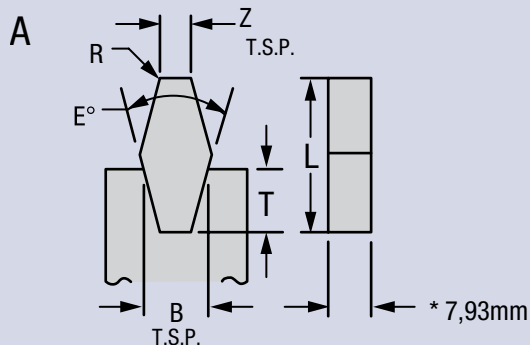
Greenleaf Sales
 US +814-763-2915 • sales@greenleafcorporation.com
 EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
 CN +86-731-89954796 • info@greenleafcorporation.com.cn
 www.greenleafglobalsupport.com • www.greenleafcorporation.com

Pulley and Poly Grooving Inserts

When ordering or requesting quotations, you should provide a part print and a sketch with dimensions as indicated in the following format:

Insert Style	B	E°	L
R ₁	R ₂	T	Z

* Recommended – other specifications available upon request.



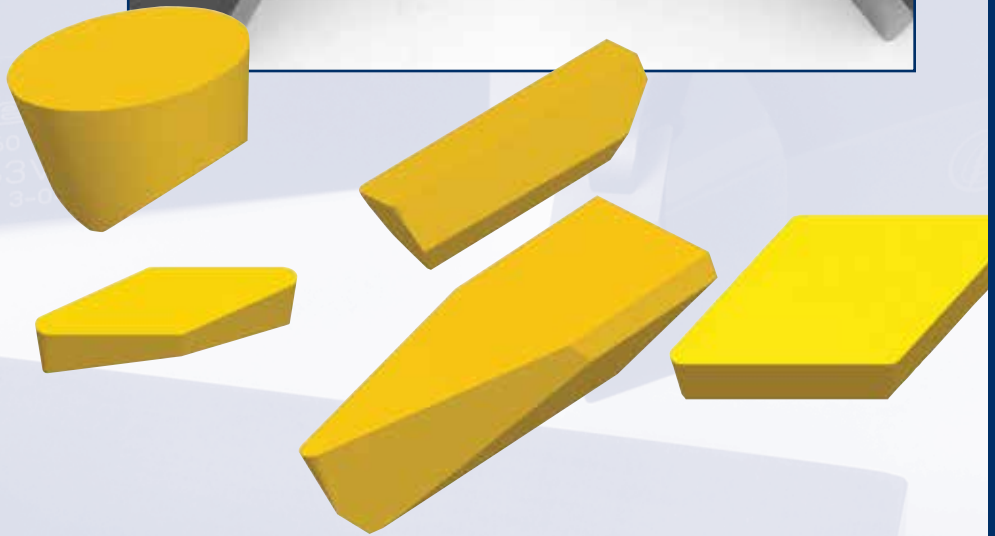
Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
CN +86-731-89954796 • info@greenleafcorporation.com.cn
www.greenleafglobalsupport.com • www.greenleafcorporation.com

Grooving, Profiling and Cut-Off Toolholders and Bars

The Greenleaf Advanced Tooling System for grooving, profiling and cut off provides every specific application with unsurpassed support to ensure the longest tool life and highest material-removal rates with both carbide and ceramic inserts. All of the tools in this system are designed to use Greenleaf carbide or ceramic inserts interchangeably for maximum versatility.

Utilizing 4140 alloyed steel at 42-44 RC, these qualified toolholders are offered in both milled nest and replaceable nest designs to provide further options in your tooling requirements.



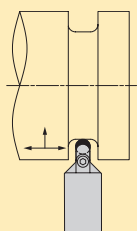
Greenleaf Corporation is continually upgrading its products.
For the most current information, please visit our web site at:

www.greenleafglobalsupport.com

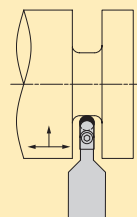
Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
CN +86-731-89954796 • info@greenleafcorporation.com.cn
www.greenleafglobalsupport.com • www.greenleafcorporation.com

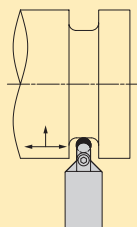
V-Bottom Round Toolholders



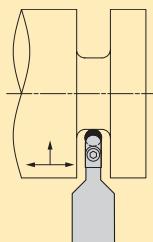
CRDPN-VS
Replaceable Nest
Shallow D.O.C.
page: GP 22



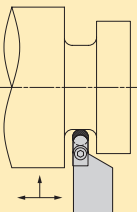
CRDPN-V
Replaceable Nest
Deep D.O.C.
page: GP 22



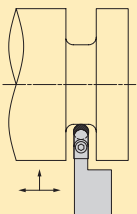
CRDPN-VMS
Milled Nest
Shallow D.O.C.
page: GP 23



CRDPN-VM
Milled Nest
Deep D.O.C.
page: GP 23

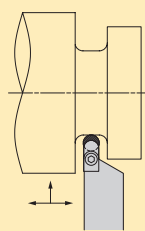


O.D.
Replaceable Nest
Shallow D.O.C.
page: GP 24

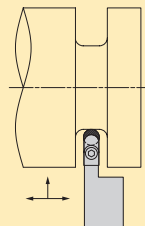


O.D.
Replaceable Nest
Deep D.O.C.
page: GP 24

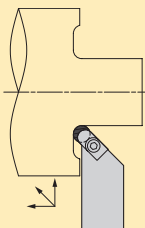
V-Bottom Round Toolholders *continued*



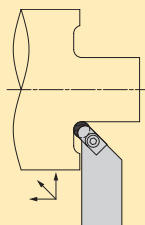
O.D.
Milled Nest
Shallow D.O.C.
page: GP 25



O.D.
Milled Nest
Deep D.O.C.
page: GP 25

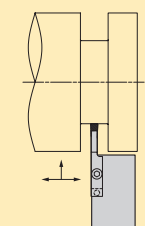


**CRGPR-V
CRGPL-V**
45°
Replaceable Nest
page: GP 26

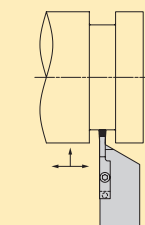


**CRGPR-VM
CRGPL-VM**
45°
Milled Nest
page: GP 26

Single-Ended Groovers

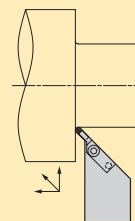


Deep D.O.C.
page: GP 27-28

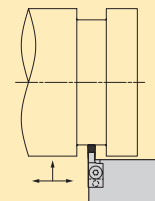


Shallow D.O.C.
page: GP 29-30

Single-Ended Groovers *continued*

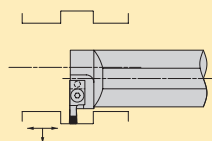


**45° G/P
Toolholder**
page: GP 31

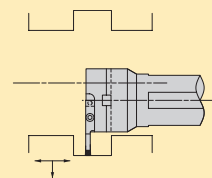


**90° G/P
Toolholder**
page: GP 32-33

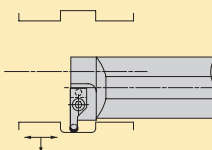
Grooving, Profiling and Cut-Off Bars



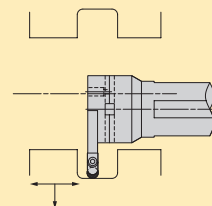
**Cut-Off
Grooving Bar**
page: GP 34



**Cut-Off
Grooving
Support Blade**
For Single-Ended,
V-Bottom Inserts
page: GP 35



Profiling Bar
Round V-Bottom Insert
Milled Nest
page: GP 36

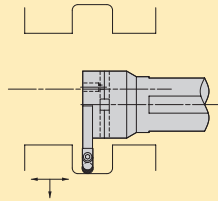


**Profiling
Support Blade**
Round V-Bottom Insert
Milled Nest
page: GP 37

Greenleaf Sales

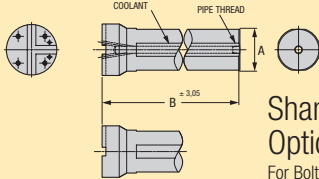
US +814-763-2915 • sales@greenleafcorporation.com
EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
CN +86-731-89954796 • info@greenleafcorporation.com.cn
www.greenleafglobalsupport.com • www.greenleafcorporation.com

Grooving, Profiling and Cut-Off Bars *continued*



Profiling Support Blade

Round V-Bottom Insert
Replaceable Nest
page: GP 37



Shank Options

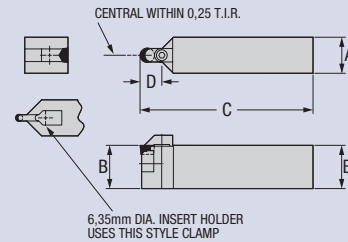
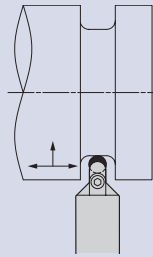
For Bolt-On
Support Blades
page: GP 38

Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
CN +86-731-89954796 • info@greenleafcorporation.com.cn
www.greenleafglobalsupport.com • www.greenleafcorporation.com

CRDPN-VS Toolholder

Round V-Bottom Insert; Replaceable Nest
Shallow D.O.C. (D) Series



Part Number	Gage Insert	Stock	D.O.C.	Dimensions (millimeters)			Standard Components				*Tune-Up Kit Includes All Standard Components
							Nest	Nest Screw	Clamp	Clamp Screw	
CRDPN-2525-06VS	**RPGX-060400	●	10	25	25	150	410631	BHCS M2.5-0.45x10mm	411910-250VRC	434416	TK-02684
CRDPN-3232-06VS		●	10	32	32	170	410631	BHCS M2.5-0.45x10mm	411910-250VRC	434416	TK-02684
CRDPN-4040-06VS		○	10	40	40	200	410631	BHCS M2.5-0.45x10mm	411910-250VRC	434416	TK-02684
CRDPN-2525-09VS	**RPGX-090700	●	15	25	25	150	413970	TBHCS M3-0.5x12mm	308063	TSHCS M5-0.8x12mm	TK-02685
CRDPN-3232-09VS		●	15	32	32	170	413970	TBHCS M3-0.5x12mm	308063	TSHCS M5-0.8x12mm	TK-02685
CRDPN-4040-09VS		○	15	40	40	200	413970	TBHCS M3-0.5x12mm	308063	TSHCS M5-0.8x12mm	TK-02685
CRDPN-2525-12VS	**RPGX-120700	●	20	25	25	150	414007	TBHCS M5-0.8x16mm	308136	434258	TK-02686
CRDPN-3232-12VS		●	20	32	32	170	414007	TBHCS M5-0.8x16mm	308136	434258	TK-02686
CRDPN-4040-12VS		○	20	40	40	200	414007	TBHCS M5-0.8x16mm	308136	434258	TK-02686

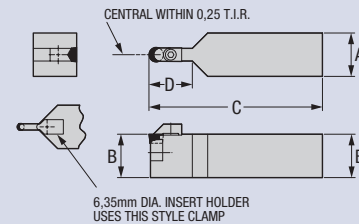
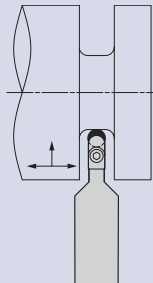
* Tune-Up Kits include one complete set of Standard Components to allow you to refurbish the toolholder.

See page GP 14 for ceramic and carbide inserts.

** RCGX can be used in place of RPGX.

CRDPN-V Toolholder

Round V-Bottom Insert; Replaceable Nest Deep
D.O.C. (D) Series



Part Number	Gage Insert	Stock	D.O.C.	Dimensions (millimeters)			Standard Components				*Tune-Up Kit Includes All Standard Components
							Nest	Nest Screw	Clamp	Clamp Screw	
CRDPN-2525-06V	**RPGX-060400	●	19	25	25	150	410631	BHCS M2.5-0.45x10mm	411910-250VRC	434416	TK-02684
CRDPN-3232-06V		●	19	32	32	170	410631	BHCS M2.5-0.45x10mm	411910-250VRC	434416	TK-02684
CRDPN-4040-06V		○	19	40	40	200	410631	BHCS M2.5-0.45x10mm	411910-250VRC	434416	TK-02684
CRDPN-2525-09V	**RPGX-090700	●	28	25	25	150	413970	TBHCS M3-0.5x12mm	308063	TSHCS M5-0.8x12mm	TK-02685
CRDPN-3232-09V		●	28	32	32	170	413970	TBHCS M3-0.5x12mm	308063	TSHCS M5-0.8x12mm	TK-02685
CRDPN-4040-09V		○	28	40	40	200	413970	TBHCS M3-0.5x12mm	308063	TSHCS M5-0.8x12mm	TK-02685
CRDPN-2525-12V	**RPGX-120700	●	38	25	25	150	414007	TBHCS M5-0.8x16mm	308136	434258	TK-02686
CRDPN-3232-12V		●	38	32	32	170	414007	TBHCS M5-0.8x16mm	308136	434258	TK-02686
CRDPN-4040-12V		○	38	40	40	200	414007	TBHCS M5-0.8x16mm	308136	434258	TK-02686

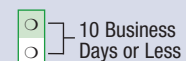
* Tune-Up Kits include one complete set of Standard Components to allow you to refurbish the toolholder.

See page GP 14 for ceramic and carbide inserts.

** RCGX can be used in place of RPGX.

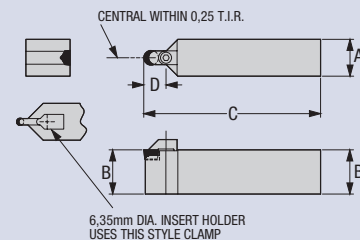
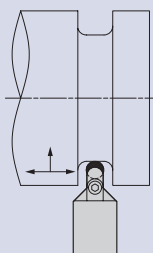
Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
CN +86-731-89954796 • info@greenleafcorporation.com.cn
www.greenleafglobalsupport.com • www.greenleafcorporation.com



CRDPN-VMS Toolholder

Round V-Bottom Insert; Milled Nest
Shallow D.O.C. (D) Series



Part Number	Gage Insert	Stock	D.O.C.	Dimensions (millimeters)			Standard Components		*Tune-Up Kit Includes All Standard Components	Optional Component Insert Screw Key Code
				D	A	B	Clamp	Clamp Screw		
CRDPN-2525-06VMS	**RPGX-060400	●	10	25	25	150	411910-250VRC	434416	TK-02717	PT-542T
CRDPN-3232-06VMS		●	10	32	32	170	411910-250VRC	434416	TK-02717	PT-542T
CRDPN-4040-06VMS		●	10	40	40	200	411910-250VRC	434416	TK-02717	PT-542T
CRDPN-2525-09VMS	**RPGX-090700	●	15	25	25	150	308063	TSHCS M5-0.8x12mm	TK-01709	PT-545T
CRDPN-3232-09VMS		●	15	32	32	170	308063	TSHCS M5-0.8x12mm	TK-01709	PT-545T
CRDPN-4040-09VMS		●	15	40	40	200	308063	TSHCS M5-0.8x12mm	TK-01709	PT-545T
CRDPN-2525-12VMS	**RPGX-120700	●	20	25	25	150	308136	434258	TK-02691	CO-5018
CRDPN-3232-12VMS		●	20	32	32	170	308136	434258	TK-02691	CO-5018
CRDPN-4040-12VMS		●	20	40	40	200	308136	434258	TK-02691	CO-5018

* Tune-Up Kits include one complete set of Standard Components to allow you to refurbish the toolholder.

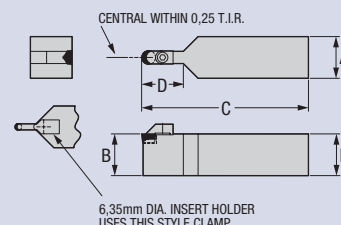
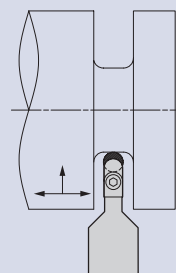
See page GP 14 for ceramic and carbide inserts.

** RCGX can be used in place of RPGX.

NOTE: Use carbide inserts RCGT and RPGT with optional insert screw for finishing.

CRDPN-VM Toolholder

Round V-Bottom Insert; Milled Nest
Deep D.O.C. (D) Series



Part Number	Gage Insert	Stock	D.O.C.	Dimensions (millimeters)			Standard Components		*Tune-Up Kit Includes All Standard Components	Optional Component Insert Screw Key Code
				D	A	B	Clamp	Clamp Screw		
CRDPN-2525-06VM	**RPGX-060400	●	19	25	25	150	411910-250VRC	434416	TK-02717	PT-542T
CRDPN-3232-06VM		●	19	32	32	170	411910-250VRC	434416	TK-02717	PT-542T
CRDPN-4040-06VM		●	19	40	40	200	411910-250VRC	434416	TK-02717	PT-542T
CRDPN-2525-09VM	**RPGX-090700	●	28	25	25	150	308063	TSHCS M5-0.8x12mm	TK-02734	PT-545T
CRDPN-3232-09VM		●	28	32	32	170	308063	TSHCS M5-0.8x12mm	TK-02734	PT-545T
CRDPN-4040-09VM		●	28	40	40	200	308063	TSHCS M5-0.8x12mm	TK-02734	PT-545T
CRDPN-2525-12VM	**RPGX-120700	●	38	25	25	150	308136	434258	TK-02691	CO-5018
CRDPN-3232-12VM		●	38	32	32	170	308136	434258	TK-02691	CO-5018
CRDPN-4040-12VM		●	38	40	40	200	308136	434258	TK-02691	CO-5018

* Tune-Up Kits include one complete set of Standard Components to allow you to refurbish the toolholder.

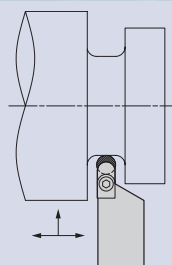
See page GP 14 for ceramic and carbide inserts.

** RCGX can be used in place of RPGX.

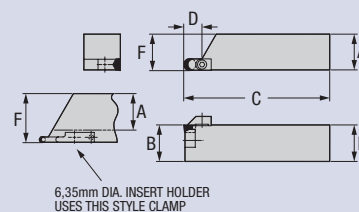
NOTE: Use carbide inserts RCGT and RPGT with optional insert screw for finishing.

O.D. Grooving/Profiling Toolholder

Round V-Bottom Insert; Replaceable Nest
Shallow D.O.C. (D) Series



Right-Hand
Toolholder Shown



Part Number		Gage	Stock		D.O.C.	Dimensions (millimeters)				Standard Components				*Tune-Up Kit Includes All Std. Components
Right	Left	Insert	R	L	D	A	B	C	F	Nest	Nest Screw	Clamp	Clamp Screw	
M-415419-06VRS	-	** RPGX-060400	●		10	25	25	150	38	410631	BHCS M2.5-0.45x10mm	411905-250VRC	434259	TK-02692
-	M-415420-06VRS			●	10	25	25	150	38	410631	BHCS M2.5-0.45x10mm	411906-250VRC	434259	TK-02693
M-415421-06VRS	-		●		10	32	32	170	45	410631	BHCS M2.5-0.45x10mm	411905-250VRC	434259	TK-02692
-	M-415422-06VRS			●	10	32	32	170	45	410631	BHCS M2.5-0.45x10mm	411906-250VRC	434259	TK-02693
M-415423-06VRS	-		●		10	40	40	200	53	410631	BHCS M2.5-0.45x10mm	411905-250VRC	434259	TK-02692
-	M-415424-06VRS			●	10	40	40	200	53	410631	BHCS M2.5-0.45x10mm	411906-250VRC	434259	TK-02693
M-415427-09VRS	M-415428-09VRS	** RPGX-090700	●	●	15	25	25	150	25	413970	TBHCS M3-0.5x12mm	308063	TSHCS M5-0.8x12mm	TK-02685
M-415429-09VRS	M-415430-09VRS		●	●	15	32	32	170	32	413970	TBHCS M3-0.5x12mm	308063	TSHCS M5-0.8x12mm	TK-02685
M-415431-09VRS	M-415432-09VRS		●	●	15	40	40	200	40	413970	TBHCS M3-0.5x12mm	308063	TSHCS M5-0.8x12mm	TK-02685
M-415435-12VRS	M-415436-12VRS	** RPGX-120700	●	●	20	25	25	150	25	414007	TBHCS M5-0.8x16mm	308136	434258	TK-02696
M-415437-12VRS	M-415438-12VRS		●	●	20	32	32	170	32	414007	TBHCS M5-0.8x16mm	308136	434258	TK-02696
M-415439-12VRS	M-415440-		●	●	20	40	40	200	40	414007	TBHCS M5-0.8x16mm	308136	434258	TK-02696

12VRS

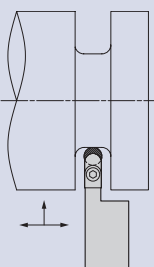
* Tune-Up Kits include one complete set of Standard Components to allow you to refurbish the toolholder.

** RCGX can be used in place of RPGX.

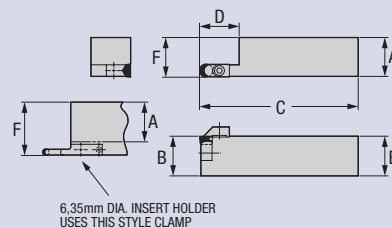
See page GP 14 for ceramic and carbide inserts.

O.D. Grooving/Profiling Toolholder

Round, V-Bottom Insert; Replaceable Nest
Deep D.O.C. (D) Series



Right-Hand
Toolholder Shown



Part Number		Gage	Stock		D.O.C.	Dimensions (millimeters)				Standard Components				*Tune-Up Kit Includes All Std. Components
Right	Left	Insert	R	L	D	A	B	C	F	Nest	Nest Screw	Clamp	Clamp Screw	
M-411149-06VRS	-	** RPGX-060400	●		19	25	25	150	38	410631	BHCS M2.5-0.45x10mm	411905-250VRC	434259	TK-02692
-	M-411150-06VRS			●	19	25	25	150	38	410631	BHCS M2.5-0.45x10mm	411906-250VRC	434259	TK-02693
M-411151-06VRS	-		●		19	32	32	170	45	410631	BHCS M2.5-0.45x10mm	411905-250VRC	434259	TK-02692
-	M-411156-06VRS			●	19	32	32	170	45	410631	BHCS M2.5-0.45x10mm	411906-250VRC	434259	TK-02693
M-411157-06VRS	-		●		19	40	40	200	53	410631	BHCS M2.5-0.45x10mm	411905-250VRC	434259	TK-02692
-	M-411158-06VRS			●	19	40	40	200	53	410631	BHCS M2.5-0.45x10mm	411906-250VRC	434259	TK-02693
M-411157-09VRS	M-411158-09VRS	** RPGX-090700	○	○	29	25	25	150	25	413970	TBHCS M3-0.5x12mm	308063	TSHCS M5-0.8x12mm	TK-02685
M-411159-09VRS	M-411160-09VRS		●	●	29	32	32	170	32	413970	TBHCS M3-0.5x12mm	308063	TSHCS M5-0.8x12mm	TK-02685
M-411161-09VRS	M-411162-09VRS		○	○	29	40	40	200	40	413970	TBHCS M3-0.5x12mm	308063	TSHCS M5-0.8x12mm	TK-02685
M-411165-12VRS	M-411166-12VRS	** RPGX-120700	●	●	38	25	25	150	25	414007	TBHCS M5-0.8x16mm	308136	434258	TK-02686
M-411167-12VRS	M-411168-12VRS		●	●	38	32	32	170	32	414007	TBHCS M5-0.8x16mm	308136	434258	TK-02686
M-411169-12VRS	M-411170-12VRS		○	○	38	40	40	200	40	414007	TBHCS M5-0.8x16mm	308136	434258	TK-02686

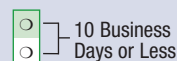
* Tune-Up Kits include one complete set of Standard Components to allow you to refurbish the toolholder.

** RCGX can be used in place of RPGX.

See page GP 14 for ceramic and carbide inserts.

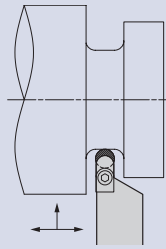
Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
CN +86-731-89954796 • info@greenleafcorporation.com.cn
www.greenleafglobalsupport.com • www.greenleafcorporation.com

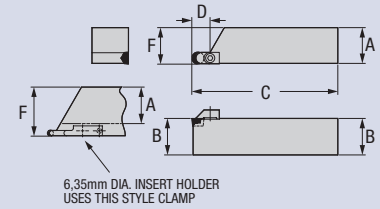


O.D. Grooving/Profiling Toolholder

Round, V-Bottom Insert; Milled Nest
Shallow D.O.C. (D) Series



Right-Hand
Toolholder Shown



Part Number		Gage	Stock		D.O.C.	Dimensions (millimeters)				Standard Components		*Tune-Up Kit Includes All Standard Components	Optional Component
Right	Left	Insert	R	L	D	A	B	C	F	Clamp	Clamp Screw		Insert Screw
M-421450-06VMRS	-	** RPGX-060400	●		10	25	25	150	38	411905-250VRC	434259	TK-02689	PT-542T
-	M-421451-06VMRS			●	10	25	25	150	38	411906-250VRC	434259	TK-02690	PT-542T
M-421452-06VMRS	-		●		10	32	32	170	45	411905-250VRC	434259	TK-02689	PT-542T
-	M-421453-06VMRS			●	10	32	32	170	45	411906-250VRC	434259	TK-02690	PT-542T
M-421454-06VMRS	-		○		10	40	40	200	53	411905-250VRC	434259	TK-02689	PT-542T
-	M-421455-06VMRS			○	10	40	40	200	53	411906-250VRC	434259	TK-02690	PT-542T
M-421458-09VMRS	M-421459-09VMRS	** RPGX-090700	●	●	15	25	25	150	25	308063	TSHCS M5-0.8x12mm	TK-02734	PT-545T
M-421460-09VMRS	M-421461-09VMRS		●	●	15	32	32	170	32	308063	TSHCS M5-0.8x12mm	TK-02734	PT-545T
M-421462-09VMRS	M-421463-09VMRS		○	○	15	40	40	200	40	308063	TSHCS M5-0.8x12mm	TK-02734	PT-545T
M-421466-12VMRS	M-421467-12VMRS	** RPGX-120700	●	●	20	25	25	150	25	308136	434258	TK-02691	CO-5018
M-421468-12VMRS	M-421469-12VMRS		●	●	20	32	32	170	32	308136	434258	TK-02691	CO-5018
M-421470-12VMRS	M-421471-12VMRS		○	○	20	40	40	200	40	308136	434258	TK-02691	CO-5018

* Tune-Up Kits include one complete set of Standard Components to allow you to refurbish the toolholder.

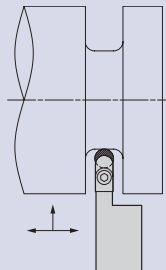
See page GP 14 for ceramic and carbide inserts.

** RCGX can be used in place of RPGX.

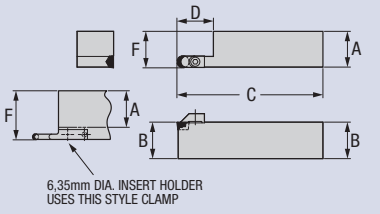
NOTE: Use carbide inserts RCGT and RPGT with optional insert screw for finishing.

O.D. Grooving/Profiling Toolholder

Round, V-Bottom Insert; Milled Nest
Deep D.O.C. (D) Series



Right-Hand
Toolholder Shown



Part Number		Gage	Stock		D.O.C.	Dimensions (millimeters)				Standard Components		*Tune-Up Kit Includes All Standard Components	Optional Component
Right	Left	Insert	R	L	D	A	B	C	F	Clamp	Clamp Screw		Insert Screw
M-421498-06VMRS	-	** RPGX-060400	●		19	25	25	150	38	411905-250VRC	434259	TK-02689	PT-542T
-	M-421499-06VMRS			●	19	25	25	150	38	411906-250VRC	434259	TK-02690	PT-542T
M-421500-06VMRS	-		●		19	32	32	170	45	411905-250VRC	434259	TK-02689	PT-542T
-	M-421501-06VMRS			●	19	32	32	170	45	411906-250VRC	434259	TK-02690	PT-542T
M-421502-06VMRS	-		●		19	40	40	200	53	411905-250VRC	434259	TK-02689	PT-542T
-	M-421503-06VMRS			●	19	40	40	200	53	411906-250VRC	434259	TK-02690	PT-542T
M-421504-09VMRS	M-421505-09VMRS	** RPGX-090700	●	●	29	25	25	150	25	308063	TSHCS M5-0.8x12mm	TK-02734	PT-545T
M-421506-09VMRS	M-421507-09VMRS		●	●	29	32	32	170	32	308063	TSHCS M5-0.8x12mm	TK-02734	PT-545T
M-421508-09VMRS	M-421509-09VMRS		●	●	29	40	40	200	40	308063	TSHCS M5-0.8x12mm	TK-02734	PT-545T
M-421510-12VMRS	M-421511-12VMRS	** RPGX-120700	●	●	38	25	25	150	25	308136	434258	TK-02691	CO-5018
M-421512-12VMRS	M-421513-12VMRS		●	●	38	32	32	170	32	308136	434258	TK-02691	CO-5018
M-421514-12VMRS	M-421515-12VMRS		●	●	38	40	40	200	40	308136	434258	TK-02691	CO-5018

* Tune-Up Kits include one complete set of Standard Components to allow you to refurbish the toolholder.

See page GP 14 for ceramic and carbide inserts.

** RCGX can be used in place of RPGX.

NOTE: Use carbide inserts RCGT and RPGT with optional insert screw for finishing.

Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com

EU +31-45-404-1774 • eurooffice@greenleafcorporation.com

CN +86-731-89954796 • info@greenleafcorporation.com.cn

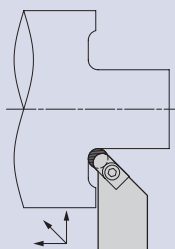
www.greenleafglobalsupport.com • www.greenleafcorporation.com

10 Business Days or Less

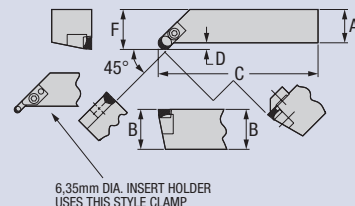
Stocked Standard

CRGPR-V/CRGPL-V

45° Grooving/Profiling Toolholder
Round V-Bottom Insert; Replaceable Nest



Right-Hand
Toolholder Shown



Part Number		Gage	Stock		D.O.C.	Dimensions (millimeters)				Standard Components				*Tune-Up Kit Includes All Std. Components
Right	Left	Insert	R	L	D	A	B	C	F	Nest	Nest Screw	Clamp	Clamp Screw	
CRGPR-2525-06V	-	** RPGX-060400	●		7	25	25	150	32	411108	BHCS M2.5-0.45x10mm	412131-250GC	434258	TK-02687
-	CRGPL-2525-06V			●	7	25	25	150	32	411108	BHCS M2.5-0.45x10mm	412132-250GC	434258	TK-02731
CRGPR-3232-06V	-		●		7	32	32	170	39	411108	BHCS M2.5-0.45x10mm	412131-250GC	434258	TK-02687
-	CRGPL-3232-06V			●	7	32	32	170	39	411108	BHCS M2.5-0.45x10mm	412132-250GC	434258	TK-02731
CRGPR-4040-06V	-		○		7	40	40	200	47	411108	BHCS M2.5-0.45x10mm	412131-250GC	434258	TK-02687
-	CRGPL-4040-06V			○	7	40	40	200	47	411108	BHCS M2.5-0.45x10mm	412132-250GC	434258	TK-02731
CRGPR-2525-09V	CRGPL-2525-09V	** RPGX-090700	●	●	7	25	25	150	32	414009	TBHCS M3-0.5x12mm	308063	TSHCS M5-0.8x12mm	TK-02733
CRGPR-3232-09V	CRGPL-3232-09V		●	●	7	32	32	170	39	414009	TBHCS M3-0.5x12mm	308063	TSHCS M5-0.8x12mm	TK-02733
CRGPR-4040-09V	CRGPL-4040-09V		○	○	7	40	40	200	47	414009	TBHCS M3-0.5x12mm	308063	TSHCS M5-0.8x12mm	TK-02733
CRGPR-2525-12V	CRGPL-2525-12V	** RPGX-120700	●	●	7	25	25	150	32	414008	TBHCS M5-0.8x16mm	308136	434258	TK-02732
CRGPR-3232-12V	CRGPL-3232-12V		●	●	7	32	32	170	39	414008	TBHCS M5-0.8x16mm	308136	434258	TK-02732
CRGPR-4040-12V	CRGPL-4040-12V		○	○	7	40	40	200	47	414008	TBHCS M5-0.8x16mm	308136	434258	TK-02732

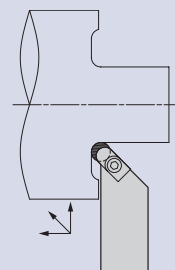
* Tune-Up Kits include one complete set of Standard Components to allow you to refurbish the toolholder.

See page GP 14 for ceramic and carbide inserts.

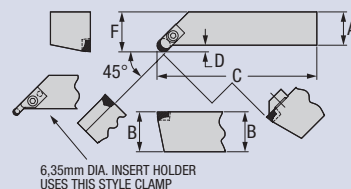
** RCGX can be used in place of RPGX.

CRGPR-VM/CRGPL-VM

45° Grooving/Profiling Toolholder
Round V-Bottom Insert; Milled Nest



Right-Hand
Toolholder Shown



Part Number		Gage	Stock		D.O.C.	Dimensions (millimeters)				Standard Components		*Tune-Up Kit Includes All Standard Components	Optional Component
Right	Left	Insert	R	L	D	A	B	C	F	Clamp	Clamp Screw		Insert Screw
CRGPR-2525-06VM	-	** RPGX-060400	●		7	25	25	150	32	412131-250GC	434259	TK-02745	PT-542T
-	CRGPL-2525-06VM			●	7	25	25	150	32	412132-250GC	434259	TK-02746	PT-542T
CRGPR-3232-06VM	-		●		7	32	32	170	39	412131-250GC	434259	TK-02745	PT-542T
-	CRGPL-3232-06VM			●	7	32	32	170	39	412132-250GC	434259	TK-02746	PT-542T
CRGPR-4040-06VM	-		○		7	40	40	200	47	412131-250GC	434259	TK-02745	PT-542T
-	CRGPL-4040-06VM			○	7	40	40	200	47	412132-250GC	434259	TK-02746	PT-542T
CRGPR-2525-09VM	CRGPL-2525-09VM	** RPGX-090700	●	●	7	25	25	150	32	308063	TSHCS M5-0.8x12mm	TK-02733	PT-545T
CRGPR-3232-09VM	CRGPL-3232-09VM		●	●	7	32	32	170	39	308063	TSHCS M5-0.8x12mm	TK-02733	PT-545T
CRGPR-4040-09VM	CRGPL-4040-09VM		○	○	7	40	40	200	47	308063	TSHCS M5-0.8x12mm	TK-02733	PT-545T
CRGPR-2525-12VM	CRGPL-2525-12VM	** RPGX-120700	●	●	7	25	25	150	32	308136	434258	TK-02691	CO-5018
CRGPR-3232-12VM	CRGPL-3232-12VM		●	●	7	32	32	170	39	308136	434258	TK-02691	CO-5018
CRGPR-4040-12VM	CRGPL-4040-12VM		○	○	7	40	40	200	47	308136	434258	TK-02691	CO-5018

* Tune-Up Kits include one complete set of Standard Components to allow you to refurbish the toolholder.

See page GP 14 for ceramic and carbide inserts.

** RCGN can be used in place of RPGN.

NOTE: Use carbide inserts RCGT and RPGT with optional insert screw for finishing.

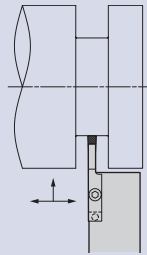
Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
CN +86-731-89954796 • info@greenleafcorporation.com.cn
www.greenleafglobalsupport.com • www.greenleafcorporation.com

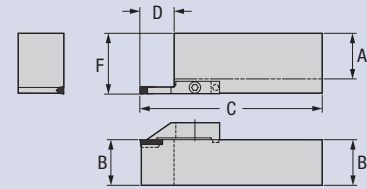


Grooving/Profiling/ Cut-Off Toolholder

Deep D.O.C. Series



Right-Hand
Toolholder Shown



Part Number		Groove Width	Stock		D.O.C.	Dimensions (millimeters)				Standard Components		Tune-Up Kit Includes Standard Clamp and *Clamp Screw	Optional Components	
Right	Left		R	L		A	B	C	F	Insert	Clamp		Insert	Clamp
M-427635-094VGS	-	2.39	●		19	25	25	150	38	WGC-4094	427651-094GC	TK-02626	COS-4094-0	429524-094GC
-	M-427636-094VGS	2.39		●	19	25	25	150	38		427652-094GC	TK-02627		429525-094GC
M-427637-094VGS	-	2.39	●		19	32	32	170	45	WG-4094	427651-094GC	TK-02626	COS-4094-4L	429524-094GC
-	M-427638-094VGS	2.39		●	19	32	32	170	45		427652-094GC	TK-02627		429525-094GC
M-427639-094VGS	-	2.39	○		19	40	40	200	53	WG-4094	427651-094GC	TK-02626	COS-4094-4R	429524-094GC
-	M-427640-094VGS	2.39		○	19	40	40	200	53		427652-094GC	TK-02627		429525-094GC
M-411173-125VGS	-	3.18	●		19	25	25	150	38	WGC-4125	411966-125GC	TK-02628	GTS-4125	429512-125GC
-	M-411961-125VGS	3.18		●	19	25	25	150	38		411967-125GC	TK-02629		429513-125GC
M-411250-125VGS	-	3.18	●		19	32	32	170	45	WG-4125	411966-125GC	TK-02628	COS-4125-0	429512-125GC
-	M-411251-125VGS	3.18		●	19	32	32	170	45		411967-125GC	TK-02629		429513-125GC
M-411962-125VGS	-	3.18	○		19	40	40	200	53	GTS-4125-2	411966-125GC	TK-02628	COS-4125-4R	429512-125GC
-	M-411963-125VGS	3.18		○	19	40	40	200	53		411967-125GC	TK-02629		429513-125GC
M-411964-156VGS	-	3.96	●		19	25	25	150	38	WGC-4156	411968-156GC	TK-02630	GTS-4156	436373-156GC
-	M-411965-156VGS	3.96		●	19	25	25	150	38		411969-156GC	TK-02631		436374-156GC
M-411256-156VGS	-	3.96	●		19	32	32	170	45	WG-4156	411968-156GC	TK-02630	GTS-4156	436373-156GC
-	M-411257-156VGS	3.96		●	19	32	32	170	45		411969-156GC	TK-02631		436374-156GC
M-411258-156VGS	-	3.96	○		19	40	40	200	53	WG-4156	411968-156GC	TK-02630	GTS-4156	436373-156GC
-	M-411259-156VGS	3.96		○	19	40	40	200	53		411969-156GC	TK-02631		436374-156GC
M-411970-187VGS	-	4.75	●		19	25	25	150	38	WGC-4187	411977-187GC	TK-02632	GTS-4187	429518-187GC
-	M-411178-187VGS	4.75		●	19	25	25	150	38		411978-187GC	TK-02633		429519-187GC
M-411262-187VGS	-	4.75	●		19	32	32	170	45	GTS-4187-1	411977-187GC	TK-02632	COS-4187-0	429518-187GC
-	M-411263-187VGS	4.75		●	19	32	32	170	45		411978-187GC	TK-02633		429519-187GC
M-411971-187VGS	-	4.75	○		19	40	40	200	53	GTS-4187-2	411977-187GC	TK-02632	COS-4187-4R	429518-187GC
-	M-411972-187VGS	4.75		○	19	40	40	200	53		411978-187GC	TK-02633		429519-187GC
M-411179-218VGS	-	5.54	●		29	25	25	150	38	WGC-6218	411979-218GC	TK-02634	-	-
-	M-411180-218VGS	5.54		●	29	25	25	150	38		411130-218GC	TK-02635		-
M-411268-218VGS	-	5.54	●		29	32	32	170	45	WG-6218	411979-218GC	TK-02634	-	-
-	M-411269-218VGS	5.54		●	29	32	32	170	45		411130-218GC	TK-02635		-
M-411270-218VGS	-	5.54	○		29	40	40	200	53	WG-6218	411979-218GC	TK-02634	-	-
-	M-411271-218VGS	5.54		○	29	40	40	200	53		411130-218GC	TK-02635		-
M-411973-250VGS	-	6.35	●		29	25	25	150	38	WGC-6250	411980-250GC	TK-02636	-	-
-	M-411974-250VGS	6.35		●	29	25	25	150	38		411981-250GC	TK-02637		-
M-411975-250VGS	-	6.35	●		29	32	32	170	45	GTS-6250	411980-250GC	TK-02636	-	-
-	M-411275-250VGS	6.35		●	29	32	32	170	45		411981-250GC	TK-02637		-
M-411276-250VGS	-	6.35	○		29	40	40	200	53	GTS-6250-1	411980-250GC	TK-02636	-	-
-	M-411277-250VGS	6.35		○	29	40	40	200	53		411981-250GC	TK-02637		-
M-411183-281VGS	-	7.14	●		29	25	25	150	38	WGC-6281	411133-281GC	TK-02638	-	-
-	M-411184-281VGS	7.14		●	29	25	25	150	38		411134-281GC	TK-02648		-
M-411280-281VGS	-	7.14	●		29	32	32	170	45	WG-6281	411133-281GC	TK-02638	-	-
-	M-411281-281VGS	7.14		●	29	32	32	170	45		411134-281GC	TK-02648		-
M-411282-281VGS	-	7.14	○		29	40	40	200	53	WG-6281	411133-281GC	TK-02638	-	-
-	M-411283-281VGS	7.14		○	29	40	40	200	53		411134-281GC	TK-02648		-

GTS is Greenleaf's groove/turn system insert with chip control. Page GP 09.

COS is Greenleaf's cut-off system insert. Page GP 08.

WG is Greenleaf flat-top groover with an 11° nose clearance. Pages GP 10 and GP 11.

WGC is Greenleaf's flat-top groover with a 6° nose clearance. Pages GP 12 and GP 13.

* All toolholders include standard clamp and clamp screw 33-434259-000 (Greenleaf Metric M6-1.0 clamp screw).

Continued on next page.

10 Business Days or Less

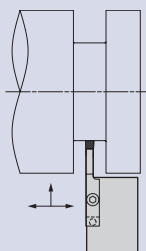
Stocked Standard

Greenleaf Sales
 US +814-763-2915 • sales@greenleafcorporation.com
 EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
 CN +86-731-89954796 • info@greenleafcorporation.com.cn
 www.greenleafglobalsupport.com • www.greenleafcorporation.com

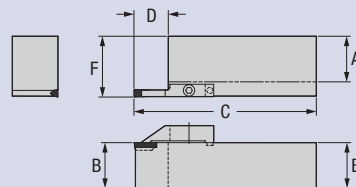


Grooving/Profiling/ Cut-Off Toolholder

Deep D.O.C. Series (Continued)



Right-Hand
Toolholder Shown



Part Number		Groove Width	Stock		D.O.C.	Dimensions (millimeters)				Standard Components		Tune-Up Kit Includes Standard Clamp and *Clamp Screw	Optional Components	
Right	Left		R	L		A	B	C	F	Insert	Clamp		Insert	Clamp
M-411982-312VGS	-	7,92	●		38	25	25	150	38	WGC-8312	411985-312GC	TK-02640	-	-
-	M-411186-312VGS	7,92		●	38	25	25	150	38		411136-312GC	TK-02641	-	-
M-411286-312VGS	-	7,92	●		38	32	32	170	45	WG-8312	411985-312GC	TK-02640	-	-
-	M-411287-312VGS	7,92		●	38	32	32	170	45		411136-312GC	TK-02641	-	-
M-411288-312VGS	-	7,92	○		38	40	40	200	53	WG-8312	411985-312GC	TK-02640	-	-
-	M-411289-312VGS	7,92		○	38	40	40	200	53		411136-312GC	TK-02641	-	-
M-411187-344VGS	-	8,74	●		38	25	25	150	38	WGC-8344	411137-344GC	TK-02642	-	-
-	M-411188-344VGS	8,74		●	38	25	25	150	38		411138-344GC	TK-02643	-	-
M-411292-344VGS	-	8,74	●		38	32	32	170	45	WG-8344	411137-344GC	TK-02642	-	-
-	M-411293-344VGS	8,74		●	38	32	32	170	45		411138-344GC	TK-02643	-	-
M-411294-344VGS	-	8,74	○		38	40	40	200	53	WG-8344	411137-344GC	TK-02642	-	-
-	M-411295-344VGS	8,74		○	38	40	40	200	53		411138-344GC	TK-02643	-	-
M-411189-375VGS	-	9,53	●		38	25	25	150	38	WGC-8375	411986-375GC	TK-02649	-	-
-	M-411190-375VGS	9,53		●	38	25	25	150	38		411987-375GC	TK-02645	-	-
M-411983-375VGS	-	9,53	●		38	32	32	170	45	WG-8375	411986-375GC	TK-02649	-	-
-	M-411984-375VGS	9,53		●	38	32	32	170	45		411987-375GC	TK-02645	-	-
M-411300-375VGS	-	9,53	○		38	40	40	200	53	WG-8375	411986-375GC	TK-02649	-	-
-	M-411301-375VGS	9,53		○	38	40	40	200	53		411987-375GC	TK-02645	-	-

* All toolholders include standard clamp and clamp screw 33-434259-000 (Greenleaf Metric M6-1.0 clamp screw).

GTS is Greenleaf's groove/turn system insert with chip control. Page GP 09.

COS is Greenleaf's cut-off system insert. Page GP 08.

WG is Greenleaf flat-top groover with an 11° nose clearance. Pages GP 10 and GP 11.

WGC is Greenleaf's flat-top groover with a 6° nose clearance. Pages GP 12 and GP 13.

Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com

EU +31-45-404-1774 • eurooffice@greenleafcorporation.com

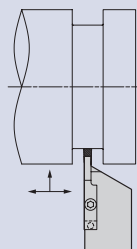
CN +86-731-89954796 • info@greenleafcorporation.com.cn

www.greenleafglobalsupport.com • www.greenleafcorporation.com

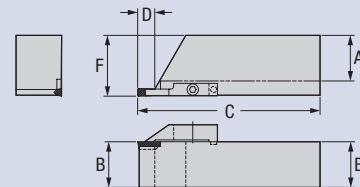


Grooving/Profiling/ Cut-Off Toolholder

Shallow D.O.C. Series



Right-Hand
Toolholder Shown



Part Number		Groove Width	Stock		D.O.C.	Dimensions (millimeters)				Standard Components		Tune-Up Kit Includes Standard Clamp and *Clamp Screw	Optional Components	
Right	Left		R	L		A	B	C	F	Insert	Clamp		Insert	Clamp
M-427641-094VGS	-	2.39	○		10	25	25	150	38	WG-4094	427651-094GC	TK-02626	COS-4094-0	429524-094GC
-	M-427642-094VGS	2.39		○	10	25	25	150	38		427652-094GC	TK-02627		429525-094GC
M-427643-094VGS	-	2.39	○		10	32	32	170	45		427651-094GC	TK-02626		429524-094GC
-	M-427644-094VGS	2.39		○	10	32	32	170	45		427652-094GC	TK-02627		429525-094GC
M-427645-094VGS	-	2.39	○		10	40	40	200	53		427651-094GC	TK-02626		429524-094GC
-	M-427646-094VGS	2.39		○	10	40	40	200	53		427652-094GC	TK-02627	COS-4094-4R	429525-094GC
M-415316-125VGS	-	3.18	○		10	25	25	150	38	GTS-4125-1	411966-125GC	TK-02628	GTS-4125	429512-125GC
-	M-415317-125VGS	3.18		○	10	25	25	150	38		411967-125GC	TK-02629		429513-125GC
M-415318-125VGS	-	3.18	○		10	32	32	170	45	GTS-4125-2	411966-125GC	TK-02628	COS-4125-0	429512-125GC
-	M-415319-125VGS	3.18		○	10	32	32	170	45		411967-125GC	TK-02629		429513-125GC
M-415320-125VGS	-	3.18	○		10	40	40	200	53	WG-4125	411966-125GC	TK-02628	COS-4125-4L	429512-125GC
-	M-415321-125VGS	3.18		○	10	40	40	200	53		411967-125GC	TK-02629		429513-125GC
M-415324-156VGS	-	3.96	○		10	25	25	150	38	WG-4156	411968-156GC	TK-02630	GTS-4156	436373-156GC
-	M-415325-156VGS	3.96		○	10	25	25	150	38		411969-156GC	TK-02631		436374-156GC
M-415326-156VGS	-	3.96	○		10	32	32	170	45	WG-4156	411968-156GC	TK-02630		436373-156GC
-	M-415327-156VGS	3.96		○	10	32	32	170	45		411969-156GC	TK-02631		436374-156GC
M-415328-156VGS	-	3.96	○		10	40	40	200	53		411968-156GC	TK-02630		436373-156GC
-	M-415329-156VGS	3.96		○	10	40	40	200	53		411969-156GC	TK-02631		436374-156GC
M-415332-187VGS	-	4.75	○		10	25	25	150	38	GTS-4187-1	411977-187GC	TK-02632	GTS-4187	429518-187GC
-	M-415333-187VGS	4.75		○	10	25	25	150	38		411978-187GC	TK-02633		429519-187GC
M-415334-187VGS	-	4.75	○		10	32	32	170	45	GTS-4187-2	411977-187GC	TK-02632	COS-4187-0	429518-187GC
-	M-415335-187VGS	4.75		○	10	32	32	170	45		411978-187GC	TK-02633		429519-187GC
M-415336-187VGS	-	4.75	○		10	40	40	200	53	WG-4187	411977-187GC	TK-02632	COS-4187-4L	429518-187GC
-	M-415337-187VGS	4.75		○	10	40	40	200	53		411978-187GC	TK-02633		429519-187GC
M-415340-218VGS	-	5.54	○		15	25	25	150	38	WG-6218	411979-218GC	TK-02634	-	-
-	M-415341-218VGS	5.54		○	15	25	25	150	38		411130-218GC	TK-02635	-	-
M-415342-218VGS	-	5.54	○		15	32	32	170	45	WG-6218	411979-218GC	TK-02634	-	-
-	M-415343-218VGS	5.54		○	15	32	32	170	45		411130-218GC	TK-02635	-	-
M-415344-218VGS	-	5.54	○		15	40	40	200	53		411979-218GC	TK-02634	-	-
-	M-415345-218VGS	5.54		○	15	40	40	200	53		411130-218GC	TK-02635	-	-
M-415348-250VGS	-	6.35	●		15	25	25	150	38	GTS-6250	411980-250GC	TK-02636	-	-
-	M-415349-250VGS	6.35		●	15	25	25	150	38		411981-250GC	TK-02637	-	-
M-415350-250VGS	-	6.35	●		15	32	32	170	45	GTS-6250-1	411980-250GC	TK-02636	-	-
-	M-415351-250VGS	6.35		●	15	32	32	170	45		411981-250GC	TK-02637	-	-
M-415352-250VGS	-	6.35	○		15	40	40	200	53	WG-6250	411980-250GC	TK-02636	-	-
-	M-415353-250VGS	6.35		○	15	40	40	200	53		411981-250GC	TK-02637	-	-
M-415356-281VGS	-	7.14	○		15	25	25	150	38	WG-6281	411133-281GC	TK-02638	-	-
-	M-415357-281VGS	7.14		○	15	25	25	150	38		411134-281GC	TK-02648	-	-
M-415358-281VGS	-	7.14	○		15	32	32	170	45	WG-6281	411133-281GC	TK-02638	-	-
-	M-415359-281VGS	7.14		○	15	32	32	170	45		411134-281GC	TK-02648	-	-
M-415360-281VGS	-	7.14	○		15	40	40	200	53		411133-281GC	TK-02638	-	-
-	M-415361-281VGS	7.14		○	15	40	40	200	53		411134-281GC	TK-02648	-	-

GTS is Greenleaf's groove/turn system insert with chip control. Page GP 09.

COS is Greenleaf's cut-off system insert. Page GP 08.

WG is Greenleaf flat-top groover with an 11° nose clearance. Pages GP 10 and GP 11.

WGC is Greenleaf's flat-top groover with a 6° nose clearance. Pages GP 12 and GP 13.

* All toolholders include standard clamp and clamp screw 33-434259-000 (Greenleaf Metric M6-1.0 clamp screw).

Continued on next page.

10 Business Days or Less

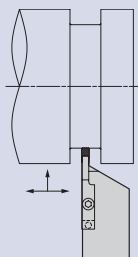
Stocked Standard

Greenleaf Sales
 US +814-763-2915 • sales@greenleafcorporation.com
 EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
 CN +86-731-89954796 • info@greenleafcorporation.com.cn
 www.greenleafglobalsupport.com • www.greenleafcorporation.com

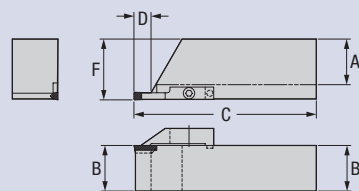


Grooving/Profiling/ Cut-Off Toolholder

Shallow D.O.C. Series (Continued)



Right-Hand
Toolholder Shown



Part Number		Groove Width	Stock		D.O.C.	Dimensions (millimeters)				Standard Components		Tune-Up Kit Includes Standard Clamp and *Clamp Screw	Optional Components	
Right	Left		R	L		A	B	C	F	Insert	Clamp		Insert	Clamp
M-415364-312VGS	-	7,92	●		20	25	25	150	38	WG-8312	411985-312GC	TK-02640	-	-
-	M-415365-312VGS	7,92		●	20	25	25	150	38		411136-312GC	TK-02641	-	-
M-415366-312VGS	-	7,92	●		20	32	32	170	45	WGC-8312	411985-312GC	TK-02640	-	-
-	M-415367-312VGS	7,92		●	20	32	32	170	45		411136-312GC	TK-02641	-	-
M-415368-312VGS	-	7,92	○		20	40	40	200	53	WG-8344	411985-312GC	TK-02640	-	-
-	M-415369-312VGS	7,92		○	20	40	40	200	53		411136-312GC	TK-02641	-	-
M-415372-344VGS	-	8,74	○		20	25	25	150	38	WG-8344	411137-344GC	TK-02642	-	-
-	M-415373-344VGS	8,74		○	20	25	25	150	38		411138-344GC	TK-02643	-	-
M-415374-344VGS	-	8,74	○		20	32	32	170	45	WGC-8344	411137-344GC	TK-02642	-	-
-	M-415375-344VGS	8,74		○	20	32	32	170	45		411138-344GC	TK-02643	-	-
M-415376-344VGS	-	8,74	○		20	40	40	200	53	WG-8375	411137-344GC	TK-02642	-	-
-	M-415377-344VGS	8,74		○	20	40	40	200	53		411138-344GC	TK-02643	-	-
M-415380-375VGS	-	9,53	○		20	25	25	150	38	WG-8375	411986-375GC	TK-02649	-	-
-	M-415381-375VGS	9,53		○	20	25	25	150	38		411987-375GC	TK-02645	-	-
M-415382-375VGS	-	9,53	○		20	32	32	170	45	WG-8375	411986-375GC	TK-02649	-	-
-	M-415383-375VGS	9,53		○	20	32	32	170	45		411987-375GC	TK-02645	-	-
M-415384-375VGS	-	9,53	○		20	40	40	200	53	WG-8375	411986-375GC	TK-02649	-	-
-	M-415385-375VGS	9,53		○	20	40	40	200	53		411987-375GC	TK-02645	-	-

* All toolholders include standard clamp and clamp screw 33-434259-000 (Greenleaf Metric M6-1.0 clamp screw).

GTS is Greenleaf's groove/turn system insert with chip control. Page GP 09.

COS is Greenleaf's cut-off system insert. Page GP 08.

WG is Greenleaf flat-top groover with an 11° nose clearance. Pages GP 10 and GP 11.

WGC is Greenleaf's flat-top groover with a 6° nose clearance. Pages GP 12 and GP 13.

Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com

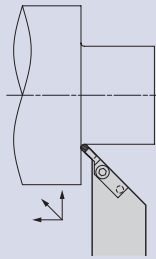
EU +31-45-404-1774 • eurooffice@greenleafcorporation.com

CN +86-731-89954796 • info@greenleafcorporation.com.cn

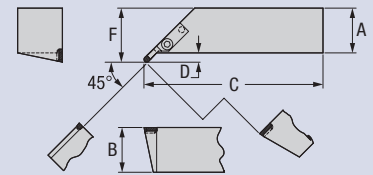
www.greenleafglobalsupport.com • www.greenleafcorporation.com



45° Grooving/Profiling Toolholder



Right-Hand Toolholder Shown



Part Number		Gage	Stock		D.O.C.	Dimensions (millimeters)				Standard Components	Tune-Up Kit Includes Standard Clamp and *Clamp Screw	Optional Components	
Right	Left	Insert	R	L	D	A	B	C	F	Clamp		Insert	Clamp
M-415293-45VGS -	- M-415294-45VGS	GTS-4125-1			8	25	25	150,5	33,43	415305-GC 415306-GC	TK-02655 TK-02656	GTS-4125	429514-GC 429515-GC
		GTS-4125-2			8	25	25	150,3	33,25				
		WG-4125			8	25	25	150,0	32,92				
		WG-4125-1	○		8	25	25	150,5	33,43				
		WG-4125-2		○	8	25	25	150,3	33,25				
		WG-4156			8	25	25	150,1	33,05				
		WG-4156-1			8	25	25	150,6	33,71				
M-415295-45VGS -	- M-415296-45VGS	GTS-4125-1			8	32	32	170,5	40,43	415305-GC 415306-GC	TK-02655 TK-02656	GTS-4125	429514-GC 429515-GC
		GTS-4125-2			8	32	32	170,3	40,26				
		WG-4125			8	32	32	170,0	39,93				
		WG-4125-1	○		8	32	32	170,5	40,43				
		WG-4125-2		○	8	32	32	170,3	40,26				
		WG-4156			8	32	32	170,1	40,05				
		WG-4156-1			8	32	32	170,6	40,71				
M-415297-45VGS -	- M-415298-45VGS	GTS-4125-1			8	40	40	200,5	33,43	415305-GC 415306-GC	TK-02655 TK-02656	GTS-4125	429514-GC 429515-GC
		GTS-4125-2			8	40	40	200,3	33,43				
		WG-4125			8	40	40	200,0	47,93				
		WG-4125-1	○		8	40	40	200,5	48,43				
		WG-4125-2		○	8	40	40	200,3	48,26				
		WG-4156			8	40	40	200,1	48,05				
		WG-4156-1			8	40	40	200,8	33,43				
M-415299-45VGS -	- M-415300-45VGS	GTS-4187-1			8	25	25	150,83	33,76	415307-GC 415308-GC	TK-02657 TK-02658	GTS-4187	429520-GC 429521-GC
		GTS-4187-2	○		8	25	25	150,66	33,59				
		WG-4187		○	8	25	25	150,00	32,92				
		WG-4187-1			8	25	25	150,83	33,76				
		WG-4187-2			8	25	25	150,66	33,58				
M-415301-45VGS -	- M-415302-45VGS	GTS-4187-1			8	32	32	170,83	40,76	415307-GC 415308-GC	TK-02657 TK-02658	GTS-4187	429520-GC 429521-GC
		GTS-4187-2	○		8	32	32	170,66	40,59				
		WG-4187		○	8	32	32	170,0	39,92				
		WG-4187-1			8	32	32	170,83	40,76				
		WG-4187-2			8	32	32	170,66	40,59				
M-415303-45VGS -	- M-415304-45VGS	GTS-4187-1			8	40	40	200,8	48,76	415307-GC 415308-GC	TK-02657 TK-02658	GTS-4187	429520-GC 429521-GC
		GTS-4187-2	○		8	40	40	200,7	49,73				
		WG-4187		○	8	40	40	200,0	47,92				
		WG-4187-1			8	40	40	200,8	48,76				
		WG-4187-2			8	40	40	200,7	48,58				

* All toolholders include standard clamp and clamp screw 33-434259-000 (Greenleaf Metric M6-1.0 clamp screw).

GTS is Greenleaf's groove/turn system insert with chip control. Page GP 09.

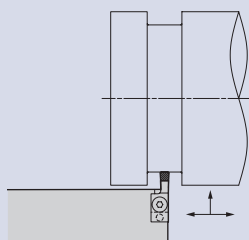
COS is Greenleaf's cut-off system insert. Page GP 08.

WG is Greenleaf flat-top groover with an 11° nose clearance. Pages GP 10 and GP 11.

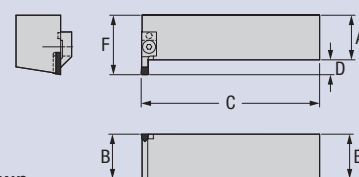
WGC is Greenleaf's flat-top groover with a 6° nose clearance. Pages GP 12 and GP 13.



90° Grooving/Profiling Toolholder



Right-Hand Toolholder Shown



Part Number		Groove Width	Stock		D.O.C.	Dimensions (millimeters)				Standard Components			Optional Components	
Right	Left		R	L		A	B	C	F	Insert	Clamp	Tune-Up Kit Includes Standard Clamp and *Clamp Screw	Insert	Clamp
M-411693-125VGS	-	3,18	○		10	25	25	150	35	GTS-4125-1	411765-125GC	TK-02659	-	429516-125GC
-	M-411694-125VGS	3,18		○	10	25	25	150	35		411766-125GC	TK-02660	GTS-4125	429517-125GC
M-411695-125VGS	-	3,18	○		10	32	32	170	42	GTS-4125-2	411765-125GC	TK-02659	COS-4125-0	429516-125GC
-	M-411696-125VGS	3,18		○	10	32	32	170	42	WG-4125	411766-125GC	TK-02660	COS-4125-4R	429517-125GC
M-411697-125VGS	-	3,18	○		10	40	40	200	50	WGC-4125	411765-125GC	TK-02659	COS-4125-4L	429516-125GC
-	M-411698-125VGS	3,18		○	10	40	40	200	50		411766-125GC	TK-02660	-	429517-125GC
M-411701-156VGS	-	3,96	○		10	25	25	150	35	WG-4156	411767-156GC	TK-02661	-	-
-	M-411702-156VGS	3,96		○	10	25	25	150	35		411768-156GC	TK-02662	-	-
M-411703-156VGS	-	3,96	○		10	32	32	170	42	WGC-4156	411767-156GC	TK-02661	-	-
-	M-411704-156VGS	3,96		○	10	32	32	170	42		411768-156GC	TK-02662	-	-
M-411705-156VGS	-	3,96	○		10	40	40	200	50		411767-156GC	TK-02661	-	-
-	M-411706-156VGS	3,96		○	10	40	40	200	50		411768-156GC	TK-02662	-	-
M-411709-187VGS	-	4,75	○		10	25	25	150	35	GTS-4187-1	411769-187GC	TK-02663	GTS-4187	429522-187GC
-	M-411710-187VGS	4,75		○	10	25	25	150	35		411770-187GC	TK-02664		429523-187GC
M-411711-187VGS	-	4,75	○		10	32	32	170	42	GTS-4187-2	411769-187GC	TK-02663	COS-4187-0	429522-187GC
-	M-411712-187VGS	4,75		○	10	32	32	170	42	WG-4187	411770-187GC	TK-02664	COS-4187-4R	429523-187GC
M-411713-187VGS	-	4,75	○		10	40	40	200	50	WGC-4187	411769-187GC	TK-02663	COS-4187-4L	429522-187GC
-	M-411714-187VGS	4,75		○	10	40	40	200	50		411770-187GC	TK-02664		429523-187GC
M-411717-218VGS	-	5,54	○		13	25	25	150	38	WG-6218	411771-218GC	TK-02665	-	-
-	M-411718-218VGS	5,54		○	13	25	25	150	38		411772-218GC	TK-02666	-	-
M-411719-218VGS	-	5,54	○		13	32	32	170	45	WGC-6218	411771-218GC	TK-02665	-	-
-	M-411720-218VGS	5,54		○	13	32	32	170	45		411772-218GC	TK-02666	-	-
M-411721-218VGS	-	5,54	○		13	40	40	200	53		411771-218GC	TK-02665	-	-
-	M-411722-218VGS	5,54		○	13	40	40	200	53		411772-218GC	TK-02666	-	-
M-411725-250VGS	-	6,35	●		13	25	25	150	38	GTS-6250	411773-250GC	TK-02667	-	-
-	M-411726-250VGS	6,35		●	13	25	25	150	38		411774-250GC	TK-02668	-	-
M-411727-250VGS	-	6,35	●		13	32	32	170	45	GTS-6250-1	411773-250GC	TK-02667	-	-
-	M-411728-250VGS	6,35		●	13	32	32	170	45	GTS-6250-2	411774-250GC	TK-02668	-	-
M-411729-250VGS	-	6,35	○		13	40	40	200	53	WG-6250	411773-250GC	TK-02667	-	-
-	M-411730-250VGS	6,35		○	13	40	40	200	53		411774-250GC	TK-02668	-	-
M-411733-281VGS	-	7,14	○		13	25	25	150	38	WG-6281	411775-281GC	TK-02669	-	-
-	M-411734-281VGS	7,14		○	13	25	25	150	38		411776-281GC	TK-02670	-	-
M-411735-281VGS	-	7,14	○		13	32	32	170	45	WGC-6281	411775-281GC	TK-02669	-	-
-	M-411736-281VGS	7,14		○	13	32	32	170	45		411776-281GC	TK-02670	-	-
M-411737-281VGS	-	7,14	○		13	40	40	200	53		411775-281GC	TK-02669	-	-
-	M-411738-281VGS	7,14		○	13	40	40	200	53		411776-281GC	TK-02670	-	-
M-411743-312VGS	-	7,92	○		16	32	32	170	48	WG-8312	411777-312GC	TK-02671	-	-
-	M-411744-312VGS	7,92		○	16	32	32	170	48		411778-312GC	TK-02672	-	-
M-411745-312VGS	-	7,92	○		16	40	40	200	56	WGC-8312	411777-312GC	TK-02671	-	-
-	M-411746-312VGS	7,92		○	16	40	40	200	56		411778-312GC	TK-02672	-	-

* All toolholders include standard clamp and BHCS clamp screw 31-434416-000.

Continued on next page.

GTS is Greenleaf's groove/turn system insert with chip control. Page GP 09.

COS is Greenleaf's cut-off system insert. Page GP 08.

WG is Greenleaf flat-top groover with an 11° nose clearance. Pages GP 10 and GP 11.

WGC is Greenleaf's flat-top groover with a 6° nose clearance. Pages GP 12 and GP 13.

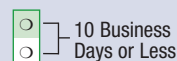
Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com

EU +31-45-404-1774 • eurooffice@greenleafcorporation.com

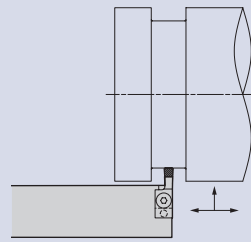
CN +86-731-89954796 • info@greenleafcorporation.com.cn

www.greenleafglobalsupport.com • www.greenleafcorporation.com

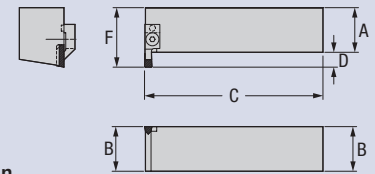


90° Grooving/Profiling Toolholder

(Continued)



Right-Hand
Toolholder Shown



Part Number		Groove Width	Stock		D.O.C.	Dimensions (millimeters)				Standard Components		Tune-Up Kit Includes Standard Clamp and *Clamp Screw	Optional Components	
Right	Left		R	L		A	B	C	F	Insert	Clamp		Insert	Clamp
M-411751-344VGS	-	8,74	○		16	32	32	170	48	WG-8344 WGC-8344	411779-344GC	TK-02673	-	-
-	M-411752-344VGS	8,74		○	16	32	32	170	48		411780-344GC	TK-02674	-	-
M-411753-344VGS	-	8,74	○		16	40	40	200	56		411779-344GC	TK-02673	-	-
-	M-411754-344VGS	8,74		○	16	40	40	200	56		411780-344GC	TK-02674	-	-
M-411759-375VGS	-	9,53	○		16	32	32	170	48	WG-8375 WGC-8375	411781-375GC	TK-02675	-	-
-	M-411760-375VGS	9,53		○	16	32	32	170	48		411782-375GC	TK-02676	-	-
M-411761-375VGS	-	9,53	○		16	40	40	200	56		411781-375GC	TK-02675	-	-
-	M-411762-375VGS	9,53		○	16	40	40	200	56		411782-375GC	TK-02676	-	-

* All toolholders include standard clamp and BHCS clamp screw 31-434416-000.

GTS is Greenleaf's groove/turn system insert with chip control. Page GP 09.

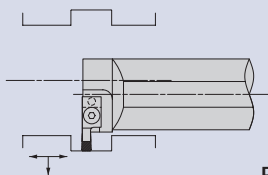
COS is Greenleaf's cut-off system insert. Page GP 08.

WG is Greenleaf flat-top groover with an 11° nose clearance. Pages GP 10 and GP 11.

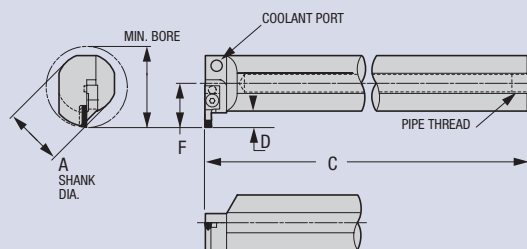
WGC is Greenleaf's flat-top groover with a 6° nose clearance. Pages GP 12 and GP 13.



Cut-Off Grooving Bar



Right-Hand Grooving Bar Shown



Part Number		Groove Width	Stock		D.O.C.		Dimensions (millimeters)			Standard Components		Tune-Up Kit Includes Standard Clamp and *Clamp Screw	Optional Components	
Right	Left		R	L	D	Min. Bore	A	C	F	Insert	Clamp		Insert	Clamp
M-512074-125VGS	-	3,18	○		10	63	50	400	35	GTS-4125-1	411765-125GC	TK-02659	GTS-4125	429516-125GC
-	M-512075-125VGS	3,18		○	10	63	50	400	35	GTS-4125-2	411766-125GC	TK-02660	COS-4125-0	429517-125GC
										WG-4125			COS-4125-4R	
										WGC-4125			COS-4125-4L	
M-512086-156VGS	-	3,96	○		10	63	50	400	35	WG-4156	411767-156GC	TK-02661	-	-
-	M-512087-156VGS	3,96		○	10	63	50	400	35	WGC-4156	411768-156GC	TK-02662	-	-
M-512098-187VGS	-	4,75	○		10	63	50	400	35	GTS-4187-1	411769-187GC	TK-02663	GTS-4187	429522-187GC
-	M-512099-187VGS	4,75		○	10	63	50	400	35	GTS-4187-2	411770-187GC	TK-02664	COS-4187-0	429523-187GC
										WG-4187			COS-4187-4R	
										WGC-4187			COS-4187-4L	
M-512106-218VGS	-	5,54	○		13	70	50	400	38	WG-6218	411771-218GC	TK-02665	-	-
-	M-512107-218VGS	5,54		○	13	70	50	400	38	WGC-6218	411772-218GC	TK-02666	-	-
M-512116-250VGS	-	6,35	●		13	70	50	400	38	GTS-6250	411773-250GC	TK-02667	-	-
-	M-512117-250VGS	6,35		●	13	70	50	400	38	GTS-6250-1	411774-250GC	TK-02668	-	-
										GTS-6250-2				
										WG-6250				
										WGC-6250				
M-512126-281VGS	-	7,14	○		13	70	50	400	38	WG-6281	411775-281GC	TK-02669	-	-
-	M-512127-281VGS	7,14		○	13	70	50	400	38	WGC-6281	411776-281GC	TK-02670	-	-
M-512132-312VGS	-	7,92	○		16	77	50	400	41	WG-8312	411777-312GC	TK-02671	-	-
-	M-512133-312VGS	7,92		○	16	77	50	400	41	WGC-8312	411778-312GC	TK-02672	-	-
M-512138-344VGS	-	8,74	○		16	77	50	400	41	WG-8344	411779-344GC	TK-02673	-	-
-	M-512139-344VGS	8,74		○	16	77	50	400	41	WGC-8344	411780-344GC	TK-02674	-	-
M-512144-375VGS	-	9,53	○		16	77	50	400	41	WG-8375	411781-375GC	TK-02675	-	-
-	M-512145-375VGS	9,53		○	16	77	50	400	41	WGC-8375	411782-375GC	TK-02676	-	-

* All toolholders include standard clamp and BHCS clamp screw 31-434416-000.

GTS is Greenleaf's groove/turn system insert with chip control. Page GP 09.

COS is Greenleaf's cut-off system insert. Page GP 08.

WG is Greenleaf flat-top groover with an 11° nose clearance. Pages GP 10 and GP 11.

WGC is Greenleaf's flat-top groover with a 6° nose clearance. Pages GP 12 and GP 13.

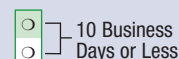
Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com

EU +31-45-404-1774 • eurooffice@greenleafcorporation.com

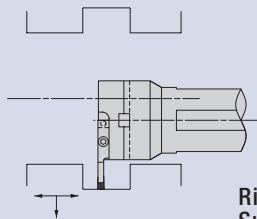
CN +86-731-89954796 • info@greenleafcorporation.com.cn

www.greenleafglobalsupport.com • www.greenleafcorporation.com

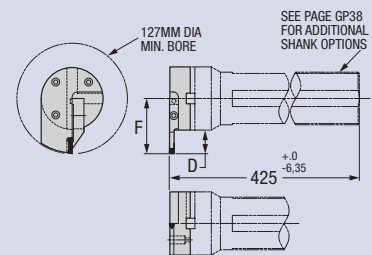


Cut-Off Grooving Support Blade

For Single Ended V-Bottom Inserts



Right-Hand Support Blade Shown



Part Number		Groove Width	Stock		D.O.C.	Dimensions (millimeters)	Standard Components		Tune-Up Kit Includes Standard Clamp and *Clamp Screw	Optional Components	
Right	Left		R	L			Insert	Clamp		Insert	Clamp
M-511309-125VGB	-	3,18	○		19	57,15	GTS-4125-1	411967-125GC	TK-02629	GTS-4125	429513-125GC
-	M-512228-125VGB	3,18		○	19	57,15	GTS-4125-2	411966-125GC	TK-02628	COS-4125-0	429512-125GC
							WG-4125			COS-4125-4R	
							WGC-4125			COS-4125-4L	
M-511311-156VGB	-	3,96	○		19	57,15	WG-4156	411969-156GC	TK-02631	-	-
-	M-511312-156VGB	3,96		○	19	57,15	WGC-4156	411968-156GC	TK-02630	-	-
M-511313-187VGB	-	4,75	○		19	57,15	GTS-4187-1	411978-187GC	TK-02633	GTS-4187	429519-187GC
-	M-511314-187VGB	4,75		○	19	57,15	GTS-4187-2	411977-187GC	TK-02632	COS-4187-0	429518-187GC
							WG-4187			COS-4187-4R	
							WGC-4187			COS-4187-4L	
M-511315-218VGB	-	5,54	○		28,6	66,68	WG-6218	411130-218GC	TK-02635	-	-
-	M-512229-218VGB	5,54		○	28,6	66,68	WGC-6218	411979-218GC	TK-02634	-	-
M-512230-250VGB	-	6,35	○		28,6	66,68	GTS-6250	411981-250GC	TK-02637	-	-
-	M-511318-250VGB	6,35		○	28,6	66,68	GTS-6250-1	411980-250GC	TK-02636	-	-
							GTS-6250-2				
							WG-6250				
							WGC-6250				
M-511319-281VGB	-	7,14	○		28,6	66,68	WG-6281	411134-281GC	TK-02648	-	-
-	M-511320-281VGB	7,14		○	28,6	66,68	WGC-6281	411133-281GC	TK-02638	-	-
M-511321-312-VGB	-	7,92	○		38,1	76,20	WG-8312	411136-312GC	TK-02641	-	-
-	M-511322-312VGB	7,92		○	38,1	76,20	WGC-8312	411985-312GC	TK-02640	-	-
M-511323-344VGB	-	8,74	○		38,1	76,20	WG-8344	411138-344GC	TK-02643	-	-
-	M-511324-344VGB	8,74		○	38,1	76,20	WGC-8344	411137-344GC	TK-02642	-	-
M-511325-375VGB	-	9,53	○		38,1	76,20	WG-8375	411987-375GC	TK-02645	-	-
-	M-511326-375VGB	9,53		○	38,1	76,20	WGC-8375	411986-375GC	TK-02649	-	-

See page GP 38 for additional shank options.

All toolholders include standard clamp and clamp screw 31-434259-000.

GTS is Greenleaf's groove/turn system insert with chip control. Page GP 09.

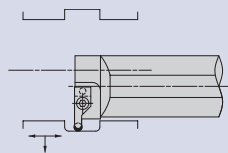
COS is Greenleaf's cut-off system insert. Page GP 08.

WG is Greenleaf flat-top groover with an 11° nose clearance. Pages GP 10 and GP 11.

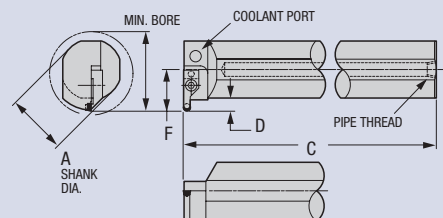
WGC is Greenleaf's flat-top groover with a 6° nose clearance. Pages GP 12 and GP 13.

Profiling Bar

Round V-Bottom Insert
Milled Nest



Right-Hand
Profiling Bar Shown



Part Number		Gage—Option 1		Gage—Option 2		Stock		D.O.C.		Dimensions (millimeters)			Standard Components		*Tune- Up Kit Includes All Std. Components	Optional Component
			Min. Bore		Min. Bore											
Right	Left	Insert		Insert		R	L	D	A	C	F	Clamp	Clamp Screw			
M-519700-06VMRB	—	RPGN-060400	38	RCGN-060400	90	○		10	25	300	22	412131-250GC	434258	TK-02745	PT-542T	
—	M-519701-06VMRB	RPGN-060400	38	RCGN-060400	90		○	10	25	300	22	412132-250GC	434258	TK-02746	PT-542T	
M-519702-06VMRB	—	RPGN-060400	45	RCGN-060400	90	○		10	32	300	25	412131-250GC	434258	TK-02745	PT-542T	
—	M-519703-06VMRB	RPGN-060400	45	RCGN-060400	90		○	10	32	300	25	412132-250GC	434258	TK-02746	PT-542T	
M-519704-06VMRB	—	RPGN-060400	50	RCGN-060400	90	○		10	40	350	28	412131-250GC	434258	TK-02745	PT-542T	
—	M-519705-06VMRB	RPGN-060400	50	RCGN-060400	90		○	10	40	350	28	412132-250GC	434258	TK-02746	PT-542T	
M-519706-06VMRB	—	RPGN-060400	64	RCGN-060400	90	○		10	50	400	35	412131-250GC	434258	TK-02745	PT-542T	
—	M-519707-06VMRB	RPGN-060400	64	RCGN-060400	90		○	10	50	400	35	412132-250GC	434258	TK-02746	PT-542T	
M-519708-09VMRB	M-519709-09VMRB	RPGN-090700	57	RCGN-090700	115	○	○	13	32	300	29	308063	TSHCS M5-0.8x12mm	TK-02734	PT-545T	
M-519710-09VMRB	M-519711-09VMRB	RPGN-090700	64	RCGN-090700	115	●	●	13	40	350	33	308063	TSHCS M5-0.8x12mm	TK-02734	PT-545T	
M-519712-09VMRB	M-519713-09VMRB	RPGN-090700	70	RCGN-090700	115	●	●	13	50	400	38	308063	TSHCS M5-0.8x12mm	TK-02734	PT-545T	
M-519714-12VMRB	M-519715-12VMRB	RPGN-120700	57	RCGN-120700	115	○	○	16	32	300	32	308136	434258	TK-02691	CO-5018	
M-519716-12VMRB	M-519717-12VMRB	RPGN-120700	64	RCGN-120700	115	●	●	16	40	350	35	308136	434258	TK-02691	CO-5018	
M-519718-12VMRB	M-519719-12VMRB	RPGN-120700	70	RCGN-120700	115	●	●	16	50	400	41	308136	434258	TK-02691	CO-5018	

* Tune-Up Kits include one complete set of Standard Components to allow you to refurbish the profiling bar.

See page GP 14 for ceramic and carbide inserts.

NOTE: Use carbide inserts RCGT and RPGT with optional insert screw for finishing.

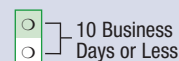
Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com

EU +31-45-404-1774 • eurooffice@greenleafcorporation.com

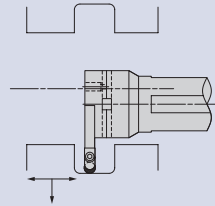
CN +86-731-89954796 • info@greenleafcorporation.com.cn

www.greenleafglobalsupport.com • www.greenleafcorporation.com

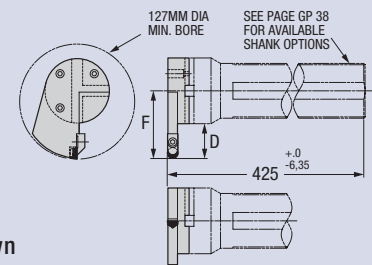


Profiling Support Blade

Round V-Bottom Insert
Milled Nest



Right-Hand
Profiling Bar Shown



Part Number		Gage	Stock		D.O.C.		Standard Components		*Tune-Up Kit Includes All Standard Components	Optional Component
Right	Left	Insert	R	L	D	F	Clamp	Clamp Screw		
M-519740-06VMB	-	** RPN-060400	○		19,05	60,33	411906-250VRC	434259	TK-02690	PT-542T
-	M-519741-06VMB	** RPN-060400		○	19,05	60,33	411905-250VRC	434259	TK-02689	PT-542T
M-519742-09VMB	-	** RPN-090700	○		28,60	69,85	308063	TSHCS M5-0.8x16mm	TK-01709	PT-545T
-	M-519743-09VMB	** RPN-090700		○	28,60	69,85	308063	TSHCS M5-0.8x16mm	TK-01709	PT-545T
M-519744-12VMB	-	** RPN-120700	○		38,10	79,38	308136	434258	TK-02691	CO-5018
-	M-519745-12VMB	** RPN-120700		○	38,10	79,38	308136	434258	TK-02691	CO-5018

* Tune-Up Kits include one complete set of Standard Components to allow you to refurbish the support blade.

See page GP 14 for ceramic and carbide inserts.

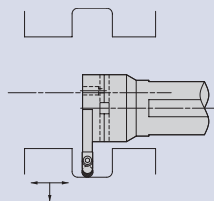
** RGN can be used in place of RPN.

See page GP 38 for available shank options.

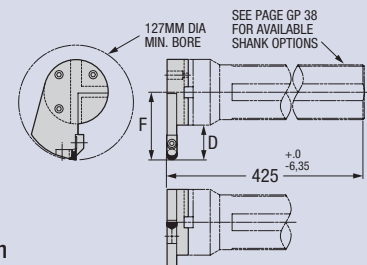
NOTE: Use carbide inserts RGN and RPT with optional insert screw for finishing.

Profiling Support Blade

Round V-Bottom Insert
Replaceable Nest



Right-Hand
Profiling Bar Shown



Part Number		Gage	Stock		D.O.C.		Standard Components		*Tune-Up Kit Includes All Standard Components
Right	Left	Insert	R	L	D	F	Nest	Nest Screw	
M-512227-06VRB	-	** RPN-060400	○		19,05	60,33	411108	BHCS M2.5-0.45x10mm	TK-02739
-	M-511287-06VRB	** RPN-060400		○	19,05	60,33	411108	BHCS M2.5-0.45x10mm	TK-02740
M-511288-09VRB	-	** RPN-090700	○		38,10	69,85	414009	TBHS M3-0.5x12mm	TK-02741
-	M-511289-09VRB	** RPN-090700		○	38,10	69,85	414009	TBHS M3-0.5x12mm	TK-02741
M-511290-12VRB	-	** RPN-120700	○		38,10	79,38	414008	TBHS M5-0.8x16mm	TK-02732
-	M-511291-12VRB	** RPN-120700		○	38,10	79,38	414008	TBHS M5-0.8x16mm	TK-02732

* Tune-Up Kits include one complete set of Standard Components to allow you to refurbish the support blade.

See page GP 14 for ceramic and carbide inserts.

** RGN can be used in place of RPN.

See page GP 38 for available shank options.

10 Business Days or Less

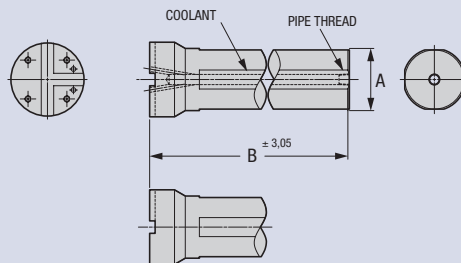
Stocked Standard

Greenleaf Sales
 US +814-763-2915 • sales@greenleafcorporation.com
 EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
 CN +86-731-89954796 • info@greenleafcorporation.com.cn
 www.greenleafglobalsupport.com • www.greenleafcorporation.com

Shank Options

For Bolt-On Support Blades

Part Number		Dimensions (millimeters)	
Shank No.	Stock	A	B
M-529756	○	50	400
M-529757	○	60	400
M-529758	○	72	400



Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
CN +86-731-89954796 • info@greenleafcorporation.com.cn
www.greenleafglobalsupport.com • www.greenleafcorporation.com

 Stocked Standard

 10 Business Days or Less

Grooving, Profiling and Cut-Off Support Blades

The Greenleaf Advanced Tooling System for grooving, profiling and cut off is further expanded to a support blade system that couples qualified shanks and qualified support blades to increase the application range of each toolholder or bar. Each Greenleaf tool has the option to utilize 252 support blade combinations of cut-off, V-bottom round profilers, and grooving inserts to meet your cut-off, grooving, profiling and face-grooving application needs.

Quick-change shanks such as CAPTO or KM, as well as straight shank holders and bars, are all part of this tooling system. Call Greenleaf to design your unique right- or left-hand support blade.

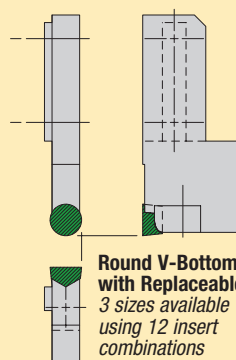


Greenleaf Corporation is continually upgrading its products.
For the most current information, please visit our web site at:

www.greenleafglobalsupport.com

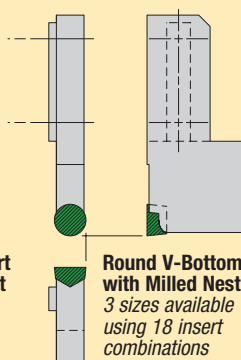
Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
CN +86-731-89954796 • info@greenleafcorporation.com.cn
www.greenleafglobalsupport.com • www.greenleafcorporation.com



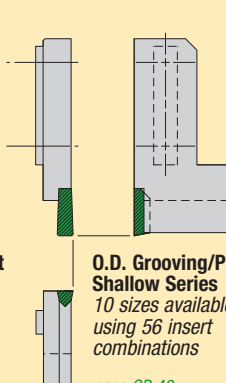
Round V-Bottom Insert with Replaceable Nest
3 sizes available
using 12 insert combinations

page GP 42



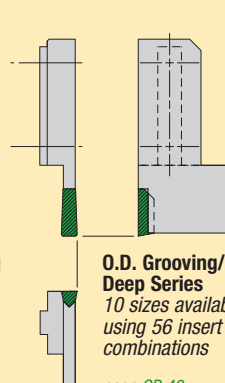
Round V-Bottom Insert with Milled Nest
3 sizes available
using 18 insert combinations

page GP 42



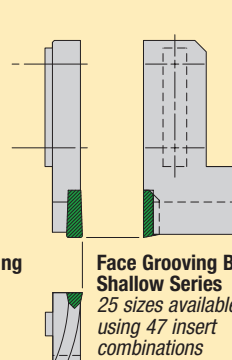
O.D. Grooving/Profiling Shallow Series
10 sizes available
using 56 insert combinations

page GP 43



O.D. Grooving/Profiling Deep Series
10 sizes available
using 56 insert combinations

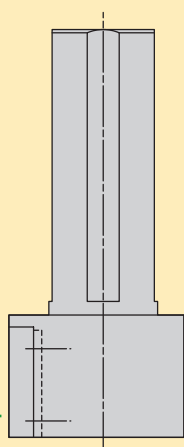
page GP 43



Face Grooving B Shallow Series
25 sizes available
using 47 insert combinations

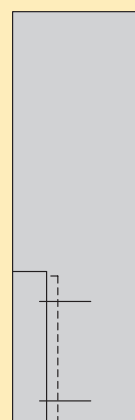
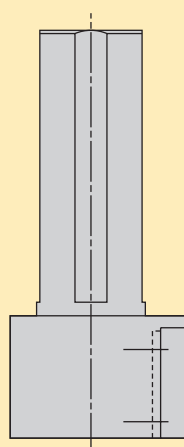
page GP 46

RIGHT HAND



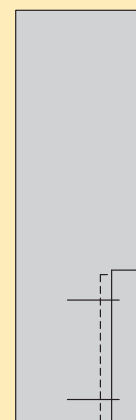
Round Shanks
6 sizes available

page GP 52

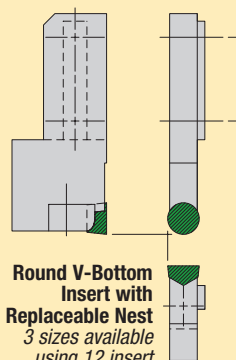


Straight Shanks
6 sizes available

page GP 52

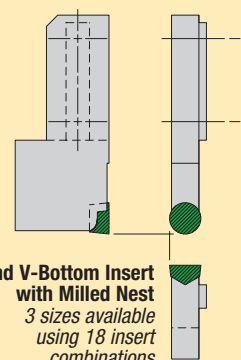


LEFT HAND



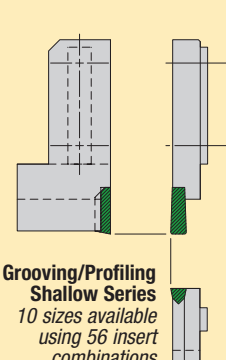
Round V-Bottom Insert with Replaceable Nest
3 sizes available
using 12 insert combinations

page GP 42



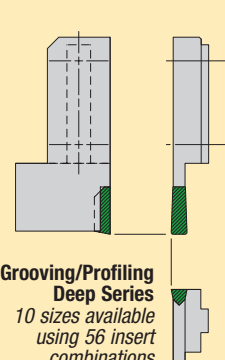
Round V-Bottom Insert with Milled Nest
3 sizes available
using 18 insert combinations

page GP 42



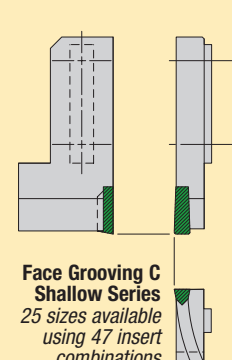
O.D. Grooving/Profiling Shallow Series
10 sizes available
using 56 insert combinations

page GP 44



O.D. Grooving/Profiling Deep Series
10 sizes available
using 56 insert combinations

page GP 44

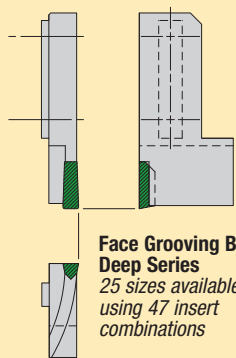


Face Grooving C Shallow Series
25 sizes available
using 47 insert combinations

page GP 47

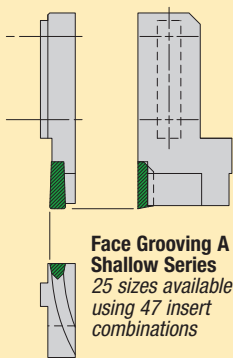
Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
CN +86-731-89954796 • info@greenleafcorporation.com.cn
www.greenleafglobalsupport.com • www.greenleafcorporation.com



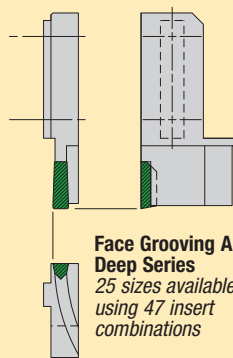
Face Grooving B Deep Series
25 sizes available
using 47 insert combinations

page GP 46



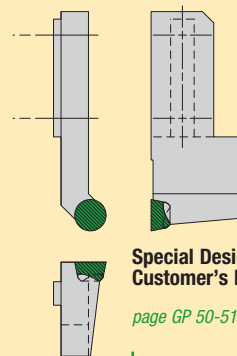
Face Grooving A Shallow Series
25 sizes available
using 47 insert combinations

page GP 45



Face Grooving A Deep Series
25 sizes available
using 47 insert combinations

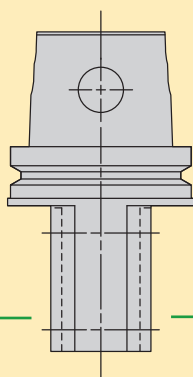
page GP 45



Special Designs to Fit Customer's Parts

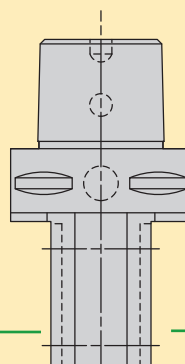
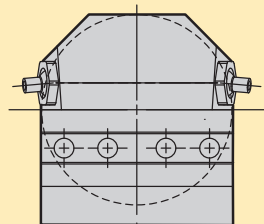
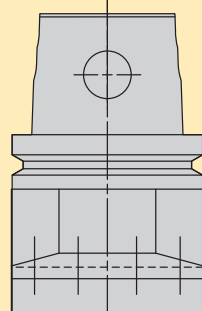
page GP 50-51

RIGHT HAND



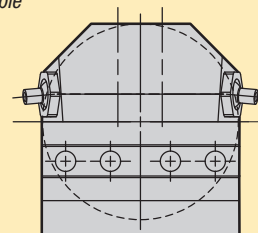
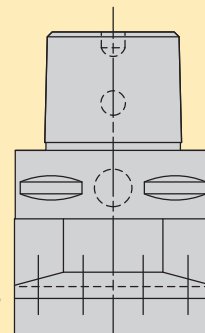
KM Tool Shanks
4 sizes available

page GP 53

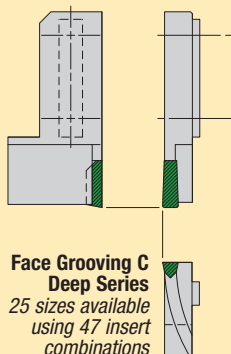


Capto Tool Shanks
4 sizes available

page GP 54

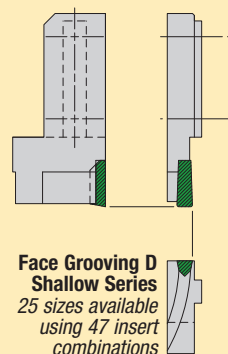


LEFT HAND



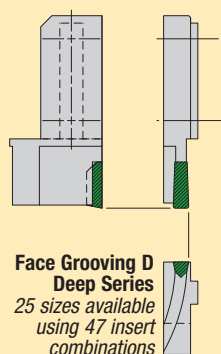
Face Grooving C Deep Series
25 sizes available
using 47 insert combinations

page GP 47



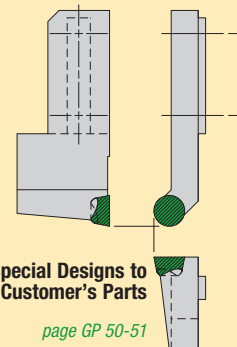
Face Grooving D Shallow Series
25 sizes available
using 47 insert combinations

page GP 48



Face Grooving D Deep Series
25 sizes available
using 47 insert combinations

page GP 48



Special Designs to Fit Customer's Parts

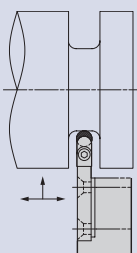
page GP 50-51

Greenleaf Sales

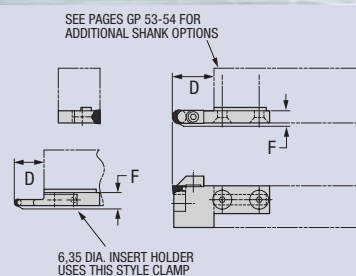
US +814-763-2915 • sales@greenleafcorporation.com
EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
CN +86-731-89954796 • info@greenleafcorporation.com.cn
www.greenleafglobalsupport.com • www.greenleafcorporation.com

O.D. Grooving/Profiling Support Blade

Round V-Bottom Insert
Replaceable Nest



Right-Hand
Support Blade Shown



Part Number			Stock		D.O.C.	Dimensions (millimeters)	Standard Components					*Tune-Up Kit Includes All Std. Components
												
Right	Left	Insert	R	L	D	F	Nest	Nest Screw	Clamp	Clamp Screw		
M-411959-06VR	—	** RPGN-060400	●		19,05	11,91	410631	BHCS M2.5-0.45x10mm	411905-250VRC	434259	TK-02692	
—	M-411960-06VR	** RPGN-060400		●	19,05	11,91	410631	BHCS M2.5-0.45x10mm	411906-250VRC	434259	TK-02693	
M-411011-09VR	M-411012-09VR	** RPGN-090700	●	●	28,60	11,91	413970	TBHCS M3-0.5x12mm	308063	TSHCS M5-0.8x12mm	TK-02685	
M-411009-12VR	M-411010-12VR	** RPGN-120700	●	●	38,10	11,91	414007	TBHCS M5-0.8x16mm	308136	434258	TK-02686	

* Tune-Up Kits include one complete set of Standard Components to allow you to refurbish the support blade.

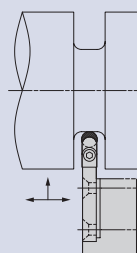
See page GP 14 for ceramic and carbide inserts.

** RCGN can be used in place of RPGN.

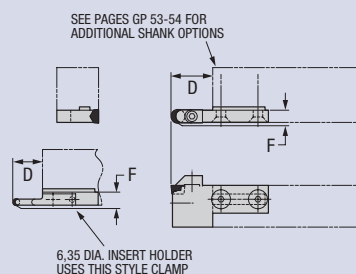
See pages GP 53-54 for additional shank options.

O.D. Grooving/Profiling Support Blade

Round V-Bottom Insert
Milled Nest



Right-Hand
Support Blade Shown



Part Number		Gage	Stock		D.O.C.	Dimensions (millimeters)		Standard Components		*Tune-Up Kit Includes All Standard Components	Optional Component
Right	Left	Insert	R	L	D	F	Clamp	Clamp Screw	Insert Screw		
M-421534-06VMR	-	** RPGN-060400	●		19,05	11,91	411905-250VRC	434259	TK-02689	PT-542T	
-	M-421535-06VMR	** RPGN-060400		●	19,05	11,91	411906-250VRC	434259	TK-02690	PT-542T	
M-421536-09VMR	M-421537-09VMR	** RPGN-090700	●	●	28,60	11,91	308063	TSHCS M5-0.8x12mm	TK-02734	PT-545T	
M-421538-12VMR	M-421539-12VMR	** RPGN-120700	●	●	38,10	11,91	308136	434258	TK-02691	CO-5018	

* Tune-Up Kits include one complete set of Standard Components to allow you to refurbish the support blade.

See page GP 14 for ceramic and carbide inserts.

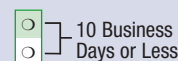
** RCGN can be used in place of RPGN.

See pages GP 53-54 for additional shank options.

NOTE: Use carbide inserts RCGT and RPGT with optional insert screw for finishing.

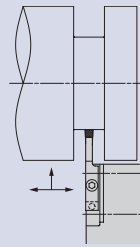
Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
CN +86-731-89954796 • info@greenleafcorporation.com.cn
www.greenleafglobalsupport.com • www.greenleafcorporation.com

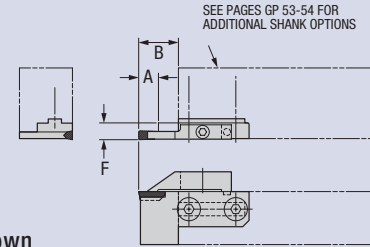


O.D. Grooving/Profiling/ Cut-Off Support Blade

Right Hand



Right-Hand
Support Blade Shown



Part Number		Groove Width	Stock		Dimensions (millimeters)			Standard Components		*Tune-Up Kit Includes Standard Clamp and *Clamp Screw	Optional Components	
Shallow Series	Deep Series		Shallow	Deep	A	B	F	Insert	Clamp		Insert	Clamp
M-427647-094VG		2,39	○		9,6	—	11,91	WG-4094	427651-094GC	TK-02626	COS-4094-0	429524-094GC
	M-427648-094VG			○	—	19	11,91	WGC-4094	427651-094GC	TK-02626	COS-4094-4L	429524-094GC
											COS-4094-4R	
M-421109-125VG		3,18	●		9,6	—	11,91	GTS-4125-1	411966-125GC	TK-02628	GTS-4125	429512-125GC
	M-411988-125VG			●	—	19	11,91	GTS-4125-2	411966-125GC	TK-02628	COS-4125-0	429512-125GC
								WG-4125			COS-4125-4R	
								WGC-4125			COS-4125-4L	
M-421110-156VG		3,96	○		9,6	—	11,91	WG-4156	411968-156GC	TK-02630		
	M-411066-156VG			○	—	19	11,91	WGC-4156	411968-156GC	TK-02630	—	—
M-421111-187VG		4,75	○		9,6	—	11,91	GTS-4187-1	411977-187GC	TK-02632	GTS-4187	429518-187GC
	M-411068-187VG			○	—	19	11,91	GTS-4187-2	411977-187GC	TK-02632	COS-4187-0	429518-187GC
								WG-4187			COS-4187-4R	
								WGC-4187			COS-4187-4L	
M-421112-218VG		5,54	○		14,2	—	11,91	WG-6218	411979-218GC	TK-02634		
	M-411081-218VG			○	—	28,7	11,91	WGC-6218	411979-218GC	TK-02634	—	—
M-421113-250VG		6,35	●		14,2	—	11,91	WG-6250	411980-250GC	TK-02636		
	M-411992-250VG			●	—	28,7	11,91	WGC-6250	411980-250GC	TK-02636	—	—
								GTS-6250				
								GTS-6250-1				
								GTS-6250-2				
M-421114-281VG		7,14	○		14,2	—	11,91	WG-6281	411133-281GC	TK-02638		
	M-411085-281VG			○	—	28,7	11,91	WGC-6281	411133-281GC	TK-02638	—	—
M-421115-312VG		7,92	●		19	—	11,91	WG-8312	411985-312GC	TK-02640		
	M-411087-312VG			●	—	38,1	11,91	WGC-8312	411985-312GC	TK-02640	—	—
M-421116-344VG		8,74	○		19	—	11,91	WG-8344	411137-344GC	TK-02642		
	M-411089-344VG			○	—	38,1	11,91	WGC-8344	411137-344GC	TK-02642	—	—
M-421117-375VG		9,53	○		19	—	11,91	WG-8375	411986-375GC	TK-02649		
	M-411994-375VG			○	—	38,1	11,91	WGC-8375	411986-375GC	TK-02649	—	—

* Tune-Up Kits include one complete set of Standard Components to allow you to refurbish the support blade.

All support blades include standard clamp and clamp screw 31-434259-000.

GTS is Greenleaf's groove/turn system insert with chip control. Page GP 09.

COS is Greenleaf's cut-off system insert. Page GP 08.

WG is Greenleaf flat-top groover with an 11° nose clearance. Pages GP 10 and GP 11.

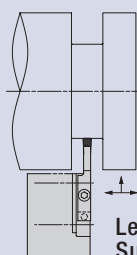
WGC is Greenleaf's flat-top groover with a 6° nose clearance. Pages GP 12 and GP 13.

See pages GP 53-54 for additional shank options.

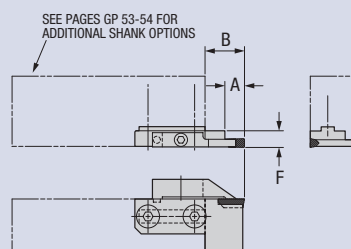


O.D. Grooving/Profiling/ Cut-Off Support Blade

Left Hand



Left-Hand
Support Blade Shown



Part Number		Groove Width	Stock		Dimensions (millimeters)			Standard Components		*Tune-Up Kit Includes Standard Clamp and *Clamp Screw	Optional Components	
Shallow Series	Deep Series		Shallow	Deep	A	B	F	Insert	Clamp		Insert	Clamp
M-427649-094VG			○		9,6	–	11,91	WG-4094	427652-094GC	TK-02627	COS-4094-0	429525-094GC
	M-427650-094VG	2,39		○	–	19,05	11,91	WGC-4094	427652-094GC	TK-02627	COS-4094-4L	429525-094GC
											COS-4094-4R	
M-421100-125VG			●		9,6	–	11,91	GTS-4125-1	411967-125GC	TK-02629	GTS-4125	429513-125GC
	M-411989-125VG	3,18		●	–	19,05	11,91	GTS-4125-2	411967-125GC	TK-02629	COS-4125-0	429513-125GC
								WG-4125			COS-4125-4R	
								WGC-4125			COS-4125-4L	
M-421101-156VG			○		9,6	–	11,91	WG-4156	411969-156GC	TK-02631		
	M-411990-156VG	3,96		○	–	19,05	11,91	WGC-4156	411969-156GC	TK-02631	–	–
M-421102-187VG			○		9,6	–	11,91	GTS-4187-1	411978-187GC	TK-02633	GTS-4187	429519-187GC
	M-411991-187VG	4,75		○	–	19,05	11,91	GTS-4187-2	411978-187GC	TK-02633	COS-4187-0	429519-187GC
								WG-4187			COS-4187-4R	
								WGC-4187			COS-4187-4L	
M-421103-218VG			○		14,2	–	11,91	WG-6218	411130-218GC	TK-02635		
	M-411082-218VG	5,54		○	–	28,7	11,91	WGC-6218	411130-218GC	TK-02635	–	–
M-421104-250VG			●		14,2	–	11,91	WG-6250	411981-250GC	TK-02637		
	M-411993-250VG	6,35		●	–	28,7	11,91	WGC-6250	411981-250GC	TK-02637	–	–
								GTS-6250				
								GTS-6250-1				
								GTS-6250-2				
M-421105-281VG			○		14,2	–	11,91	WG-6281	411134-281GC	TK-02648		
	M-411086-281VG	7,14		○	–	28,7	11,91	WGC-6281	411134-281GC	TK-02648	–	–
M-421106-312VG			●		19	–	11,91	WG-8312	411136-312GC	TK-02641		
	M-411088-312VG	7,92		●	–	38,1	11,91	WGC-8312	411136-312GC	TK-02641	–	–
M-421107-344VG			○		19	–	11,91	WG-8344	411138-344GC	TK-02643		
	M-411090-344VG	8,74		○	–	38,1	11,91	WGC-8344	411138-344GC	TK-02643	–	–
M-421108-375VG			○		19	–	11,91	WG-8375	411987-375GC	TK-02645		
	M-411122-375VG	9,53		○	–	38,1	11,91	WGC-8375	411987-375GC	TK-02645	–	–

* Tune-Up Kits include one complete set of Standard Components to allow you to refurbish the support blade.

All support blades include standard clamp and clamp screw 31-434259-000.

GTS is Greenleaf's groove/turn system insert with chip control. Page GP 09.

COS is Greenleaf's cut-off system insert. Page GP 08.

WG is Greenleaf flat-top groover with an 11° nose clearance. Pages GP 10 and GP 11.

WGC is Greenleaf's flat-top groover with a 6° nose clearance. Pages GP 12 and GP 13.

See pages GP 53-54 for additional shank options.

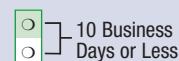
Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com

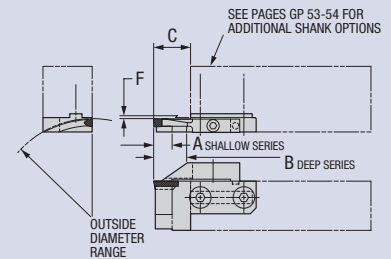
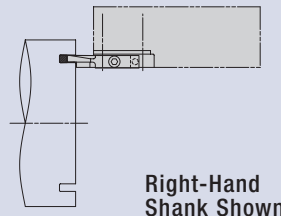
EU +31-45-404-1774 • eurooffice@greenleafcorporation.com

CN +86-731-89954796 • info@greenleafcorporation.com.cn

www.greenleafglobalsupport.com • www.greenleafcorporation.com



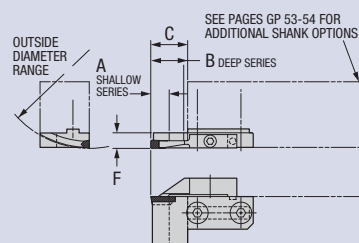
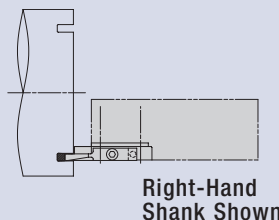
Face Grooving Support Blade A



Part Number		Gage	Stock		Outside Diameter Range	Dimensions (millimeters)				Standard Components		*Tune-Up Kit Includes All Standard Components
Shallow Series	Deep Series	Insert	Shallow	Deep		A	B	C	F	Clamp	Clamp Screw	
M-421218-125S-030	M-421243-125L-030	WG-4125	○	○	76,20 - 88,90	9,65	16	19,05	0,79	421323-125GC	434259	TK-02650
M-421219-125S-035	M-421244-125L-035	WG-4125	○	○	88,90 - 107,95	9,65	16	19,05	0,79	421323-125GC	434259	TK-02650
M-421220-125S-0425	M-421245-125L-0425	WG-4125	○	○	107,95 - 139,70	9,65	16	19,05	0,79	421323-125GC	434259	TK-02650
M-421221-125S-055	M-421246-125L-055	WG-4125	○	○	139,70 - 190,50	9,65	16	19,05	0,79	421323-125GC	434259	TK-02650
M-421222-125S-075	M-421247-125L-075	WG-4125	○	○	190,50 - 317,50	9,65	16	19,05	0,79	421323-125GC	434259	TK-02650
M-421223-125S-125	M-421248-125L-125	WG-4125	○	○	317,50 - 1016,0	9,65	16	19,05	0,79	421323-125GC	434259	TK-02650
M-421224-187S-030	M-421249-187L-030	WG-4187	○	○	76,20 - 88,90	9,65	16	19,05	0,79	421324-187GC	434259	TK-02651
M-421225-187S-035	M-421250-187L-035	WG-4187	○	○	88,90 - 107,95	9,65	16	19,05	0,79	421324-187GC	434259	TK-02651
M-421226-187S-0425	M-421251-187L-0425	WG-4187	○	○	107,95 - 139,70	9,65	16	19,05	0,79	421324-187GC	434259	TK-02651
M-421227-187S-055	M-421252-187L-055	WG-4187	○	○	139,70 - 190,50	9,65	16	19,05	0,79	421324-187GC	434259	TK-02651
M-421228-187S-075	M-421253-187L-075	WG-4187	○	○	190,50 - 317,50	9,65	16	19,05	0,79	421324-187GC	434259	TK-02651
M-421229-187S-125	M-421254-187L-125	WG-4187	○	○	317,50 - 1016,0	9,65	16	19,05	0,79	421324-187GC	434259	TK-02651
M-421230-250S-030	M-421255-250L-030	WG-6250	○	○	76,20 - 107,95	14,22	25,40	28,58	0,79	421325-250GC	434259	TK-02652
M-421231-250S-0425	M-421256-250L-0425	WG-6250	○	○	107,95 - 152,40	14,22	25,40	28,58	0,79	421325-250GC	434259	TK-02652
M-421232-250S-060	M-421257-250L-060	WG-6250	○	○	152,40 - 215,90	14,22	25,40	28,58	0,79	421325-250GC	434259	TK-02652
M-421233-250S-085	M-421258-250L-085	WG-6250	○	○	215,90 - 393,70	14,22	25,40	28,58	0,79	421325-250GC	434259	TK-02652
M-421234-250S-155	M-421259-250L-155	WG-6250	○	○	393,70 - 1016,0	14,22	25,40	28,58	0,79	421325-250GC	434259	TK-02652
M-421235-312S-030	M-421260-312L-030	WG-8312	○	○	76,20 - 127,00	19,05	33,27	38,10	0,79	421326-312GC	434259	TK-02653
M-421236-312S-050	M-421261-312L-050	WG-8312	○	○	127,00 - 228,60	19,05	33,27	38,10	0,79	421326-312GC	434259	TK-02653
M-421237-312S-090	M-421262-312L-090	WG-8312	○	○	228,60 - 482,60	19,05	33,27	38,10	0,79	421326-312GC	434259	TK-02653
M-421238-312S-190	M-421263-312L-190	WG-8312	○	○	482,60 -	19,05	33,27	38,10	0,79	421326-312GC	434259	TK-02653
M-421239-375S-030	M-421264-375L-030	WG-8375	○	○	76,20 - 127,00	19,05	33,27	38,10	0,79	421327-375GC	434259	TK-02654
M-421240-375S-050	M-421265-375L-050	WG-8375	○	○	127,00 - 228,60	19,05	33,27	38,10	0,79	421327-375GC	434259	TK-02654
M-421241-375S-090	M-421266-375L-090	WG-8375	○	○	228,60 - 482,60	19,05	33,27	38,10	0,79	421327-375GC	434259	TK-02654
M-421242-375S-190	M-421267-375L-190	WG-8375	○	○	482,60 -	19,05	33,27	38,10	0,79	421327-375GC	434259	TK-02654

* Tune-Up Kits include one complete set of Standard Components to allow you to refurbish the support blade. See pages GP 10 and GP 11 for ceramic and carbide inserts.
See pages GP 53-54 for additional shank options.

Face Grooving Support Blade B



Part Number		Gage	Stock	Outside Diameter Range	Dimensions (millimeters)				Standard Components		*Tune-Up Kit Includes All Standard Components
Shallow Series	Deep Series	Insert	Shallow Deep		A	B	C	F	Clamp	Clamp Screw	
M-421118-125S-030	M-421143-125L-030	WG-4125	○ ○	76,20 - 88,90	9,65	16	19,05	11,91	421318-125GC	434259	TK-02677
M-421119-125S-035	M-421144-125L-035	WG-4125	○ ○	88,90 - 107,95	9,65	16	19,05	11,91	421318-125GC	434259	TK-02677
M-421120-125S-0425	M-421145-125L-0425	WG-4125	○ ○	107,95 - 139,70	9,65	16	19,05	11,91	421318-125GC	434259	TK-02677
M-421121-125S-055	M-421146-125L-055	WG-4125	○ ○	139,70 - 190,50	9,65	16	19,05	11,91	421318-125GC	434259	TK-02677
M-421122-125S-075	M-421147-125L-075	WG-4125	○ ○	190,50 - 317,50	9,65	16	19,05	11,91	421318-125GC	434259	TK-02677
M-421123-125S-125	M-421148-125L-125	WG-4125	○ ○	317,50 - 1016,0	9,65	16	19,05	11,91	421318-125GC	434259	TK-02677
M-421124-187S-030	M-421149-187L-030	WG-4187	○ ○	76,20 - 88,90	9,65	16	19,05	11,91	421319-187GC	434259	TK-02678
M-421125-187S-035	M-421150-187L-035	WG-4187	○ ○	88,90 - 107,95	9,65	16	19,05	11,91	421319-187GC	434259	TK-02678
M-421126-187S-0425	M-421151-187L-0425	WG-4187	○ ○	107,95 - 139,70	9,65	16	19,05	11,91	421319-187GC	434259	TK-02678
M-421127-187S-055	M-421152-187L-055	WG-4187	○ ○	139,70 - 190,50	9,65	16	19,05	11,91	421319-187GC	434259	TK-02678
M-421128-187S-075	M-421153-187L-075	WG-4187	○ ○	190,50 - 317,50	9,65	16	19,05	11,91	421319-187GC	434259	TK-02678
M-421129-187S-125	M-421154-187L-125	WG-4187	○ ○	317,50 - 1016,0	9,65	16	19,05	11,91	421319-187GC	434259	TK-02678
M-421130-250S-030	M-421155-250L-030	WG-6250	○ ○	76,20 - 107,95	14,22	25,40	28,58	11,91	421320-250GC	434259	TK-02679
M-421131-250S-0425	M-421156-250L-0425	WG-6250	○ ○	107,95 - 152,40	14,22	25,40	28,58	11,91	421320-250GC	434259	TK-02679
M-421132-250S-060	M-421157-250L-060	WG-6250	○ ○	152,40 - 215,90	14,22	25,40	28,58	11,91	421320-250GC	434259	TK-02679
M-421133-250S-085	M-421158-250L-085	WG-6250	○ ○	215,90 - 393,70	14,22	25,40	28,58	11,91	421320-250GC	434259	TK-02679
M-421134-250S-155	M-421159-250L-155	WG-6250	○ ○	393,70 - 1016,0	14,22	25,40	28,58	11,91	421320-250GC	434259	TK-02679
M-421135-312S-030	M-421160-312L-030	WG-8312	○ ○	76,20 - 127,00	19,05	33,27	38,10	11,91	421321-312GC	434259	TK-02680
M-421136-312S-050	M-421161-312L-050	WG-8312	○ ○	127,00 - 228,60	19,05	33,27	38,10	11,91	421321-312GC	434259	TK-02680
M-421137-312S-090	M-421162-312L-090	WG-8312	○ ○	228,60 - 482,60	19,05	33,27	38,10	11,91	421321-312GC	434259	TK-02680
M-421138-312S-190	M-421163-312L-190	WG-8312	○ ○	482,60 -	19,05	33,27	38,10	11,91	421321-312GC	434259	TK-02680
M-421139-375S-030	M-421164-375L-030	WG-8375	○ ○	76,20 - 127,00	19,05	33,27	38,10	11,91	421322-375GC	434259	TK-02681
M-421140-375S-050	M-421165-375L-050	WG-8375	○ ○	127,00 - 228,60	19,05	33,27	38,10	11,91	421322-375GC	434259	TK-02681
M-421141-375S-090	M-421166-375L-090	WG-8375	○ ○	228,60 - 482,60	19,05	33,27	38,10	11,91	421322-375GC	434259	TK-02681
M-421142-375S-190	M-421167-375L-190	WG-8375	○ ○	482,60 -	19,05	33,27	38,10	11,91	421322-375GC	434259	TK-02681

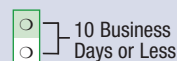
* Tune-Up Kits include one complete set of Standard Components to allow you to refurbish the support blade.

See page GP 10 and GP 11 for ceramic and carbide inserts.

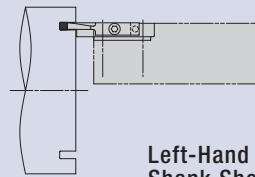
See pages GP 53-54 for additional shank options.

Greenleaf Sales

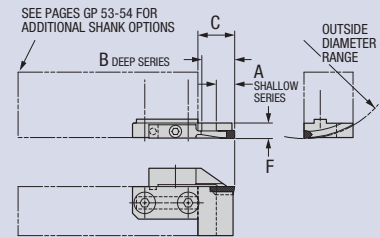
US +814-763-2915 • sales@greenleafcorporation.com
EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
CN +86-731-89954796 • info@greenleafcorporation.com.cn
www.greenleafglobalsupport.com • www.greenleafcorporation.com



Face Grooving Support Blade C



Left-Hand
Shank Shown



Part Number		Gage	Stock	Outside Diameter Range	Dimensions (millimeters)				Standard Components		*Tune-Up Kit Includes All Standard Components
Shallow Series	Deep Series	Insert	Shallow Deep		A	B	C	F	Clamp	Clamp Screw	
M-421168-125S-030	M-421193-125L-030	WG-4125	○ ○	76,20 - 88,90	9,65	16	19,05	11,91	421323-125GC	434259	TK-02650
M-421169-125S-035	M-421194-125L-035	WG-4125	○ ○	88,90 - 107,95	9,65	16	19,05	11,91	421323-125GC	434259	TK-02650
M-421170-125S-0425	M-421195-125L-0425	WG-4125	○ ○	107,95 - 139,70	9,65	16	19,05	11,91	421323-125GC	434259	TK-02650
M-421171-125S-055	M-421196-125L-055	WG-4125	○ ○	139,70 - 190,50	9,65	16	19,05	11,91	421323-125GC	434259	TK-02650
M-421172-125S-075	M-421197-125L-075	WG-4125	○ ○	190,50 - 317,50	9,65	16	19,05	11,91	421323-125GC	434259	TK-02650
M-421173-125S-125	M-421198-125L-125	WG-4125	○ ○	317,50 - 1016,0	9,65	16	19,05	11,91	421323-125GC	434259	TK-02650
M-421174-187S-030	M-421199-187L-030	WG-4187	○ ○	76,20 - 88,90	9,65	16	19,05	11,91	421324-187GC	434259	TK-02651
M-421175-187S-035	M-421200-187L-035	WG-4187	○ ○	88,90 - 107,95	9,65	16	19,05	11,91	421324-187GC	434259	TK-02651
M-421176-187S-0425	M-421201-187L-0425	WG-4187	○ ○	107,95 - 139,70	9,65	16	19,05	11,91	421324-187GC	434259	TK-02651
M-421177-187S-055	M-421202-187L-055	WG-4187	○ ○	139,70 - 190,50	9,65	16	19,05	11,91	421324-187GC	434259	TK-02651
M-421178-187S-075	M-421203-187L-075	WG-4187	○ ○	190,50 - 317,50	9,65	16	19,05	11,91	421324-187GC	434259	TK-02651
M-421179-187S-125	M-421204-187L-125	WG-4187	○ ○	317,50 - 1016,0	9,65	16	19,05	11,91	421324-187GC	434259	TK-02651
M-421180-250S-030	M-421205-250L-030	WG-6250	○ ○	76,20 - 107,95	14,22	25,40	28,58	11,91	421325-250GC	434259	TK-02652
M-421181-250S-0425	M-421206-250L-0425	WG-6250	○ ○	107,95 - 152,40	14,22	25,40	28,58	11,91	421325-250GC	434259	TK-02652
M-421182-250S-060	M-421207-250L-060	WG-6250	○ ○	152,40 - 215,90	14,22	25,40	28,58	11,91	421325-250GC	434259	TK-02652
M-421183-250S-085	M-421208-250L-085	WG-6250	○ ○	215,90 - 393,70	14,22	25,40	28,58	11,91	421325-250GC	434259	TK-02652
M-421184-250S-155	M-421209-250L-155	WG-6250	○ ○	393,70 - 1016,0	14,22	25,40	28,58	11,91	421325-250GC	434259	TK-02652
M-421185-312S-030	M-421210-312L-030	WG-8312	○ ○	76,20 - 127,00	19,05	33,27	38,10	11,91	421326-312GC	434259	TK-02653
M-421186-312S-050	M-421211-312L-050	WG-8312	○ ○	127,00 - 228,60	19,05	33,27	38,10	11,91	421326-312GC	434259	TK-02653
M-421187-312S-090	M-421212-312L-090	WG-8312	○ ○	228,60 - 482,60	19,05	33,27	38,10	11,91	421326-312GC	434259	TK-02653
M-421188-312S-190	M-421213-312L-190	WG-8312	○ ○	482,60 -	19,05	33,27	38,10	11,91	421326-312GC	434259	TK-02653
M-421189-375S-030	M-421214-375L-030	WG-8375	○ ○	76,20 - 127,00	19,05	33,27	38,10	11,91	421327-375GC	434259	TK-02654
M-421190-375S-050	M-421215-375L-050	WG-8375	○ ○	127,00 - 228,60	19,05	33,27	38,10	11,91	421327-375GC	434259	TK-02654
M-421191-375S-090	M-421216-375L-090	WG-8375	○ ○	228,60 - 482,60	19,05	33,27	38,10	11,91	421327-375GC	434259	TK-02654
M-421192-375S-190	M-421217-375L-190	WG-8375	○ ○	482,60 -	19,05	33,27	38,10	11,91	421327-375GC	434259	TK-02654

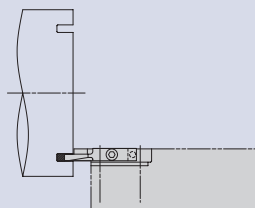
* Tune-Up Kits include one complete set of Standard Components to allow you to refurbish the support blade.

See page GP 10 and GP 11 for ceramic and carbide inserts.

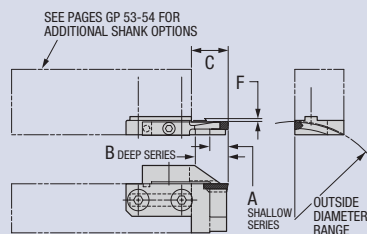
See pages GP 53-54 for additional shank options.



Face Grooving Support Blade D



Left-Hand
Shank Shown



Part Number		Gage	Stock		Outside Diameter Range	Dimensions (millimeters)				Standard Components		*Tune-Up Kit Includes All Standard Components
Shallow Series	Deep Series	Insert	Shallow	Deep		A	B	C	F	Clamp	Clamp Screw	
M-421268-125S-030	M-421293-125L-030	WG-4125	○	○	76,20 - 88,90	9,65	16	19,05	0,79	421318-125GC	434259	TK-02677
M-421269-125S-035	M-421294-125L-035	WG-4125	○	○	88,90 - 107,95	9,65	16	19,05	0,79	421318-125GC	434259	TK-02677
M-421270-125S-0425	M-421295-125L-0425	WG-4125	○	○	107,95 - 139,70	9,65	16	19,05	0,79	421318-125GC	434259	TK-02677
M-421271-125S-055	M-421296-125L-055	WG-4125	○	○	139,70 - 190,50	9,65	16	19,05	0,79	421318-125GC	434259	TK-02677
M-421272-125S-075	M-421297-125L-075	WG-4125	○	○	190,50 - 317,50	9,65	16	19,05	0,79	421318-125GC	434259	TK-02677
M-421273-125S-125	M-421298-125L-125	WG-4125	○	○	317,50 - 1016,0	9,65	16	19,05	0,79	421318-125GC	434259	TK-02677
M-421274-187S-030	M-421299-187L-030	WG-4187	○	○	76,20 - 88,90	9,65	16	19,05	0,79	421319-187GC	434259	TK-02678
M-421275-187S-035	M-421300-187L-035	WG-4187	○	○	88,90 - 107,95	9,65	16	19,05	0,79	421319-187GC	434259	TK-02678
M-421276-187S-0425	M-421301-187L-0425	WG-4187	○	○	107,95 - 139,70	9,65	16	19,05	0,79	421319-187GC	434259	TK-02678
M-421277-187S-055	M-421302-187L-055	WG-4187	○	○	139,70 - 190,50	9,65	16	19,05	0,79	421319-187GC	434259	TK-02678
M-421278-187S-075	M-421303-187L-075	WG-4187	○	○	190,50 - 317,50	9,65	16	19,05	0,79	421319-187GC	434259	TK-02678
M-421279-187S-125	M-421304-187L-125	WG-4187	○	○	317,50 - 1016,0	9,65	16	19,05	0,79	421319-187GC	434259	TK-02678
M-421280-250S-030	M-421305-250L-030	WG-6250	○	○	76,20 - 107,95	14,22	25,40	28,58	0,79	421320-250GC	434259	TK-02679
M-421281-250S-0425	M-421306-250L-0425	WG-6250	○	○	107,95 - 152,40	14,22	25,40	28,58	0,79	421320-250GC	434259	TK-02679
M-421282-250S-060	M-421307-250L-060	WG-6250	○	○	152,40 - 215,90	14,22	25,40	28,58	0,79	421320-250GC	434259	TK-02679
M-421283-250S-085	M-421308-250L-085	WG-6250	○	○	215,90 - 393,70	14,22	25,40	28,58	0,79	421320-250GC	434259	TK-02679
M-421284-250S-155	M-421309-250L-155	WG-6250	○	○	393,70 - 1016,0	14,22	25,40	28,58	0,79	421320-250GC	434259	TK-02679
M-421285-312S-030	M-421310-312L-030	WG-8312	○	○	76,20 - 127,00	19,05	33,27	38,10	0,79	421321-312GC	434259	TK-02680
M-421286-312S-050	M-421311-312L-050	WG-8312	○	○	127,00 - 228,60	19,05	33,27	38,10	0,79	421321-312GC	434259	TK-02680
M-421287-312S-090	M-421312-312L-090	WG-8312	○	○	228,60 - 482,60	19,05	33,27	38,10	0,79	421321-312GC	434259	TK-02680
M-421288-312S-190	M-421313-312L-190	WG-8312	○	○	482,60 -	19,05	33,27	38,10	0,79	421321-312GC	434259	TK-02680
M-421289-375S-030	M-421314-375L-030	WG-8375	○	○	76,20 - 127,00	19,05	33,27	38,10	0,79	421322-375GC	434259	TK-02681
M-421290-375S-050	M-421315-375L-050	WG-8375	○	○	127,00 - 228,60	19,05	33,27	38,10	0,79	421322-375GC	434259	TK-02681
M-421291-375S-090	M-421316-375L-090	WG-8375	○	○	228,60 - 482,60	19,05	33,27	38,10	0,79	421322-375GC	434259	TK-02681
M-421292-375S-190	M-421317-375L-190	WG-8375	○	○	482,60 -	19,05	33,27	38,10	0,79	421322-375GC	434259	TK-02681

* Tune-Up Kits include one complete set of Standard Components to allow you to refurbish the support blade. See page GP 10 and GP 11 for ceramic and carbide inserts.
See pages GP 53-54 for additional shank options.

Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
CN +86-731-89954796 • info@greenleafcorporation.com.cn
www.greenleafglobalsupport.com • www.greenleafcorporation.com



Stocked Standard



10 Business
Days or Less

**Greenleaf Sales**



Face Grooving Tools - Ordering Instructions

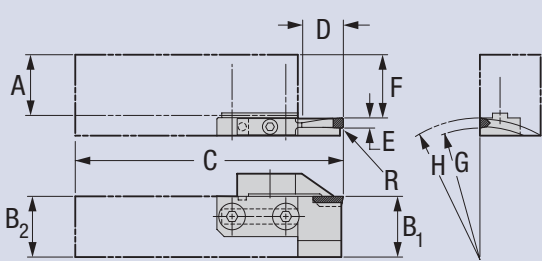
Face grooving tools must be matched to a specific radius and are, therefore, manufactured to order for your particular application.

We offer tools either with integral support blades (SFG) or with separate replaceable blades (AFG). Four combinations are available relative to hand of tool and hand of radius.

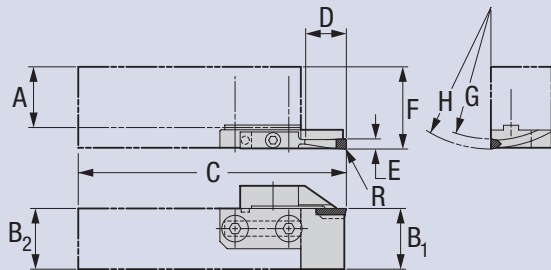
When ordering replaceable blade styles, we suggest the purchase of additional back-up blades at time of original order.

For your convenience in ordering or request for quotation, we have published sample blank engineering data forms. You must provide *ALL* of the dimensional data listed to ensure the correct tool being manufactured.

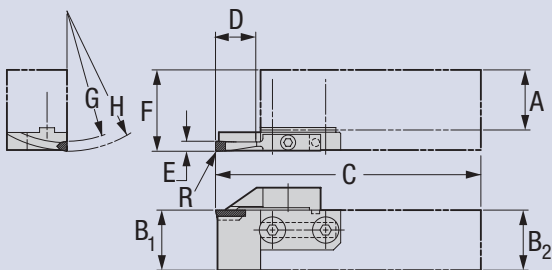
Note: Tools will be quoted either with radius relieved blades or angular relieved blades, according to groove diameter. Radius relieved blades are illustrated.



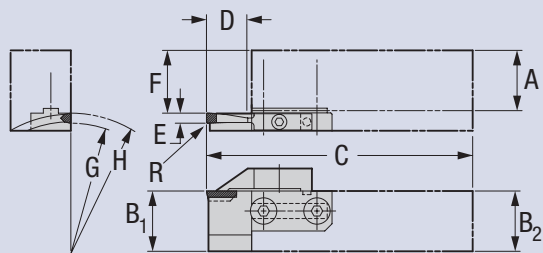
AFGVLL



AFGVLR

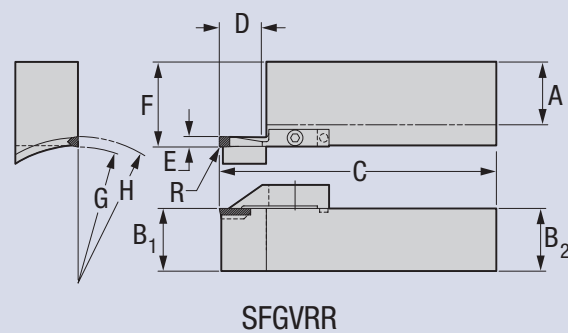
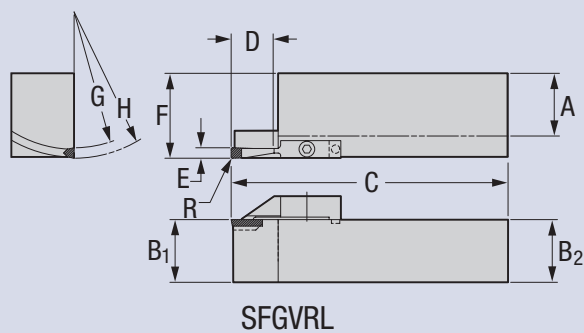
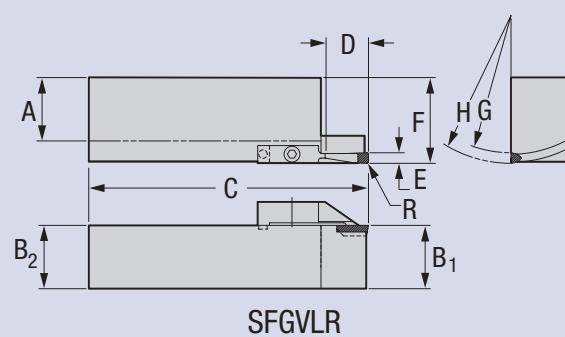
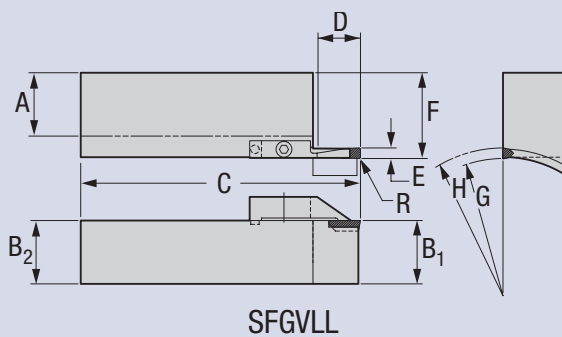


AFGVRL



AFGVRR

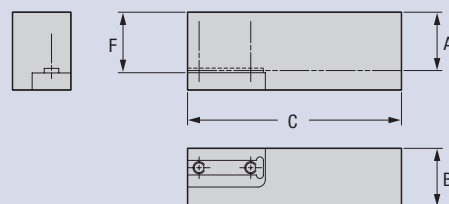
AFGV__	A	C	F
Drawing #	B ₁	D (depth of cut)	G (radius)
R (radius)	B ₂	E	H (radius)



SFGV__	A	C	F
Drawing #	B ₁	D (depth of cut)	G (radius)
R (radius)	B ₂	E	H (radius)

Straight Shank Holder

For Support Blades

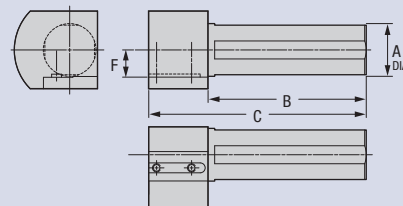


Part Number		Stock		Dimensions (millimeters)				Standard Component	*Tune-Up Kit Includes All Standard Components
Right	Left	R	L	A	B	C	F	Mounting Screw	
M-411055	M-411056	●	●	25	25	125	26	FHCS M8-1.25x25mm	TK-02682
M-411059	M-411449	●	●	32	32	150	33	FHCS M8-1.25x25mm	TK-02682
M-411015	M-411016	○	○	40	40	200	41	FHCS M8-1.25x25mm	TK-02682

* Tune-Up Kits include one complete set of Standard Components to allow you to refurbish the toolholder.

Round Shank Holder

For Support Blades

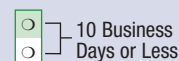


Part Number		Stock		Dimensions (millimeters)				Standard Component	*Tune-Up Kit Includes All Standard Components
Right	Left	R	L	A	B	C	F	Mounting Screw	
M-529678	M-529679	○	○	32	150	200	23	FHCS M8-1.25x25mm	TK-02682
M-529680	M-529681	●	●	40	150	200	27	FHCS M8-1.25x25mm	TK-02682
M-529682	M-529683	●	●	50	150	200	32	FHCS M8-1.25x25mm	TK-02682
M-529684	M-529685	○	○	60	150	200	37	FHCS M8-1.25x25mm	TK-02682

* Tune-Up Kits include one complete set of Standard Components to allow you to refurbish the toolholder.

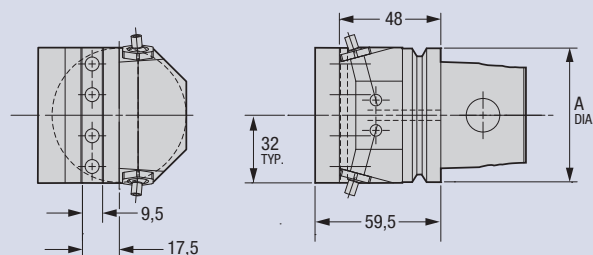
Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
 EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
 CN +86-731-89954796 • info@greenleafcorporation.com.cn
 www.greenleafglobalsupport.com • www.greenleafcorporation.com



KM Shank

Face Mount



Part Number		Dimensions (millimeters)	Standard Component	*Tune-Up Kit Includes All Standard Components
† Face Mount	Stock	A	Mounting Screw	
M-SBH-KM50-F	○	50	FHCS M8-1.25x25mm	TK-02682
M-SBH-KM63-F	○	63	FHCS M8-1.25x25mm	TK-02682

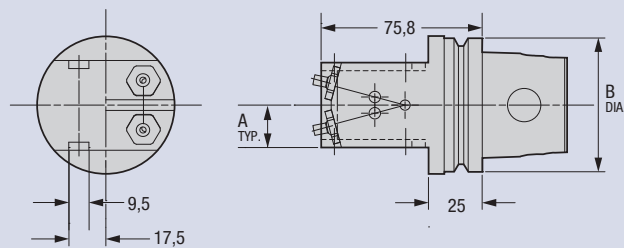
High-pressure coolant – 1,500 PSI Max (100 bar)

* Tune-Up Kits include one complete set of Standard Components to allow you to refurbish the toolholder.

† These tools based on KM63UT shank.

KM Shank

Side Mount



Part Number		Dimensions (millimeters)		Standard Component	*Tune-Up Kit Includes All Standard Components
† Side Mount	Stock	A	B	Mounting Screw	
M-SBH-KM50-S	○	17,5	50	FHCS M8-1.25x25mm	TK-02682
M-SBH-KM63-S	○	20	63	FHCS M8-1.25x25mm	TK-02682

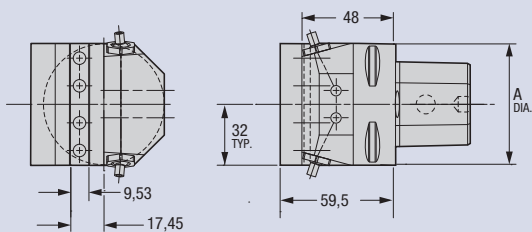
High-pressure coolant – 1,500 PSI Max (100 bar)

* Tune-Up Kits include one complete set of Standard Components to allow you to refurbish the toolholder.

† These tools based on KM63UT shank.

Capto Shank

Face Mount



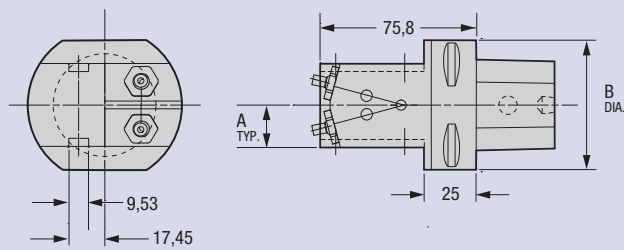
Part Number		Dimensions (millimeters)	Standard Component	*Tune-Up Kit Includes All Standard Components
Face Mount	Stock	A	Mounting Screw	
M-SBH-C5-F	○	50	FHCS M8-1.25x25mm	TK-02682
M-SBH-C6-F	○	63	FHCS M8-1.25x25mm	TK-02682

High-pressure coolant – 1,500 PSI Max (100 bar)

* Tune-Up Kits include one complete set of Standard Components to allow you to refurbish the toolholder.

Capto Shank

Side Mount



Part Number		Dimensions (millimeters)		Standard Component	*Tune-Up Kit Includes All Standard Components
Side Mount	Stock	A	B	Mounting Screw	
M-SBH-C5-S	○	17,5	50	FHCS M8-1.25x25mm	TK-02682
M-SBH-C6-S	○	20	63	FHCS M8-1.25x25mm	TK-02682

High-pressure coolant – 1,500 PSI Max (100 bar)

* Tune-Up Kits include one complete set of Standard Components to allow you to refurbish the toolholder.

Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
 EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
 CN +86-731-89954796 • info@greenleafcorporation.com.cn
 www.greenleafglobalsupport.com • www.greenleafcorporation.com



CERAMIC

Greenleaf is the industry leader in the development and manufacture of ceramic and coated ceramic inserts in ANSI standard and special geometries. Some of the most prominent include:

WG-300® Whisker-reinforced ceramic with excellent wear and shock resistance at high surface speeds. WG-300 is very effective at machining nickel and cobalt based super-alloys, and other hard materials at metal removal rates up to 10 times higher than carbide.

WG-600® Coated whisker-reinforced ceramic offering longer tool life and better performance over uncoated ceramics due to outstanding thermal properties and shock-resistance at high cutting speeds. Application areas include rough and finish turning, as well as high-performance milling of high-strength alloys, hardened steels and select stainless steels.

U.S. Patent No. 6,447,896 B1.

WG-700™ New whisker-reinforced Al_2O_3 ceramic substrate featuring improved toughness and a unique high-speed coating. WG-700 is ideal for machining nickel- and cobalt-based super alloys and other difficult-to-machine materials. WG-700 exhibits high metal-removal rates with exceptional tool life. *U.S. Patent No. 6,447,896 B1.*

XSYTIN™-1 New phase-toughened ceramic capable of extreme feed rates. XSYTIN™-1 excels at machining a wide variety of materials including steels, cast and ductile irons, high-temperature alloys and other challenging metals. XSYTIN™-1 is ideal for use in interrupted cuts, scale, abrasive casting materials and milling.

GSN100™ New engineered blend of silicon nitride and proprietary toughening agents that redefines productivity in the machining of cast iron. GSN100 delivers outstanding tool life at high cutting speeds in turning, grooving and milling applications.

GEM-7™ Al_2O_3 + TiC composite ceramic with a high degree of predictability in roll turning and hard alloy (up to 65 R/c) machining.

GEM-19™ Cold pressed and sintered Al_2O_3 ceramic for economical roughing and finishing of cast iron grades application range on severe interruption or old machinery.

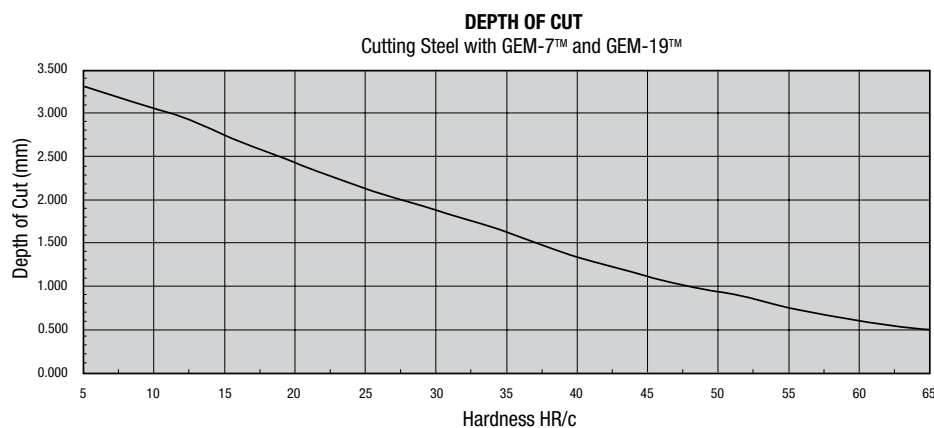
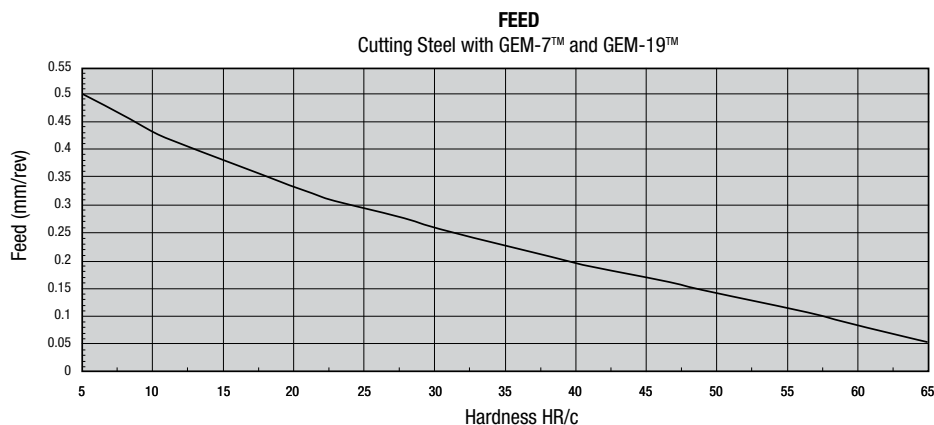
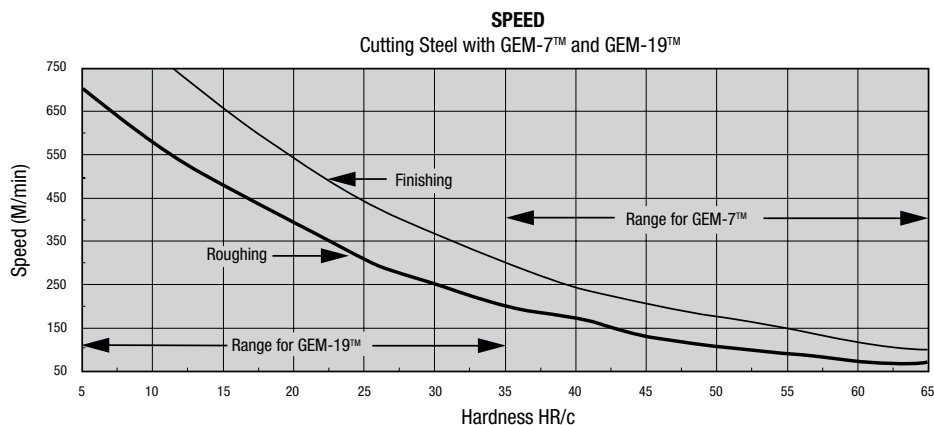
Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
CN +86-731-89954796 • info@greenleafcorporation.com.cn
www.greenleafglobalsupport.com • www.greenleafcorporation.com



Greenleaf Sales
US +814-763-2915 • sales@greenleafcorporation.com
EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
CN +86-731-89954796 • info@greenleafcorporation.com.cn
www.greenleafglobalsupport.com • www.greenleafcorporation.com

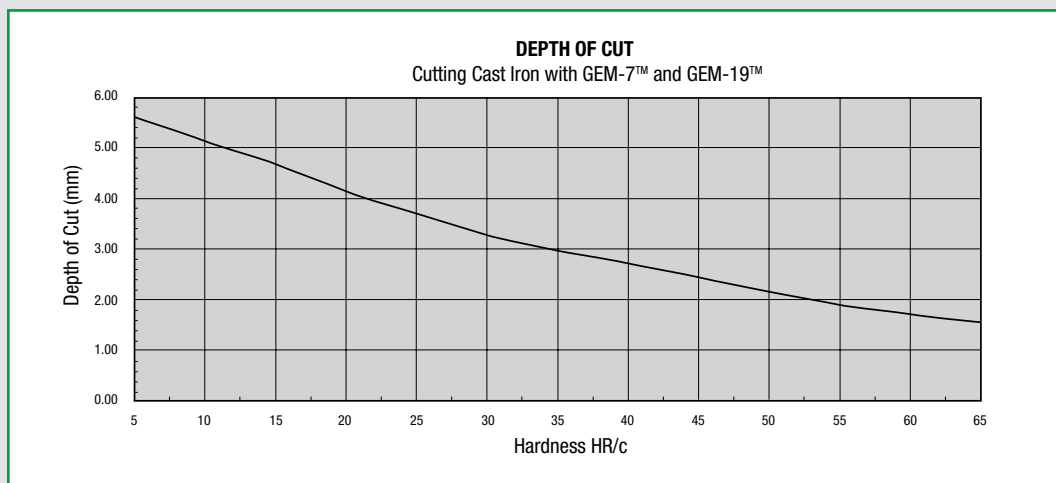
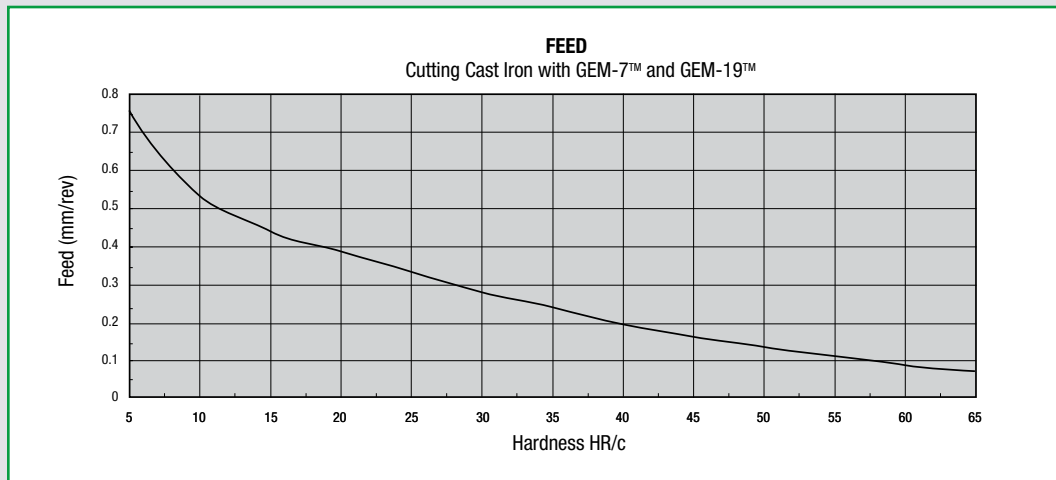
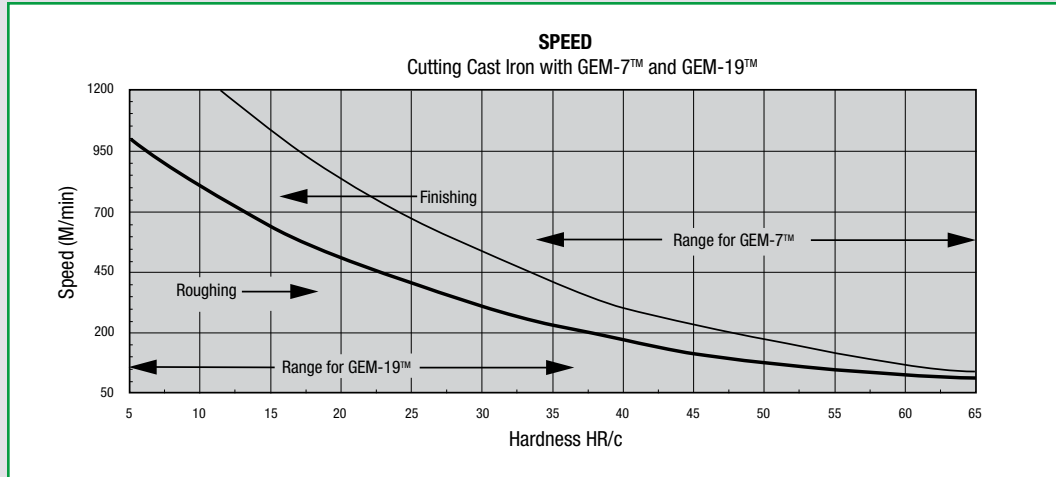
Cutting Steel with GEM-7™ and GEM-19™



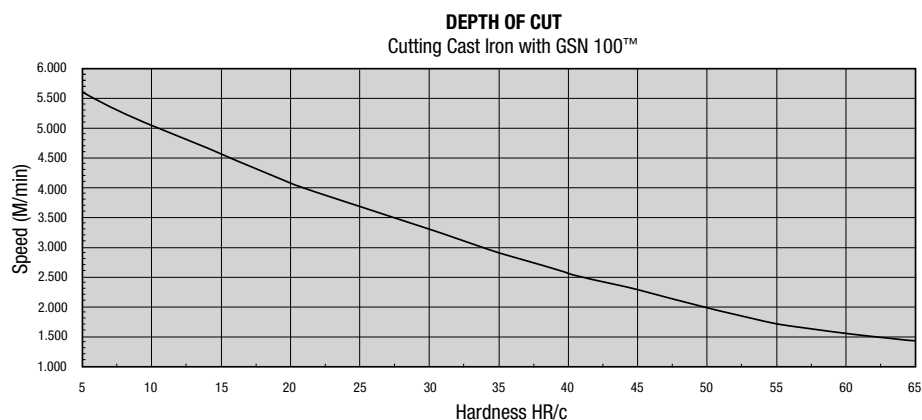
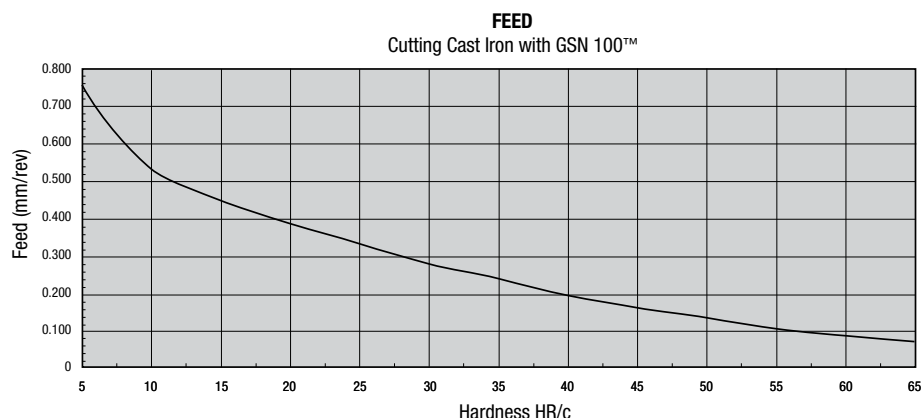
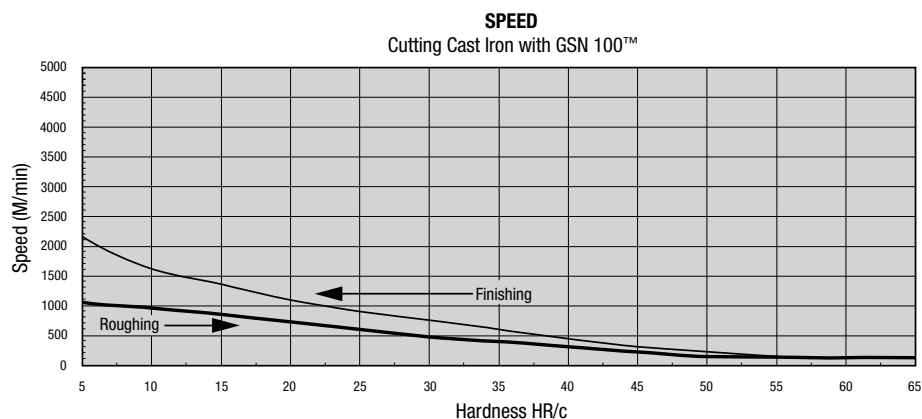
Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
CN +86-731-89954796 • info@greenleafcorporation.com.cn
www.greenleafglobalsupport.com • www.greenleafcorporation.com

Cutting Cast Iron with GEM-7™ and GEM-19™



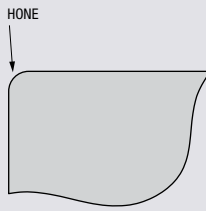
Cutting Cast Iron with GSN100™



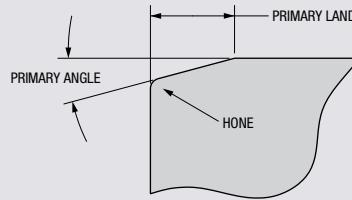
Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
 EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
 CN +86-731-89954796 • info@greenleafcorporation.com.cn
www.greenleafglobalsupport.com • www.greenleafcorporation.com

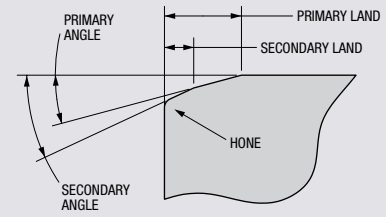
Edge Preparations and Application Guide



HONE



PRIMARY ANGLE



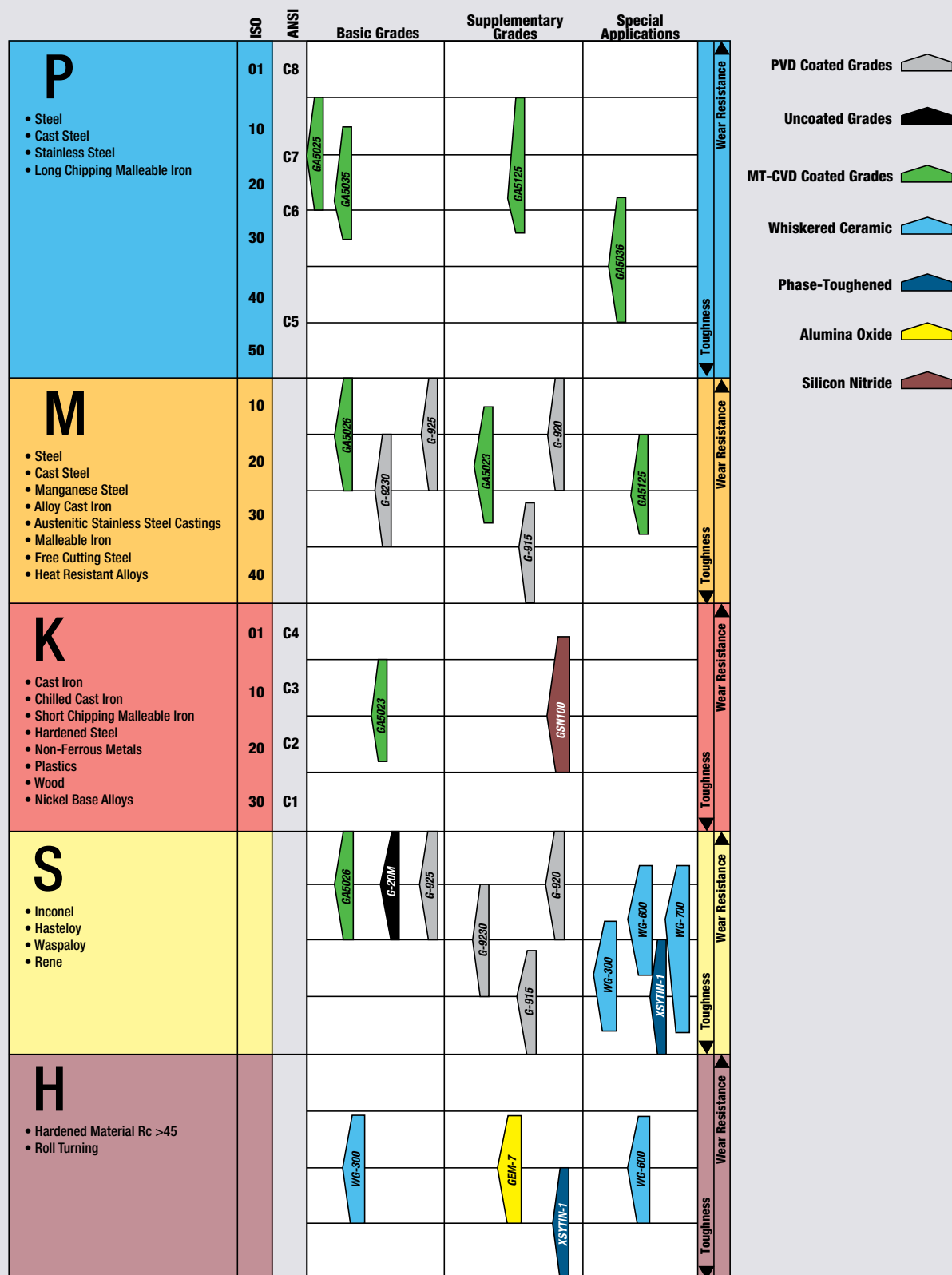
SECONDARY ANGLE

Edge Prep	Hone	Primary Land	Primary Angle	Secondary Land	Secondary Angle	Application
A	0,013 - 0,025mm R					For light finishing and grooving, also added to designated negative lands (i.e. T1, T2, T9).
B	0,025 - 0,051mm R					Used in addition to heavy machining chamfers and designated negative lands (i.e. T4, T10).
T1		0,051 - 0,102mm	20°			General purpose for turning and light milling in clean high-temp. alloys and materials <50R/C.
T1A	0,013 - 0,025mm R	0,051 - 0,102mm	20°			Used where more protection is needed than T1 such as in scale and light interruptions, hard turning.
T2		0,152 - 0,203mm	20°			General purpose chamfer for light to medium feed rates, cast-iron machining.
T2A	0,013 - 0,025mm R	0,152 - 0,203mm	20°			Scale applications, light interruptions, weld overlays, finish turning and milling of hardened materials.
T3		0,330 - 0,381mm	30°			Used on smaller IC inserts as an alternative to T7.
T3A	0,013 - 0,025mm R	0,330 - 0,381mm	30°			Used on smaller IC inserts as an alternative to T7A.
T4B	0,025 - 0,051mm R	1,90	10°	0,17	25°	Heavy machining <19mm IC - Roll turning, 090700, 120700, CDH-22, CDH-33.
T5B	0,025 - 0,051mm R	1,52	15°	0,17	30°	Heavy machining - alternative to T4B.
T7		0,381 - 0,508mm	20°			For use in similar applications as T2 - use in heavier feed areas.
T7A	0,013 - 0,025mm R	0,381 - 0,508mm	20°			For use in similar applications as T2A - use in heavier feed areas.
T9		0,152 - 0,203mm	30°			General purpose chamfer for medium to heavy feed rates, milling, cast-iron machining <16mm IC.
T9A	0,013 - 0,025mm R	0,152 - 0,203mm	30°			For medium to heavy feed rates, milling, cast-iron machining for heavier interruptions <16mm IC.
T10A	0,013 - 0,025mm R	2,290 - 2,540mm	15°	0,17	30°	Heavy machining, iron and steel roll turning >19mm IC, CDH-43, CDH-53.
T10B	0,025 - 0,051mm R	2,290 - 2,540mm	15°	0,17	30°	Heavy machining, iron and steel roll turning >19mm IC, CDH-43, CDH-53.

Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
 EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
 CN +86-731-89954796 • info@greenleafcorporation.com.cn
 www.greenleafglobalsupport.com • www.greenleafcorporation.com

Insert Grade Reference for Turning, Grooving and Profiling



Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com

EU +31-45-404-1774 • eurooffice@greenleafcorporation.com

CN +86-731-89954796 • info@greenleafcorporation.com.cn

www.greenleafglobalsupport.com • www.greenleafcorporation.com

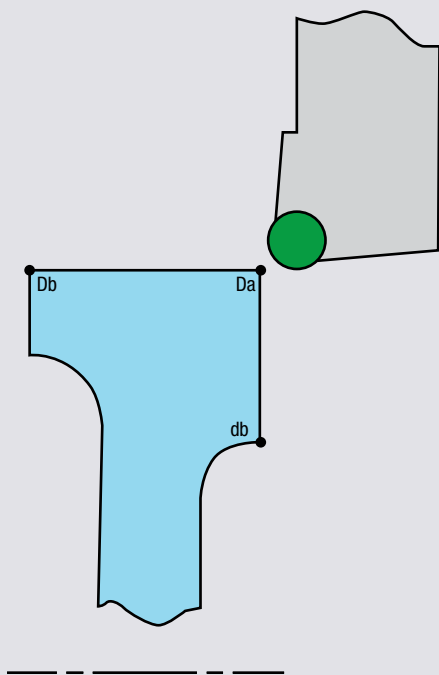
Insert Grade Reference for Milling

	ISO	ANSI	Basic Grades	Supplementary Grades	Special Applications	
P - Steel - Cast Steel - Stainless Steel - Long Chipping Malleable Iron	01	C8				Wear Resistance
	10					
	20	C7				
	30	C6				
	40					
	50	C5				Toughness
M - Steel - Cast Steel - Manganese Steel - Alloy Cast Iron - Austenitic Stainless Steel Castings - Malleable Iron - Free Cutting Steel - Heat Resistant Alloys	10					Wear Resistance
	20					
	30					
	40					Toughness
K - Cast Iron - Chilled Cast Iron - Short Chipping Malleable Iron - Hardened Steel - Non-Ferrous Metals - Plastics - Wood - Nickel Base Alloys	01	C4				Wear Resistance
	10	C3				
	20	C2				Toughness
	30	C1				
S - High Temperature Alloys - Inconel - Waspaloy - Hasteloy - Rene						Toughness
						Wear Resistance
H Hardened Material (Rc >45)						Toughness
						Wear Resistance

- PVD Coated Grades 
- Uncoated Grades 
- MT-CVD Coated Grades 
- Whiskered Ceramic 
- Phase-Toughened 
- Silicon Nitride 

Formulas for Turning and Facing

Imperial



Turning

$$SFM = \frac{Dia. \times \pi \times RPM}{12}$$

$$RPM = \frac{SFM \times 12}{Dia. \times \pi}$$

$$T = \frac{LOC}{IPR \times RPM}$$

$$LOC Da to Db = \frac{SFM \times 12 \times IPR \times T}{Dia. \times \pi}$$

Facing

To calculate the time (T) for a facing operation from starting point (Da) to finishing point (db):

$$Time Da to db = \frac{\pi (Da^2 - db^2)}{48 \times SFM \times IPR}$$

To calculate the endpoint (db) for facing from starting point (Da) to finishing point (db):

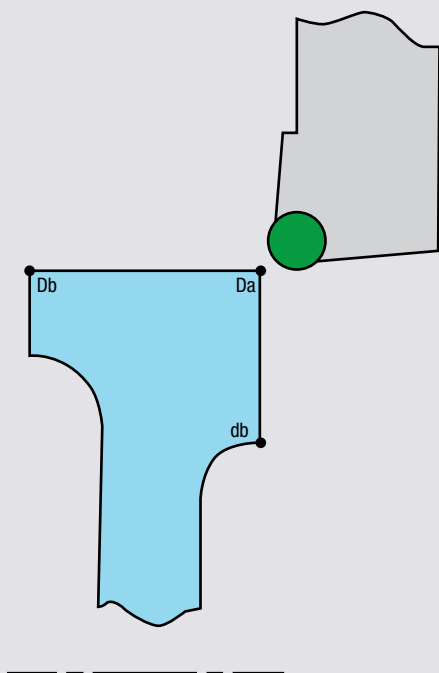
$$db = \sqrt{Da^2 - (15.279 \times T \times SFM \times IPR)}$$

If db is minus, you have passed center.

- SFM** = Surface Speed (feet/minute)
- IPR** = Feed Rate (inches/revolution)
- LOC** = Length of cut (inches)
- T** = Time (min.)
- π = 3.1416
- D** = Large Diameter (inches)
- d** = Small Diameter (inches)
- 15.279** = $\frac{48}{\pi}$

Note: The constant speed capabilities of the lathe are assumed in the above facing calculations.

Metric



Turning

$$V = \frac{Dia. \times \pi \times RPM}{1000}$$

$$RPM = \frac{V \times 1000}{Dia. \times \pi}$$

$$T = \frac{LOC}{S \times RPM}$$

$$LOC Da to Db = \frac{V \times 1000 \times S \times T}{Dia. \times \pi}$$

Facing

To calculate the time (T) for a facing operation from starting point (Da) to finishing point (db):

$$Time Da to db = \frac{\pi (Da^2 - db^2)}{4000 \times V \times S}$$

To calculate the endpoint (db) for facing from starting point (Da) to finishing point (db):

$$db = \sqrt{Da^2 - (1273.2 \times T \times V \times S)}$$

If db is minus, you have passed center.

- V** = Surface Speed (meters/minute)
- S** = Feed Rate (mm/revolution)
- LOC** = Length of cut (mm)
- T** = Time (min.)
- π = 3.1416
- D** = Large Diameter (mm)
- d** = Small Diameter (mm)
- 1273,2** = $\frac{4000}{\pi}$

Note: The constant speed capabilities of the lathe are assumed in the above facing calculations.

Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
 EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
 CN +86-731-89954796 • info@greenleafcorporation.com.cn
 www.greenleafglobalsupport.com • www.greenleafcorporation.com

Optional Clamps

To give maximum flexibility and provide for maximum clamping advantage in any given cutting situation, there are alternative clamps available. The variation in these clamps is the reach. Barrel diameters are common.

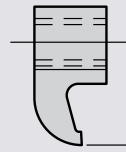
A typical example of alternate clamp usage would be in holding an insert without a hole. In this case, the lock pin would be removed and the clamp substituted so that maximum top clamping capability may be applied.

We have chosen as standard for each tool cataloged a clamp and differential screw combination for use with inserts with holes (pinlock). A longer reach clamp should be used when using top clamp alone. If conditions indicate, another combination would be advantageous. Please note as follows:

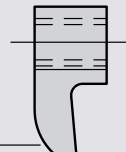
- Clamps CLM6, CLM7 and CLM19 are interchangeable. The difference is in the reach only.
- CLM9, CLM12 and CLM30 are all interchangeable, the difference being in the reach only.
- CLM20 and CLM22 are interchangeable, the difference being in the reach only.

Barrel diameters "B" and thread sizes are common. The reach "C", height "D", and "E" and "G" dimensions may be different. It is very important that sufficient clearance exist in the toolholder for the clamp to drop down far enough into the holder to attain clamping action on the insert.

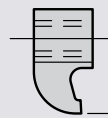
CLM20



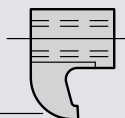
CLM22



CLM19



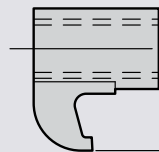
CLM6



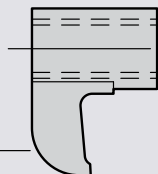
CLM7



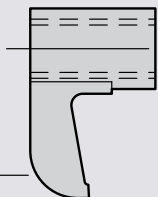
CLM9



CLM12

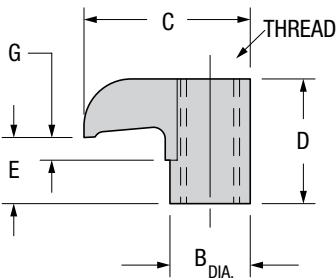


CLM30



Clamp Interchangeability

Order Number	Clamp Dimensions (mm)						Thread
	B	C	D	E	G		
CLM6	7,87	14,73	11,18	4,83	2,29		M5 x 0.8
CLM7	7,87	16,26	7,87	1,65	-		M5 x 0.8
CLM9	10,87	19,05	16,76	8,89	3,05		M8 x 1
CLM12	10,87	22,35	17,53	8,89	3,05		M8 x 1
CLM19	7,87	13,97	7,11	1,65	-		M5 x 0.8
CLM20	9,47	18,54	10,16	3,30	-		M6 x 1
CLM22	9,47	21,59	13,46	7,11	3,30		M6 x 1
CLM24	12,52	25,40	19,81	11,68	3,30		M10 x 1.25
CLM30	10,87	25,40	16,76	8,89	3,05		M8 x 1



Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
 EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
 CN +86-731-89954796 • info@greenleafcorporation.com.cn
 www.greenleafglobalsupport.com • www.greenleafcorporation.com

Greenleaf Sales**US** +814-763-2915 • sales@greenleafcorporation.com**EU** +31-45-404-1774 • eurooffice@greenleafcorporation.com**CN** +86-731-89954796 • info@greenleafcorporation.com.cnwww.greenleafglobalsupport.com • www.greenleafcorporation.com

Greenleaf Advanced Whisker-Reinforced Ceramic Inserts

Greenleaf advanced whisker-reinforced ceramic inserts exhibit excellent wear and shock resistance at high surface speeds. These insert grades are very effective at machining nickel- and cobalt-based super alloys and other hard materials at metal removal rates up to 10 times greater than carbide.

The Ceramic Productivity Manual will help you to machine more effectively with WG-300®, WG-600® and WG-700™. For additional technical support, contact a Greenleaf representative at 1-814-763-2915.



Greenleaf Corporation is continually upgrading its products. For the most current information, please visit our web site at:

www.greenleafglobalsupport.com

Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
CN +86-731-89954796 • info@greenleafcorporation.com.cn
www.greenleafglobalsupport.com • www.greenleafcorporation.com

Index

	<i>Page</i>
What is a Whisker-Reinforced Ceramic.....	ATI 28
WG-300® Fracture Surface	ATI 28
Physical Properties	ATI 29
How to Use the Properties of Greenleaf Advanced Ceramics	ATI 30
Relative Strength at Elevated Temperatures	ATI 31
Ceramic Application Guidelines.....	ATI 31
Strength Comparison of Ceramic Inserts.....	ATI 32-34
The Application of Greenleaf Advanced Ceramics	ATI 36
Anticipated Tool Life	ATI 37
Speed and Feed vs. Depth of Cut for Round Inserts	ATI 38-39
Lead-Angle Effect on Round vs	ATI 40
Straight-Edged Inserts	
Lead-Angle Effect with Other Than Round Inserts.....	ATI 41
Recommended Depth of Cut for Round Inserts	ATI 41
Recommended Depth of Cut for Insert Nose Radii	ATI 42
Recommended Percentage (%) Reduction.....	ATI 43
of Feed Per Revolution for Other Than Round Inserts (Except Grooving)	
Theoretical Surface Roughness vs.....	ATI 44
Feed and Insert Radius	
The Effect of Increased Clearance on Tool Life	ATI 45
Edge Preparation for Nickel-Based Alloys	ATI 46
Coolant.....	ATI 47
Notching and Correct Tool Path	ATI 48
Pre-Chamfer Parts Whenever Possible	ATI 48
Both on Entry and Exit Surface	

	<i>Page</i>
The Chamfer Ramp Approach	ATI 48-49
To Exit a Cut	ATI 50
Programming Alternatives	ATI 50-55
for Roughing Operations	
Turning to a Shoulder	ATI 56
Double Notching – Not Recommended	ATI 57
for Notch-Sensitive Situations	
Finishing a Fillet	ATI 58-60
Grooving	ATI 61-64
Cut-Off Operation with Ceramic Inserts.....	ATI 65
Thin-Wall Applications	ATI 65-66
Interrupted Cuts.....	ATI 66-67
Surface Hardening	ATI 67
Smearing.....	ATI 67
Impingement	ATI 68
Boring Holes	ATI 68
Wear Mechanisms	ATI 69
Indexing of Inserts	ATI 70
Turning Hard Materials 45-65 Rc.....	ATI 71
Milling of Nickel-Based Alloys.....	ATI 71-72
Targeted Application Areas for Greenleaf Advanced Whisker-Reinforced Ceramic	ATI 73
Starting Point from Advanced Ceramics Graph	ATI 73-74
for Various Materials	

Illustrations

<i>Fig.</i>	<i>Title</i>	<i>Page</i>
1	Fracture Surface 3000x	ATI 28
2	Physical Properties.....	ATI 29
3	Deck-of-Cards Principle	ATI 30
4	Heat Dissipation in Ceramic Machining	ATI 30
5	Relative Strength at Elevated Temperatures.....	ATI 31
6	Ceramic Application Guidelines	ATI 31
7	Insert Shapes and Strengths	ATI 32

<i>Fig.</i>	<i>Title</i>	<i>Page</i>
8	Relative Strength for Various Insert Radii	ATI 32
9	Relative Strength for Various Insert Thicknesses	ATI 32
10	Toolholder System	ATI 33
11	Straight-Edged Inserts vs. Round	ATI 34
12	Shank-Diameter-to-Bar-Length Ratio for Ceramic Inserted Boring Bars	ATI 34
13	Advanced Ceramics Machining	ATI 36
	Recommendations	

Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
CN +86-731-89954796 • info@greenleafcorporation.com.cn
www.greenleafglobalsupport.com • www.greenleafcorporation.com

Illustrations *continued*

Fig.	Title	Page
14	Anticipated Tool Life	ATI 37
15	Surface Speed and Feed Rate (%)..... vs.Depth of Cut of Radii (IMPERIAL)	ATI 38
16	Surface Speed and Feed Rate (%)..... vs.Depth of Cut of Radii (METRIC)	ATI 39
17	Lead-Angle Effect on Round	ATI 40
	vs. Straight-Edged Inserts and the Theoretical Chip Thickness	
18	Lead-Angle Effect.....	ATI 41
19	Recommended Depth of Cut for	ATI 41
	Round Inserts	
20	Recommended Depth of Cut for	ATI 42
	Insert Nose Radii	
21	Feed Adjustment for Straight-Sided Inserts	ATI 43
22	Theoretical Surface Roughness	ATI 44
23	The Effect of Increased Clearance	ATI 45
	on Tool Life	
24	Standard Edge Preparations	ATI 46
25	Coolant.....	ATI 47
26	Chamfering Techniques.....	ATI 48
27	Straight Facing	ATI 48
28	Chamfering and Facing	ATI 48
29	Ramp Approach to Pre-Chamfering	ATI 49
	(Straight-Edged Inserts)	
30	Ramp Approach to Pre-Chamfering	ATI 49
	(Finishing)	
31	Ramp Approach to Pre-Chamfering	ATI 49
	(Corner Examples)	
32	Pre-Chamfer to Eliminate Burrs.....	ATI 50
33	Rethink Depth of Cut.....	ATI 50
34	Multiple Passes at the Same Depth of Cut.....	ATI 51
35	Multiple Passes at Varying Depths of Cut	ATI 51
36	Multiple Passes Using Ramping.....	ATI 51
37	Ramping/Negative Inserts.....	ATI 52
38	Ramping/RPGN-RCGN	ATI 52
39	Optimized Ramping Technique	ATI 53
40	Optimization of Ramping Technique	ATI 54
	with 1/2" Round Inserts	
41	Various Ramping Methods.....	ATI 55
42	Boring a Cavity with WG-300®	ATI 55
43	Chip Being Trapped Against Shoulder	ATI 56

Fig.	Title	Page
44	Avoid Leaving Scallop at Shoulder	ATI 56
45	Tool Engagement Angle.....	ATI 56
46	Double Notching/Carbide Method – <i>Beware</i>	ATI 57
47	Double Notching/Ceramic Method	ATI 57
48	Finishing a Fillet Using an 80°-Diamond	ATI 58
	Insert (Plunge Cut)	
49	Finishing a Fillet Using a Grooving Tool	ATI 59
	and a Round Insert	
50	Turning to a Shoulder in Cavities with	ATI 59
	V-Bottom Grooving Inserts	
51	Ramping Effect on Shoulder Cuts	ATI 60
52	Grooving Feeds	ATI 61
53	Thin-Wall Grooving.....	ATI 62
54	Widening Cavity Techniques.....	ATI 62
55	Additional Cavity Techniques.....	ATI 63
56	Additional Cavity Techniques.....	ATI 63
57	Ramping in Cavities.....	ATI 64
58	Producing a Test Sample	ATI 64
59	Ceramic Inserts Used in Cut-Off Operations.....	ATI 65
60	Thin-Wall Heat Penetration.....	ATI 65
61	Cutting Direction Resultant Forces.....	ATI 65
62	Interrupted Cuts	ATI 66
63	Edge Preparations	ATI 67
64	Smearing	ATI 67
65	Impingement.....	ATI 68
66	Spindle Overhang Increasing.....	ATI 68
67	Spindle Overhang Decreasing.....	ATI 68
68	Tool Wear.....	ATI 69
69	Indexing of Round Inserts (Due to Notching)	ATI 70
70	Indexing of Round Inserts.....	ATI 70
	(Due to Notching and Wear)	
71	WG-300® Machining Recommendations.....	ATI 71
	for Hardened Materials	
72	Recommended Speed Increase for Milling	ATI 72
	with Various Declining Widths of Cut	

Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
 EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
 CN +86-731-89954796 • info@greenleafcorporation.com.cn
 www.greenleafglobalsupport.com • www.greenleafcorporation.com

What is a Whisker-Reinforced Ceramic?

Greenleaf WG-300®, developed by Greenleaf Corporation, is the first commercially available ceramic composite using the technology of whisker reinforcement. It can operate up to 10 times the speed used for uncoated carbide tools.

Greenleaf WG-600® is the first commercially available coated, whisker-reinforced ceramic composite. Greenleaf WG-600 offers up to 30% speed improvement and up to 3 times tool life over uncoated ceramics.

Greenleaf WG-700™ is the newest whisker-reinforced ceramic substrate. Featuring improved toughness and a unique high-speed coating, WG-700 is ideal for machining nickel- and cobalt-based super alloys and other difficult-to-cut materials. WG-700 offers high metal removal rates with exceptional tool life.

The basic concept involves reinforcing a hard ceramic matrix with extremely strong, stiff, silicon-carbide crystals, commonly called whiskers.

These whiskers are grown under carefully controlled conditions and, due to their high purity and lack of grain boundaries, approach the theoretical maximum strength obtainable. This strength is calculated to be in the order of 1 million psi (6,900 MPa) tensile!

The super-strong whiskers are dispersed into a matrix of fine-grained aluminum oxide where they act much like

glass filaments do in fiberglass, for example, by adding tensile strength and improving the fracture toughness of the brittle matrix.

The increase in the fracture toughness of the material is such that inserts are now offered without hones as a standard, making them suitable for finish cuts on most forged nickel-based alloys without "smearing."

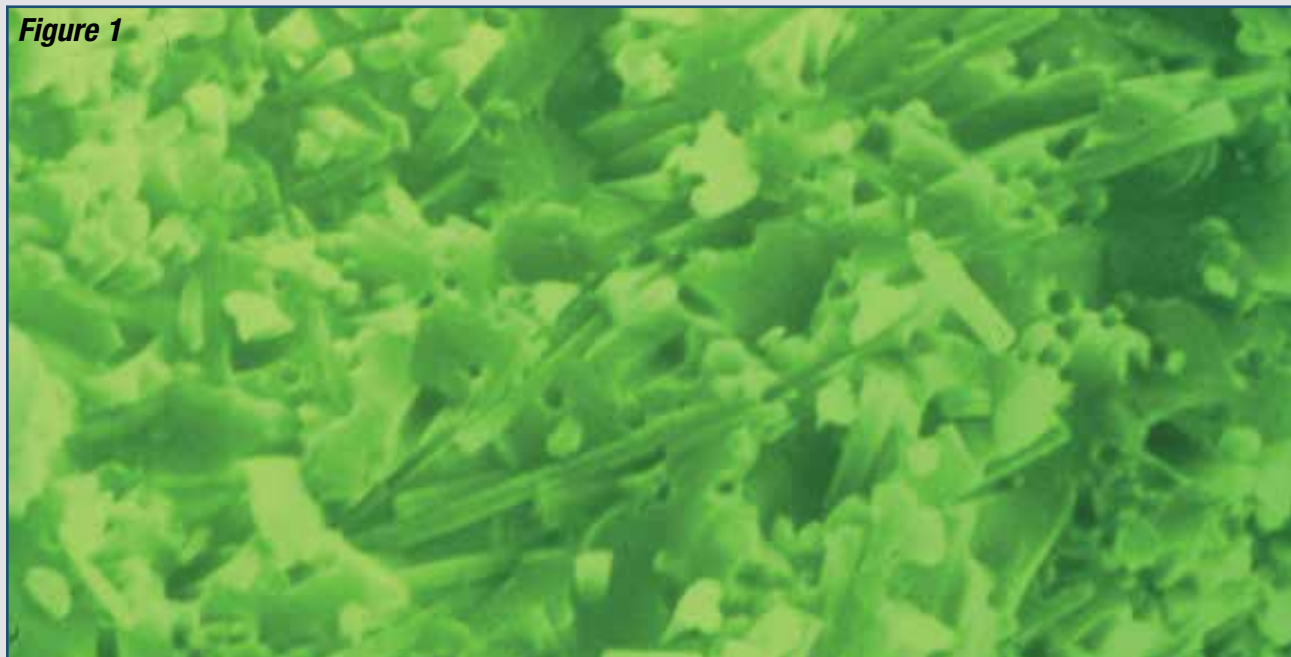
A properly manufactured whisker-reinforced ceramic has outstanding thermal and mechanical shock resistance. It can withstand intermittent cut applications, such as in milling, without breakage.

WG-300® Fracture Surface

The fracture toughness of a whisker-reinforced ceramic is enhanced by the phenomenon of whisker "pull-out." A close examination of the fracture surface at 3000x will reveal not only a clear indication of the whiskers randomly dispersed throughout the matrix, but also the obvious hexagonal holes where whiskers have actually been pulled out in the fracture process. A large amount of energy is required to pull the whiskers out. This greatly enhances the fracture toughness and the high predictability of the inserts.

Greenleaf WG -300® will not fail by catastrophic breakage unless grossly misapplied, but will be gradually consumed in a predictable wear pattern. This wear pattern will be unlike the wear modes of carbide tools. It is the subject of a later paragraph in this section and should be studied and clearly understood for successful results.

Figure 1



Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
CN +86-731-89954796 • info@greenleafcorporation.com.cn
www.greenleafglobalsupport.com • www.greenleafcorporation.com

SEM Photomicrograph 3000x

Physical Properties

Physical properties are only a rough indicator of cutting tool performance. Ceramic cutting tools should always be evaluated in actual service where the synergisms of material properties and cutting-tool engineering can be clearly seen.

Particular note should be made that "Modulus of Rigidity" or "Transverse Rupture Strength" is expressed according to the accepted laboratory procedures for ceramics.

Here, a 2" (50,8 mm) long sample is broken by a four-point bend test. It is more common to refer to the 9/16" (14,3 mm) long three-point test in the case of carbide, and some manufacturers use this test also for ceramics. Naturally, the T.R.S. values for ceramic on the 2" (50,8 mm) sample are appreciably lower than they would be on a 9/16" (14,3 mm) test bar.

Figure 2 – Physical Properties

Microstructure	2 Phase Polycrystalline > 50% Alumina < 50% Silicon Carbide Whiskers
Density	= 3.74 g/cc
Melting Point	2040°C (3,700° F)
Hardness	≥ 94.4 RA
Modulus of Rigidity (E) (4-Point Bend)	} TRS = { 100,000 P.S.I. ± 6,000 690 MPa ± 41
Young's Modulus (E) Modulus of Rigidity(G)	
Poisson's Ratio (M) $M = \frac{E}{2G} - 1$	= .23
Fracture Toughness (Measures resistance of crack growth from stress)	
Cemented Carbide	= 13.0
Hot Pressed Composite	= 3.8
WG Ceramics	= 10.0

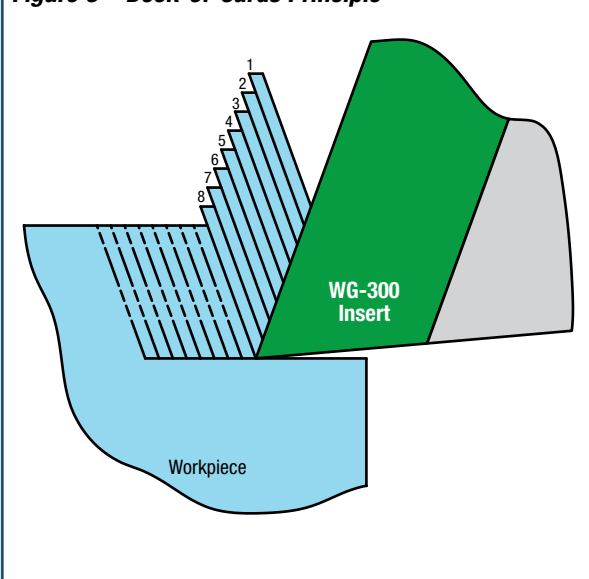
Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
CN +86-731-89954796 • info@greenleafcorporation.com.cn
www.greenleafglobalsupport.com • www.greenleafcorporation.com

How to Use the Properties of Greenleaf Advanced Ceramics

During the metal-removal operation, material is displaced ahead of the tool by being forced through a “shear zone” and subsequently sliding over the rake face of the tool as a chip. This action has been studied by numerous researchers including “Piispanen and Merchant,” who demonstrated the mechanism of chip formation, likening it to the sideways slide of a deck of cards, caused by the rake face of the tool. (Figure 3)

Figure 3 – Deck-of-Cards Principle



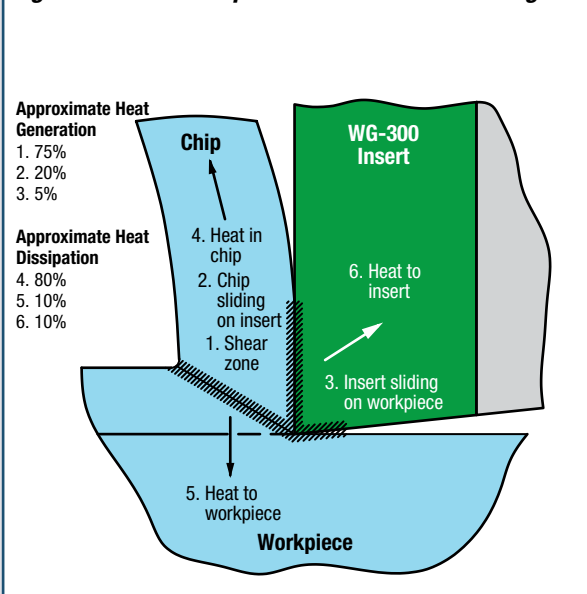
The chip is formed first by grain boundary distortion in front and below the shear plane, followed by grain boundary dislocation. This results in a chip that is always thicker than the layer of material being removed.

A large amount of shear stress is required to cause plastic deformation and shear to occur in the “shear zone,” and this results in the generation of significant quantities of heat. In fact, as much as 75% of the heat generated during cutting is produced in this way. The other 25% comes from the sliding of the chip over the tool rake face and the contact of the flank of the tool with the workpiece. (Figure 4)

Most of the heat generated during metal cutting is dissipated by the chip carrying it away. As cutting speeds increase, the metal-cutting process becomes more adiabatic. In other words, the heat generated in

the “shear zone” cannot be conducted away during the very short time in which the metal passes through this zone. We can benefit from the heat generation, temperature rise and softening effects in the “shear zone.”

Figure 4 – Heat Dissipation in Ceramic Machining



The heat generated in the “shear zone” has been traditionally thought of as a negative factor since it is also associated with heat-related failure of cemented carbide cutting tools. This often leads to the need to slow down the cutting operation to a point where carbide inserts will give acceptable life.

Whisker-reinforced ceramics are able to withstand high temperatures while maintaining strength and hardness, and it has been shown that contrary to traditional methods of machining, we can, in fact, use the heat generated in the shear zone ahead of the tool to our advantage. There is an optimum speed outside the range of carbide tools where the heat generated lessens the cutting forces by softening the metal and aiding in the grain boundary dislocation.

This advantage can be very dramatic, sometimes moving the possible metal-cutting speeds from a few hundred feet per minute to thousands of feet per minute!

Such is the case with Greenleaf’s whisker-reinforced ceramics when applied to most forged nickel-based alloys. Optimum speeds can be achieved with temperatures exceeding 1000° Celsius.

The excellent thermal shock resistance of whisker-reinforced ceramics results in a cutting material which can be used either dry, wet or even intermittently cooled without fear of catastrophic tool failure from thermal cracking.

Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
 EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
 CN +86-731-89954796 • info@greenleafcorporation.com.cn
 www.greenleafglobalsupport.com • www.greenleafcorporation.com

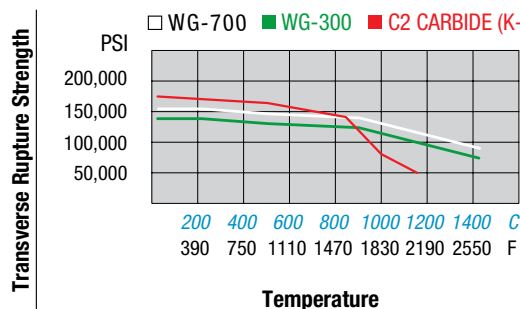
The outstanding hardness of Greenleaf whisker-reinforced ceramic inserts, combined with the high strength imparted by the reinforcing silicon-carbide whiskers, makes possible the machining of many materials previously workable only by grinding. Heat-treated alloy steels, die steels, weld overlays, and hard irons with interrupted cuts are just a few of the successful applications completed on a daily basis.

If your job is in the 45Rc to 65Rc range, chances are that Greenleaf's whisker-reinforced ceramic inserts can increase productivity and cut machining costs substantially.

Relative Strength at Elevated Temperatures

It is important to recognize that laboratory hardness and strength tests are conducted at room temperatures. Under actual cutting conditions where temperature at the tool/chip interface may reach over 1000° C, Greenleaf whisker-

Figure 5 – Relative Strength at Elevated Temperatures



reinforced ceramics will retain high strength and hardness well beyond the point at which a tungsten-carbide material has softened, deformed or failed completely. Productivity advantages multiply quickly in this range of application.

Ceramic Application Guidelines

Rethink the process

The correct application of ceramic tooling on a CNC machine necessitates reprogramming of the part. Since we are doing this, we might just as well re-examine the entire process. Are we using the best geometry,

largest radius, thickest insert, best tool path, etc.?

When you have studied this application guide, you will be more aware of the variables and best approaches to the job using ceramic cutting tools.

Integrate the following tested methods into your programs:

Figure 6 – Ceramic Application Guidelines

1. Use a toolholder system designed for ceramic inserts.
2. Use the strongest insert shape possible.
3. Use the largest corner radius possible.
4. Use the correct edge preparation for the application.
5. Use the thickest inserts available for roughing.
6. Use a toolholder or boring bar with the largest possible cross section.
7. Consider heavy metal or carbide bars for boring applications.
8. Prechamfer on entry and exit whenever possible.
9. Keep toolholder overhang to a minimum.
10. **Rethink the process**

Greenleaf Sales

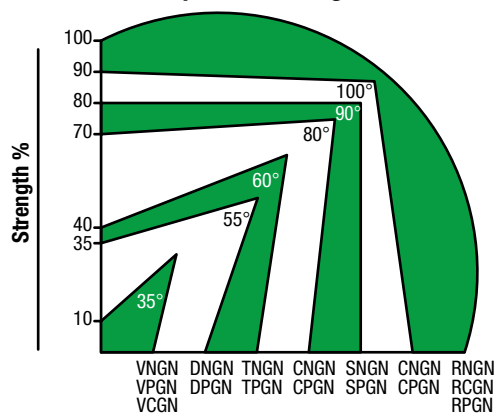
US +814-763-2915 • sales@greenleafcorporation.com
 EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
 CN +86-731-89954796 • info@greenleafcorporation.com.cn
 www.greenleafglobalsupport.com • www.greenleafcorporation.com

Strength Comparison of Ceramic Inserts

Use the strongest insert shape

In declining order of corner strength, the strongest inserts are: Round, 100° Diamond, Square, 80° Diamond, Triangle, 55° Diamond, and 35° Diamond. Always use the strongest possible shape to maximize corner strength and metal-removal capability.

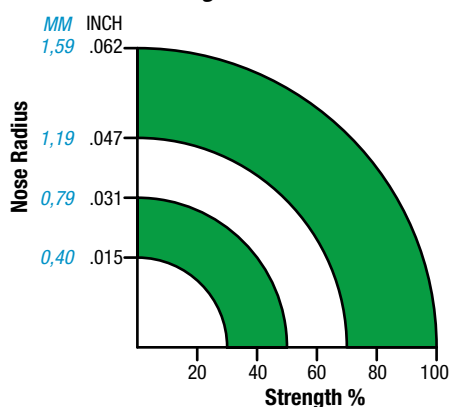
Figure 7 – Insert Shapes and Strengths



Use the largest corner radius possible

The larger the corner radius, the stronger the corner. Do not attempt to do all roughing operations with a small corner radius just because the finished fillet calls for a small radius. Use a round insert or large radius insert for roughing and change the tool for the final cuts.

Figure 8 – Relative Strength for Various Insert Radii

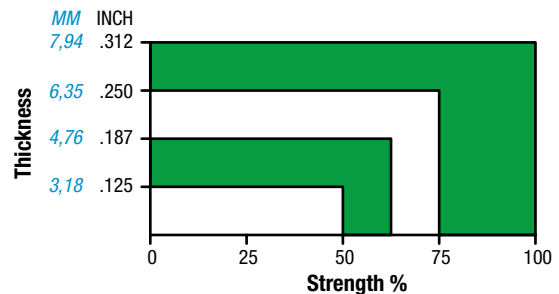


Use thick inserts for roughing

Increased insert thickness results in far better impact resistance, better heat dispersion, and longer tool life.

This adds to greater predictability of performance and less downtime.

Figure 9 – Relative Strength for Various Insert Thicknesses

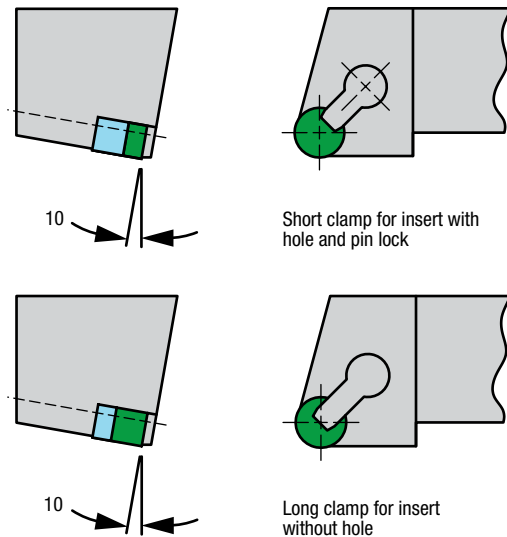


Greenleaf Sales

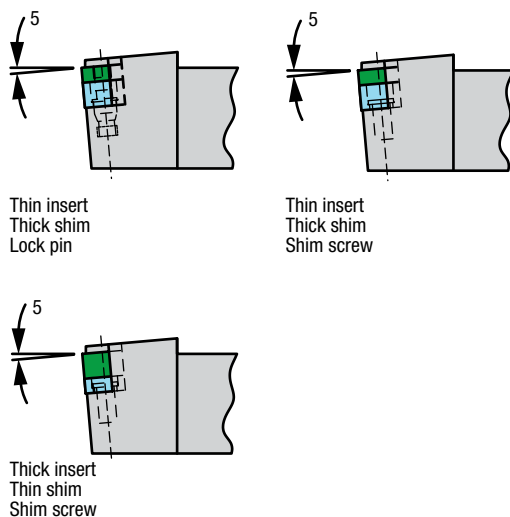
US +814-763-2915 • sales@greenleafcorporation.com
EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
CN +86-731-89954796 • info@greenleafcorporation.com.cn
www.greenleafglobalsupport.com • www.greenleafcorporation.com

Figure 10 – Toolholder System

Side Rake



Top Rake



Use the Greenleaf toolholder system

The use of Greenleaf toolholders and accessories permits:

- Either standard or thick inserts to be used in the same toolholder by changing shim seats.
- The toolholders can be used for pinlock-style inserts by exchanging the shim screw for a tilt pin.
- Alternative lengths of clamps are available with the holder being supplied standard with the large clamp to ensure good retention of ceramic inserts without holes.
- In the case of negative-rake tooling, we have found that the normal carbide tool geometry of -5° top and side rake may be changed very advantageously to -5° top rake, and -10° side rake for materials under 45Rc hardness. Greenleaf tools for use with whisker-reinforced ceramics are illustrated in the Ceramic Toolholders in the Turning section of this catalog and have been designed to take advantage of this increased negative rake which will give longer tool life. The increased pressure associated with a greater negative rake is insignificant and not evident at the high velocity and temperatures at which these tools are used.

NOTE:

Greenleaf toolholders for v-bottom inserts are designed to take 7° side-clearance inserts as well as 11° .

Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
CN +86-731-89954796 • info@greenleafcorporation.com.cn
www.greenleafglobalsupport.com • www.greenleafcorporation.com

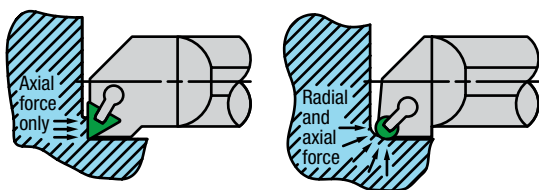
Use toolholder or boring bar with greatest cross sectional area

Stability of the tool and freedom from deflection are paramount to consistent performance. If the tool post will accept 1-1/4" (32 mm) shanks, do not be satisfied to take a 1" (25 mm) shank and shim it to suit. This is false economy.

Straight-edged inserts versus rounds

Long overhangs for tools are necessary when working with turrets in order to clear other tools. In these cases, straight-edged inserts should be applied to eliminate radial tool forces and avoid chatter.

Figure 11 – Straight-Edged Inserts vs. Round



Keep overhang to a minimum

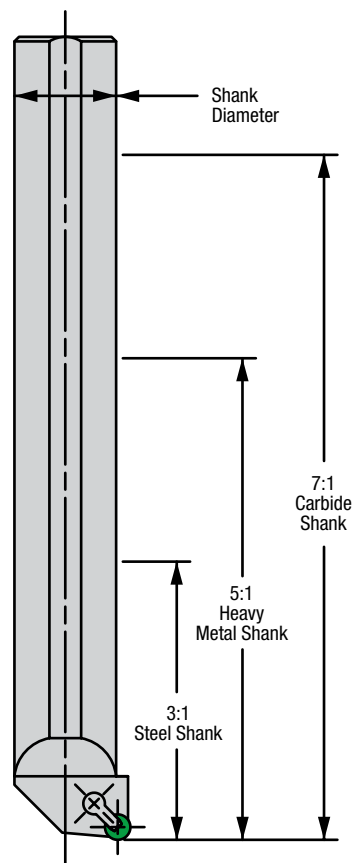
Any deflection will lead to vibrations, which are particularly damaging to ceramic tools. Unnecessary tool overhang is the principle cause of vibration. It should be noted, the force required to produce a particular deflection decreases by the cube of the overhang! That means that doubling the overhang will increase deflection eight (8) times if all other conditions are constant.

Boring bars, in particular, usually operate with much greater length-to-diameter ratios than turning tools. In this case, "heavy" metal or solid-carbide bars are often easily justified.

Solid-carbide boring bars have three (3) times the modulus of elasticity of a steel bar. This means that a carbide bar will only deflect 1/3 as much as a comparable steel bar under identical circumstances.

As a general rule, when machining nickel-based alloys, steel boring bars will give adequate performance at overhang-to-bar diameter ratios of up to 3:1. Special boring bars manufactured from "heavy" metals give an advantage over steel bars and can be used at ratios up to 5:1. Carbide boring bars extend this range to ratios up to 7:1.

Figure 12 – Shank Diameter-to-Bar-Length Ratio for Ceramic Inserted Boring Bars



Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
 EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
 CN +86-731-89954796 • info@greenleafcorporation.com.cn
www.greenleafglobalsupport.com • www.greenleafcorporation.com

[illegible]

ATI 35

The Application of Greenleaf Advanced Ceramics

Feed and speed recommendations are expressed in the graph below (Figure 13). This graph is based on empirical data gathered during extensive testing under shop conditions.

The most significant factors are the hardness of the material and the surface condition. It is on the basis of these parameters that the data are presented.

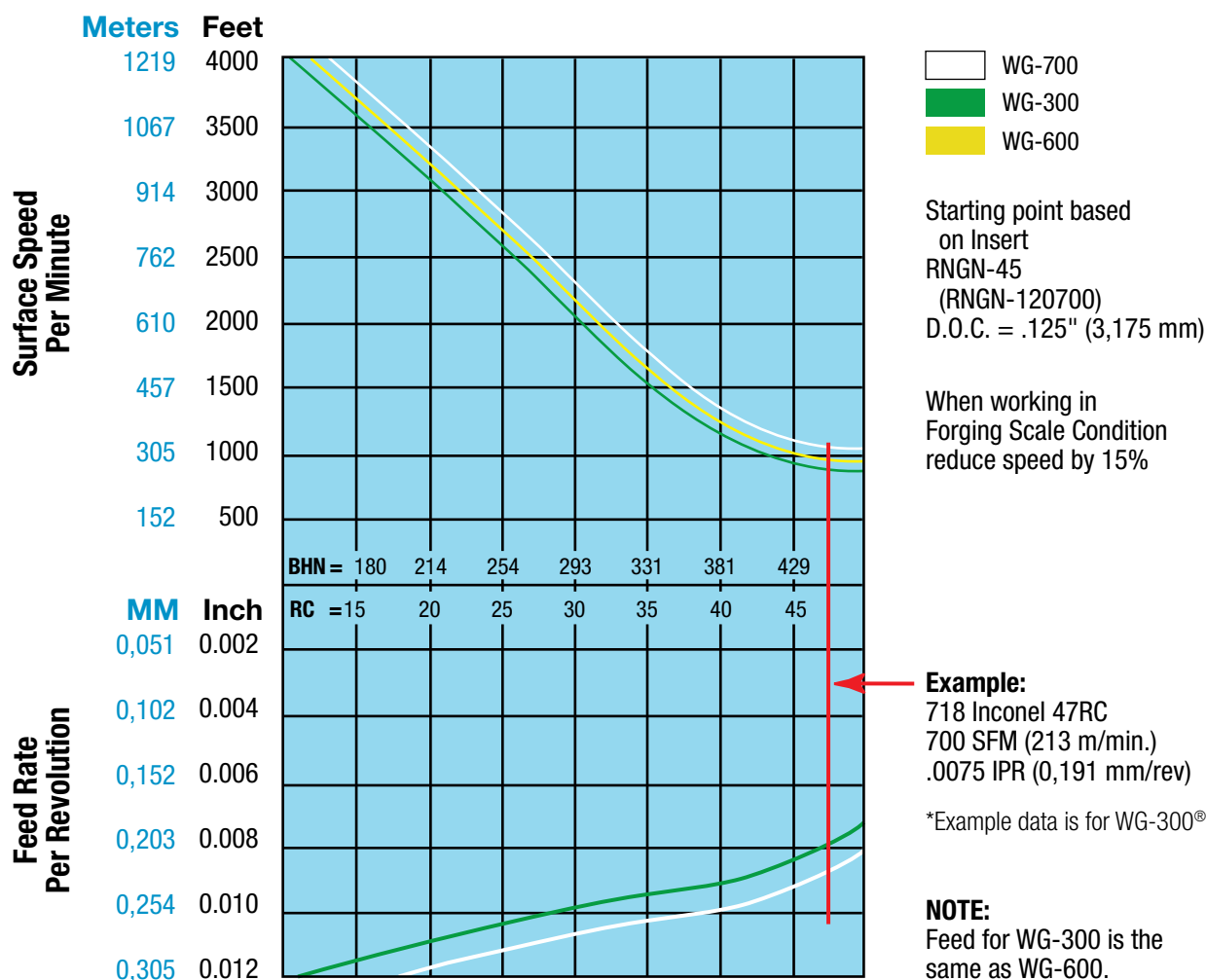
To achieve optimum cutting conditions, it is necessary to regulate not only the speed but also the feed. There must be a carefully balanced relationship between the speed and the feed. The higher temperatures required can be generated

by a slower speed than the optimum, provided that the chip is thinned by reducing the feed.

Any reduction of speed from the recommended starting points without a corresponding decrease in feed results in a thicker, cooler chip and an increase in cutting forces. This may result in shortened tool life or failure by chipping and breakage.

It must be noted that thick chips provide a larger heat sink and tend to be cooler and stiffer, and that thin chips do not have sufficient heat absorbing capacity and tend to be too hot. For each metal hardness and surface condition, there is a speed and a feed at which the best temperature balance is obtained.

Figure 13 – Greenleaf Advanced Ceramics Machining Recommendations



Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
CN +86-731-89954796 • info@greenleafcorporation.com.cn
www.greenleafglobalsupport.com • www.greenleafcorporation.com

How to use Figure 13 graph:

- 1) Feed and speed are based on RNGN-45 (12 07 00) round inserts. When using inserts with weaker shapes such as triangles, etc., some reduction of feed will be required. (Figure 21)
- 2) **You must know the physical hardness of the material.**
- 3) The recommendations are based on an average depth of cut of .125" (3,175 mm). Deeper depths will require some reduction of speed and feed, and shallower depths can be cut at elevated speeds and feeds. See Figures 15 & 16.
- 4) From the material hardness, move vertically downward to the curve and then horizontally to the left to read the recommended feed rate per revolution.
- 5) Whenever the recommended speed is not achievable on the machine tool, then the recommended feed must be reduced by the same percentage (%), i.e.
 Speed recommended – 2000 SFM (610 m/min.)
 Feed recommended – .010" I.P.R. (0,254 mm)
 Top speed on machine –
 1000 SFM (305 m/min.) = 50% of
 recommended speed then use feed of
 .005" I.P.R. (0,127 mm)

The feed and speed are based upon the ability of the ceramic insert to withstand high temperatures and to run with a chip thickness which results in heat being concentrated in the shear zone ahead of the tool. This will reduce cutting pressure and minimize wear. If the speed is reduced without a corresponding reduction in feed, this effect will be lost and performance will fall off due to chipping of the cutting edge from a colder chip.

General starting speeds should be eight times the uncoated carbide speeds and four times coated carbide speeds.

Compared to sialon materials, speed and then feed should be increased 25% to 50%.

Rule of thumb when cutting nickel-based cast material rather than forged material:

1. Increase speed from graph recommended by factor of 2x.
2. Decrease recommended feed to one half of value.
3. Maintain a depth of cut of less than .060" (1,5 mm) for an RNGN-45 (12 07 00) insert.
4. Use plentiful supply of coolant.

Aged and solution treated nickel-based cast alloys – use same parameters as forged materials, except less than .075 (2 mm) DOC for an RNGN-45 (12 07 00) insert.

Anticipated Tool Life

For programming purposes, it is useful to have a starting guideline for anticipated tool life. We present here some approximate values which are based upon actual experience at the maximum recommended depth of cut (1/4 of insert diameter) and at the speed given in the graph. It should be noted that these speeds are up to eight times those used with uncoated carbide tools. Even at the conservative starting values for tool life per corner given, the actual volume of metal removed per index also will be eight times that produced in the same period of time with carbide tools.

Another way of stating this is – five minutes of tool life with a Greenleaf advanced ceramic is equivalent, in work produced, to 40 minutes of life with a carbide tool! *In fact, a carbide tool will never last 40 minutes.*

Figure 14 – Anticipated Tool Life

Starting Points for Time in Cut	
Round Insert	Life per Index
.250" (6,3 mm)	3 min.
.375" (9,5 mm)	4 min.
.500" (12,7 mm)	5 min.

Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
 EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
 CN +86-731-89954796 • info@greenleafcorporation.com.cn
 www.greenleafglobalsupport.com • www.greenleafcorporation.com

Speed and Feed vs. Depth of Cut for Round Inserts

The round insert behaves differently from a straight-sided insert as depth of cut is changed.

Because the chip produced by a round insert is crescent shaped and reduces in thickness toward the finished surface, as the depth is reduced, the thinning chip, combined with increased lead angle, gives a significant drop in pressure at the workpiece surface/tool interface. This means that both speed and feed can be increased without detriment to tool life as depth reduces.

Speed and feed should be increased by a like amount percentage (%) to achieve the best result.

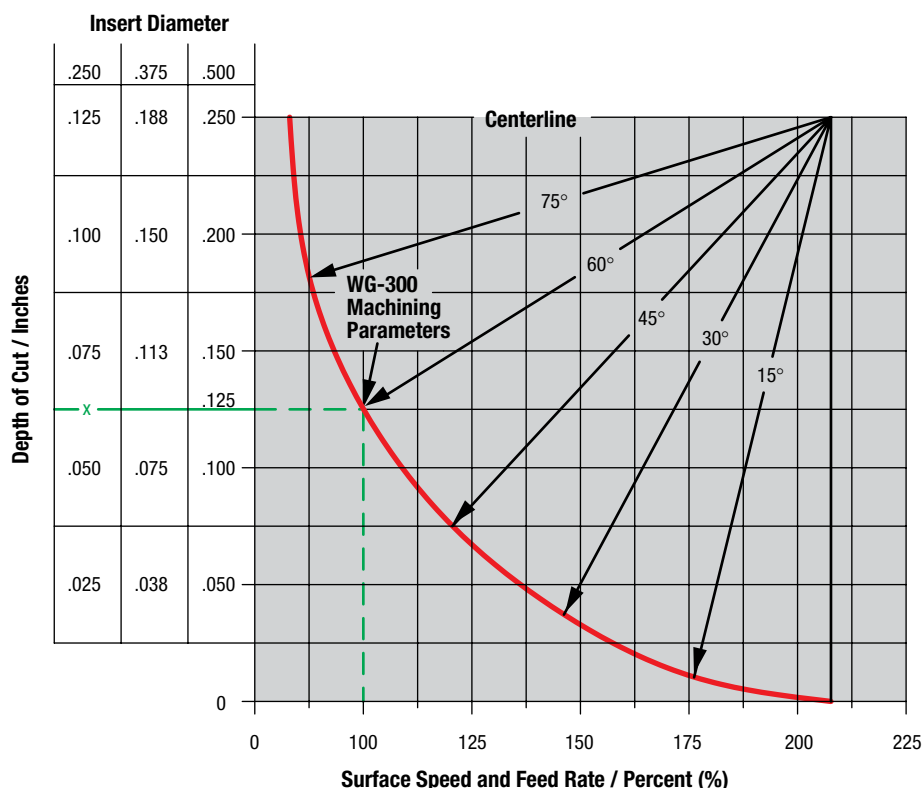
We can now refer to the graph **Surface Speed and Feed Rate/Percent (%) Versus Depth-of-Cut of Radii.** (Figure 15)

1) It will be seen from reference to this chart that the speed/feed graph is set up on .125" (3,18 mm) depth of cut, using a .250" (6,35 mm) radius tool or .500" (12,7 mm) round insert. This results in a depth equal to the 60° mark (90° being half the diameter or radius) and gives a reasonably conservative starting point for most Inconel 718 applications. A slightly shallower depth at around the 45° line will usually give the best tool life in exchange for a small decrease in metal removal rates.

2) Finishing cuts are usually taken at depths of cut less than those set up as reference points on the graph. (Figure 13)

When using round inserts, it will be possible to make substantial increases in both feed and speed beyond the values given in the graph if the depth of cut is less than "X" value.

Figure 15 – Surface Speed and Feed Rate/Percent (%) vs. Depth of Cut of Radii (IMPERIAL)



Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
 EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
 CN +86-731-89954796 • info@greenleafcorporation.com.cn
 www.greenleafglobalsupport.com • www.greenleafcorporation.com

As always, the rule should be applied that feed and speed will be increased together and by the same percentage (%). Failure to regard this rule will result in cooler or hotter interface temperatures with corresponding drop-off of tool performance.

When taking a depth of cut that is less than the graph value for "X," refer to *Figures 15 and 16 (Imperial and Metric)*. Select the insert diameter that best suits the application and provides the depth-of-cut capability that is closest to the graph value of "X," then adjust the speed/feed according to the chart.

For example:

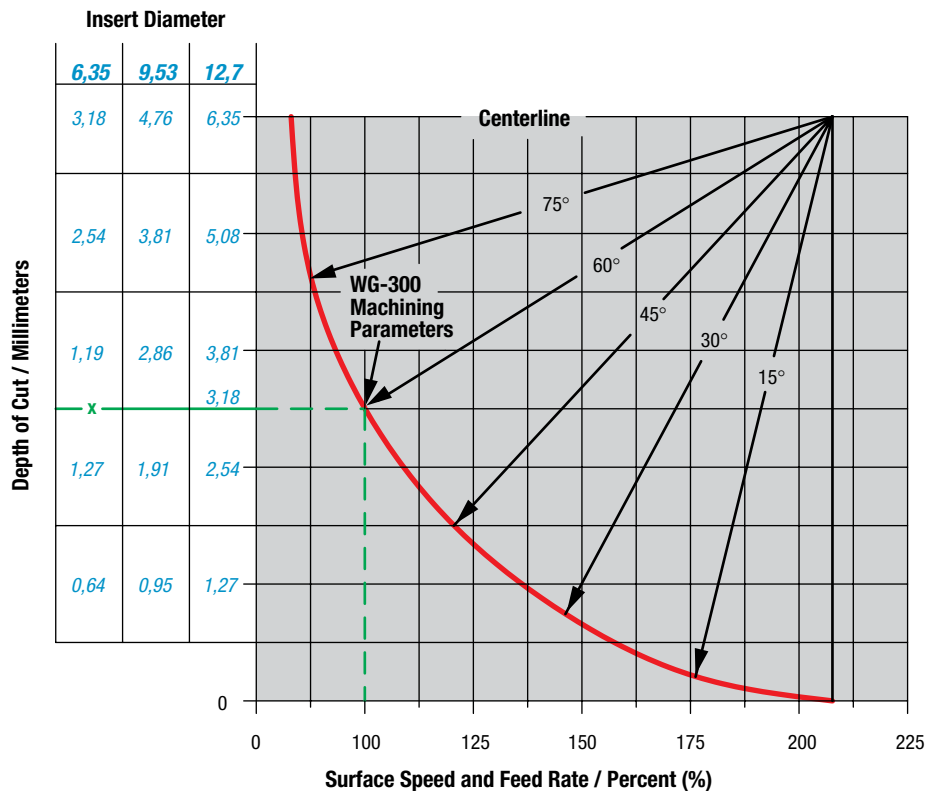
Column 1 is for .250" (6,35 mm) round insert
or .125" (3,18 mm) radius.

Column 2 is for .375" (9,53 mm) round insert
or .188" (4,76 mm) radius.

Column 3 is for .500" (12,7 mm) round insert
or .250" (6,35 mm) radius.

1. Select approximate desired depth of cut
Example: .500" (12,7 mm) diameter round at .050" (1,27 mm) depth of cut is bottom box of column 3.
2. Follow the line to the right until it intersects the heavy curved line.
3. Follow the line vertically downward to the bottom scale and read value of 137% (midway between 125% and 150%).
4. You may increase the speed and feed values in the graph (*Figure 13*) by 37% for this cut.

Figure 16 – Surface Speed and Feed Rate/Percent (%) vs. Depth of Cut of Radii (METRIC)



Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
CN +86-731-89954796 • info@greenleafcorporation.com.cn
www.greenleafglobalsupport.com • www.greenleafcorporation.com

Lead-Angle Effect on Round Versus Straight-Edged Inserts

To emphasize the advantage of using round inserts, let us look at a comparison between the chip-thinning effect obtained at various depths on a round insert compared to the lead angle needed to get the same effect with a straight-edged insert.

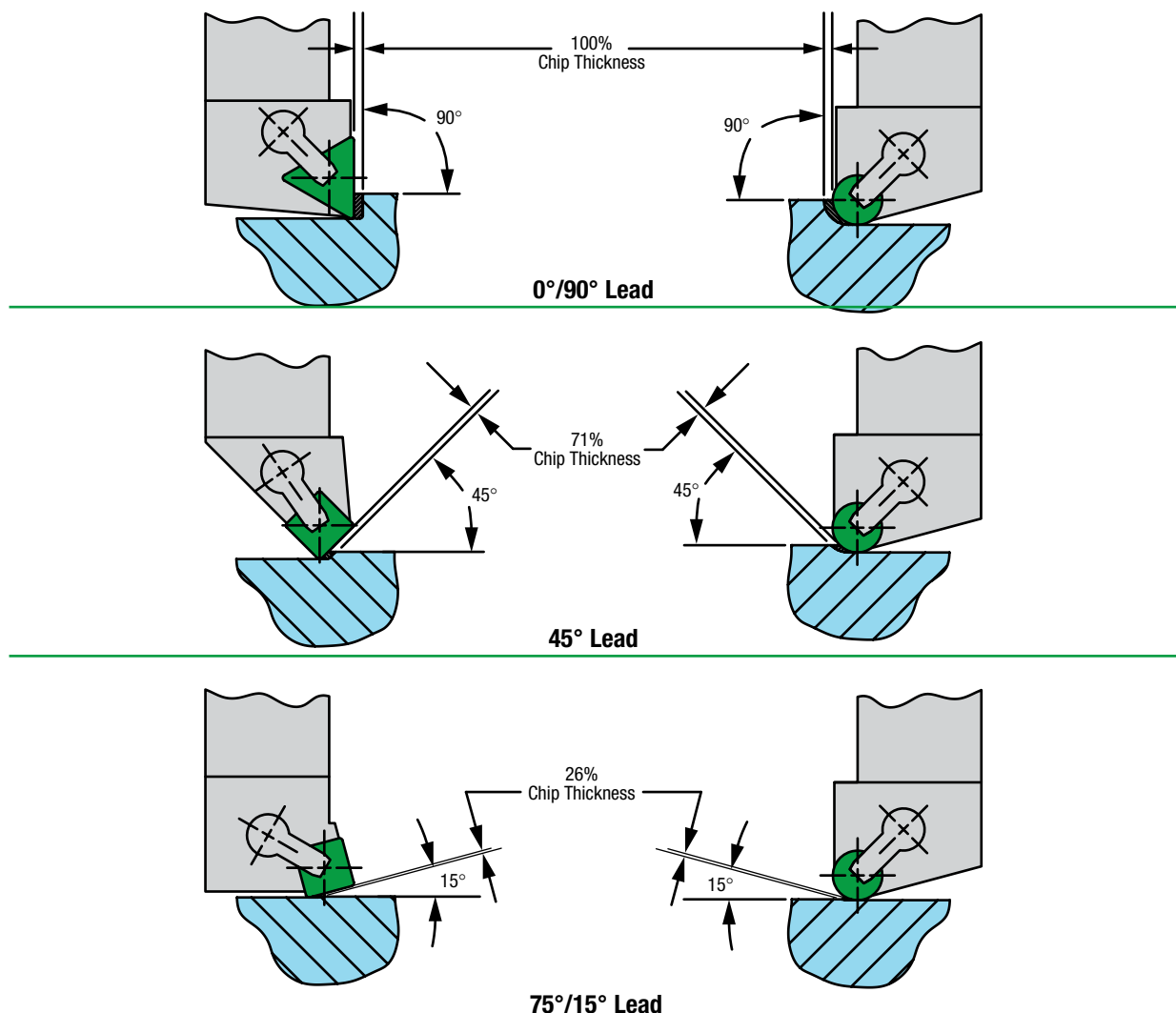
If we assume operations with lighter depths of cut, then a round insert engaged up to 45° or halfway along the available cutting edge and advancing at $.010''$ ($0,25\text{ mm}$) per revolution will produce an actual maximum chip thickness of 71% or $.007''$ ($0,18\text{ mm}$).

The chip actually thins from this point gradually towards the finished surface. To thin the chip to $.007''$ ($0,18\text{ mm}$) with a straight-edged insert requires a lead angle of 45° , which is about the maximum lead angle practical.

Beyond this point, the round insert can be used very easily at 30° or less. To get the same chip-thinning effect from a straight-edged insert requires 60° or more of lead angle which is just not practical.

In summary, the high lead-angle effect with corresponding reduction of pressure, especially at the depth-of-cut line, is more practical with round inserts.

Figure 17 – Lead-Angle Effect on Round vs. Straight-Edged Inserts and the Theoretical Chip Thickness



Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
 EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
 CN +86-731-89954796 • info@greenleafcorporation.com.cn
www.greenleafglobalsupport.com • www.greenleafcorporation.com

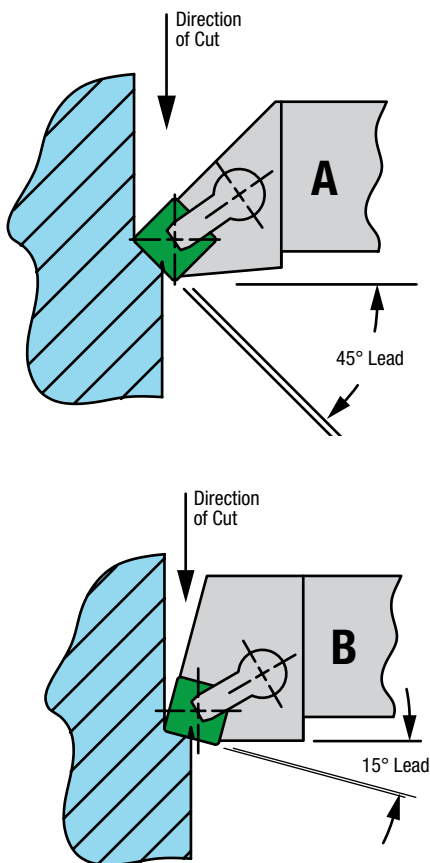
Lead-Angle Effect with Other Than Round Inserts

In the cutting of nickel-based alloys, the lead angle employed is of significance. Larger lead angles reduce chip thickness, improving tool life and surface finish.

Figure 18 shows the change in lead-angle effect. It may be necessary to design tooling which does not stand on traditional carbide values to get optimum performance.

It should be noted that example (A) will produce more pressure on the part piece and may not be feasible on thin sections.

Figure 18 – Lead-Angle Effect



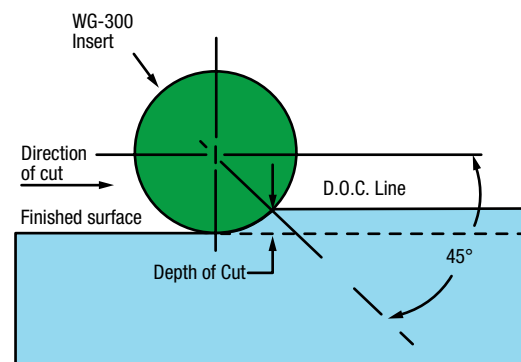
Recommended Depth of Cut for Round Inserts

For best results, there must be a planned relationship between the insert radius and the proposed depth of cut, if the notching effect at the depth-of-cut line is to be minimized.

It will be seen by reference to the illustration, (Figure 19) that there will be a sudden decrease in lead-angle effect beyond a given depth on a given insert radius. This point lies at the intersection of a line drawn at 45° from the center of the insert. The effect of the decreasing lead angle is increased cutting pressures. The deeper the cut with a round insert beyond this point, the greater the depth-of-cut notching.

It is often a clear advantage in nickel-based alloys to make light cuts with relatively large-diameter round inserts. Here are the depths of cut that produce the optimum relationship on given insert sizes.

Figure 19 – Recommended Depth of Cut for Round Inserts



Insert Radius		Optimum Depth of Cut	
Inches	Millimeter	Inches	Millimeter
.125	3,18	.037	0,93
.187	4,76	.052	1,40
.250	6,35	.073	1,86
.312	7,94	.092	2,33
.375	9,53	.110	2,79
.437	11,11	.128	3,26
.500	12,70	.147	3,72

Of course, depths lighter than those given will increase tool life at some penalty of metal removal rate. Refer back to Figures 15 and 16 where we discuss the use of lighter depths of cut combined with increased feeds and speeds.

Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
 EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
 CN +86-731-89954796 • info@greenleafcorporation.com.cn
 www.greenleafglobalsupport.com • www.greenleafcorporation.com

Recommended Depth of Cut for Insert Nose Radii

It is very important in roughing operations with round inserts to leave the recommended amount of stock for finishing with straight inserts.

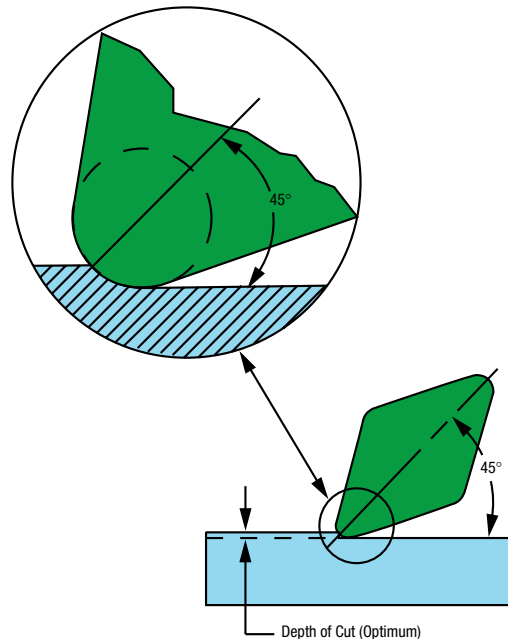
For maximum tool life when using straight-edged inserts with corner radii as opposed to round inserts, a similar effect as described with round inserts is obtained. In this case, the allowable depths of cut are related to the radius and not the insert size, assuming that the depth of cut being attempted is relatively light, such as in finishing operations.

The table to the right shows the *optimum* depth of cut at which maximum tool life (minimum notching) should start.

The accuracy for roughing therefore becomes more important, and the depth of recommended passes for finishing must be as illustrated in *Figure 20*:

A large radius, while having reduced notching tendency, will sometimes be impractical because of radius requirements on the workpiece. Larger insert radii may also cause the deflection of thin sections as a consequence of larger radial forces acting between the tool and the workpiece. A compromise between notching and these factors must often be made. However, it should be remembered that regardless of geometry, cutting force will be lower when using WG-300 high-speed techniques to plasticize the material.

Figure 20 – Recommended Depth of Cut for Insert Nose Radii



Insert Radius		Optimum Depth of Cut	
Inches	Millimeter	Inches	Millimeter
.015	0,38	.0046	0,12
.031	0,80	.0092	0,23
.048	1,21	.0139	0,35
.063	1,59	.0183	0,47
.094	2,38	.0275	0,70
.125	3,18	.0370	0,93

Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
 EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
 CN +86-731-89954796 • info@greenleafcorporation.com.cn
 www.greenleafglobalsupport.com • www.greenleafcorporation.com

Recommended Percentage (%) Reduction of Feed Per Revolution for Other Than Round Inserts (Except Grooving)

When applying inserts other than rounds, there are a number of variables present which have a direct effect on the ability of the insert to tolerate the cutting loads. These variables include the specific corner or nose radius of

the insert, the included angle of the corner (i.e. Triangle, Square or Diamond shape), the lead angle of the cutting tool to be used, the depth of cut selected, and the part piece being machined due to entry and exit angles.

It is possible to look at all of the variables and then apply percentage (%) reduction factors to the recommended feed of the graph (Figure 13) to compensate for them.

In all cases the speed should be maintained as recommended.

Figure 21 – Feed Adjustment for Straight-Sided Inserts

Nose radius	1/64	1/32	3/64	1/16	3/32	1/8
ANSI designation	1	2	3	4	6	8
ISO designation	04	08	12	16	24	32
Inches	.015	.031	.047	.062	.094	.125
mm	0,4	0,8	1,19	1,59	2,38	3,18
Reduction percentage	19%	16%	13%	10%	5%	2%
DOC/inches	0-.050	.125	.250	.375	.500	.750
DOC/mm	0-1,27	3,18	6,35	9,53	12,7	19,05
Reduction percentage	5%	8%	13%	16%	18%	20%
Lead angle	0° & -5°	15°	30°	45°	60°	75°
Reduction percentage	18%	17%	15%	12%	8%	5%
Included angle	35°	55°	60°	80°	90°	100°
Reduction percentage	17%	13%	10%	6%	4%	2%
Part diameter/inches	0-5	10	20	30	40	50
Part diameter/mm	0-127	254	508	762	1016	1270
Reduction percentage	18%	14%	10%	6%	2%	0%

Select and add five reduction percentage (%) factors and subtract from feed rate of graph in Figure 13.

Example: CNGN 432 (120408)

Nose Radius 0.031 (0,8 mm)	=	16%
Assumed DOC .125 (3,18 mm)	=	8%
Lead -5°	=	18%
Included angle (80°)	=	6%
Assumed part dia. 20" (508 mm)	=	10%
		58%

58% reduction of feed rate recommended from graph (Figure 13).

Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
CN +86-731-89954796 • info@greenleafcorporation.com.cn
www.greenleafglobalsupport.com • www.greenleafcorporation.com

Theoretical Surface Roughness vs. Feed and Insert Radius

Rethink the process

The quality of the finished surface is affected directly by the radius of the tool and the feed rate at which the tool is advanced. The larger the radius, the faster the tool may be fed for a given degree of surface finish. The finish is usually stated as surface roughness in micro inches or micro meters.

The chart can be used to determine the combination of tool radius and feed rate for various roughness measurements from 8 micro inches (0,2 micro meters) to 250 micro inches (6,3 micro meters). *Using less feed rate than necessary results in premature tool wear causing bad finish, taper, and size problems.*

Figure 22 – Theoretical Surface Roughness

Roughness average		8	16	32	63	80	100	125	150	200	250
Micro inches (Ra)											
Micro meter (µm)		0,2	0,4	0,8	1,6	2,0	2,5	3,1	3,8	5,0	6,3
Nose radius		Feed rate per revolution									
Inches	.0156	.002	.0025	.004	.0055	.0065	.007	.0075	.008	.010	.011
mm	0,40	0,05	0,06	0,10	0,14	0,17	0,18	0,19	0,20	0,25	0,23
Inches	.0313	.003	.004	.0055	.008	.009	.010	.011	.012	.014	.016
mm	0,79	0,08	0,10	0,14	0,20	0,23	0,25	0,28	0,30	0,35	0,41
Inches	.0469	.0035	.005	.007	.0095	.0105	.012	.013	.015	.017	.019
mm	1,19	0,09	0,13	0,18	0,24	0,27	0,30	0,33	0,38	0,43	0,42
Inches	.0625	.004	.0055	.008	.011	.0125	.014	.015	.017	.020	.022
mm	1,59	0,10	0,14	0,20	0,28	0,32	0,35	0,38	0,43	0,50	0,56
Inches	.0938	.0045	.007	.009	.013	.015	.017	.019	.021	.023	.026
mm	2,38	0,11	0,18	0,23	0,33	0,33	0,43	0,43	0,53	0,58	0,66
Inches	.125	.0055	.008	.011	.016	.018	.020	.022	.024	.027	.031
mm	3,13	0,14	0,20	0,23	0,41	0,45	0,50	0,56	0,60	0,69	0,79
Inches	.1875	.007	.0095	.0135	.017	.021	.025	.027	.030	.034	.040
mm	4,76	0,18	0,24	0,34	0,43	0,53	0,64	0,69	0,76	0,86	1,02
Inches	.250	.008	.011	.016	.022	.025	.027	.031	.034	.040	.044
mm	6,35	0,20	0,28	0,41	0,56	0,65	0,69	0,79	0,86	1,02	1,12

Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
 EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
 CN +86-731-89954796 • info@greenleafcorporation.com.cn
 www.greenleafglobalsupport.com • www.greenleafcorporation.com

The Effect of Increased Clearance on Tool Life

Under normal tool wear circumstances, a tool is said to be “worn out” when the flank wear has developed to the point that surface finish has deteriorated outside of acceptable limits. This is determined when the width of the wear land has decreased clearance and increased heat and pressures in the tool workpiece interface area to the point that further use will lead to complete failure of the tool by severe chipping or catastrophic breakage. On nickel-based alloys, the depth-of-cut notch may become too severe before this flank wear has progressed to that limit.

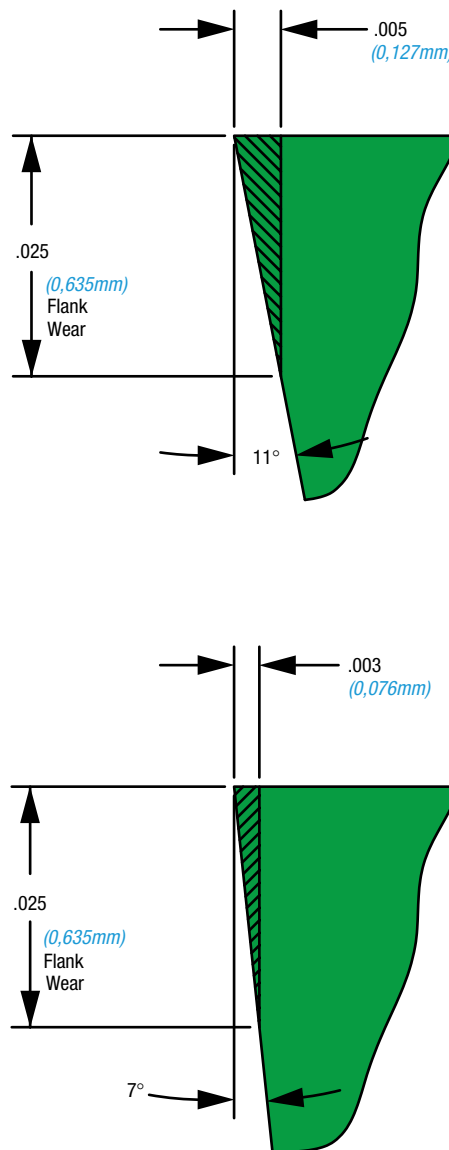
However, assuming that notching is under reasonable control, tool life, as judged by wear land development, can be prolonged by increasing the tool side clearance. With “normal” hot-pressed or cold-pressed ceramic and composites, this clearance is usually limited to about 7° since the materials are too brittle and friable to permit a larger angle. Greenleaf advanced whisker-reinforced ceramics do not suffer from this problem, and large clearances can be used because of the greater edge strength. To view the difference that, for example, an 11° clearance makes compared to a 7° clearance, refer to the illustration. (Figure 23)

It will be seen that with a 7° clearance angle, .003" (0,07 mm) of material will be worn from the insert to produce a .025" (0,64 mm) wear land, whereas .005" (0,12 mm) of material must be worn from an 11° clearance insert to produce the same amount of wear land. This will then equate to increased tool life between indexes.

It is recommended that tooling be carefully evaluated on all operations relative to using clearance angle inserts. In most cases, investments in new tools can be justified.

Remember, a Greenleaf tool is designed to take 7° side-clearance inserts as well as 11°.

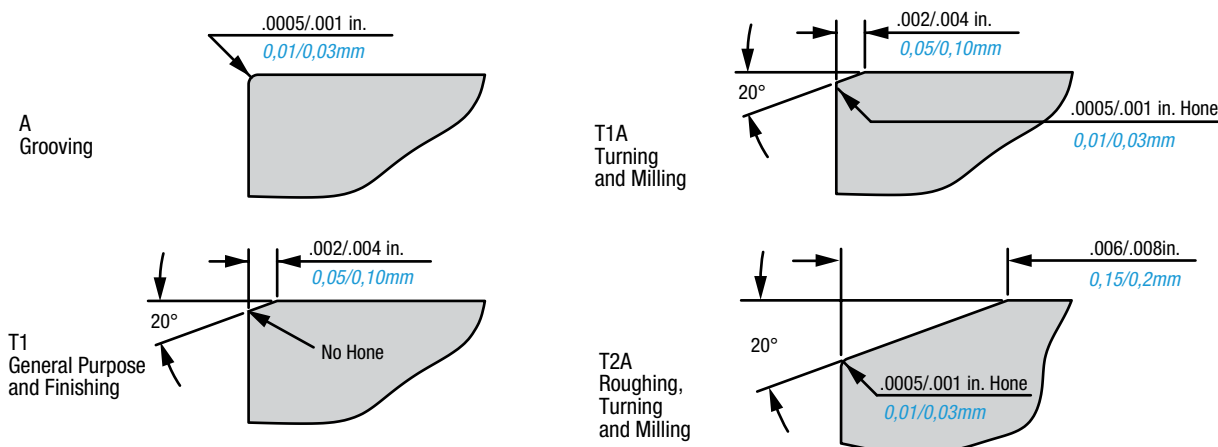
Figure 23 – The Effect of Increased Clearance on Tool Life



Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
CN +86-731-89954796 • info@greenleafcorporation.com.cn
www.greenleafglobalsupport.com • www.greenleafcorporation.com

Figure 24 – Standard Edge Preparations



Edge Preparation For Nickel-Based Alloys

Greenleaf advanced whisker-reinforced ceramics have inherently strong cutting edges, and it is recommended to use them without hones, except when making heavy roughing cuts or in scale conditions. A sharp cutting edge is a clear advantage in finishing operations to avoid “burnishing” and “smearing.”

For most nickel-alloy operations involving light roughing and finishing in clean material, the T1 edge preparation should be standard. *No hone is used.*

In ceramic tool applications, edge preparation is critical to tool life and surface integrity. Edge preparations are used to change the shear forces at the edge to compressive forces, thereby guarding against chipping and breakage.

If we use a wide negative land on a tool and use a very light feed rate, we have in fact changed the geometry of the tool by doing all of the cutting on the land itself. This is incorrect use of a negative land giving rise to a new set of problems. We highly recommend using a T1 edge preparation (.002"-.004" x 20°) (0,05 mm-0,10 mm x 20°) for increased strength with minimum “smearing” effect during finishing operations. (See Figure 24 for more details.) It may be necessary to add a hone (T1A) when light scale conditions or minor interruptions are present.

For milling and roughing other than very heavy-duty machining, a T2A edge prep should be used (.006"-.008" x 20°+.0005" hone) (0,15 mm-0,2 mm x 20°+ 0,013 mm hone).

For most aircraft-type work, T1 and T2A should be the only edge conditions required.

Remember; *never* use a honed edge unless it has been shown conclusively that a hone is required. This should be in very few applications. *Always* start by testing the T1 edge preparation.

The exceptions to the general stated rule would be:

Grooving

Because a grooving tool moves constantly forward into clean material, there is no notching problem in normal usage. Also, a grooving tool is usually a relatively fragile tool especially in the narrow-width grooves found in jet engine work.

For these reasons, we highly recommend that grooving tools do not have a negative land. This will keep cutting forces to a minimum.

For grooving use an “A” hone only.

Heavy Interruptions

In severely interrupted cuts, we need to keep the cutting edge in compression to avoid shear forces. This will reduce chipping and breakage. The chip width is smaller than the negative land width.

Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
CN +86-731-89954796 • info@greenleafcorporation.com.cn
www.greenleafglobalsupport.com • www.greenleafcorporation.com

Coolant

The recommendation to use flood coolant on whisker-reinforced ceramics may appear to be something of a paradox. "How to Use the Properties of Greenleaf Advanced Whisker-Reinforced Cermics", page ATI30, introduces the concept that heat produced by the application of WG-300 plasticizes the metal in front of the cutting edge. This action is desirable and heat is used advantageously. However, it is also desirable to cool the whole operation by flooding it with coolants—thus, the paradox.

Whisker-reinforced ceramics are a good heat conductor compared to ordinary ceramic materials. The heat is pulled away from the tool/workpiece interface into the body of the insert where the coolant can help to maintain a lower tool temperature. We can lower the temperature of the chip with coolant after it has formed and make it more manageable.

Coolant will also help keep the part piece temperature stable to aid in size control and reduce distortion. Use coolant liberally at all times. Unlike ordinary ceramics, the whisker-reinforced grades will not suffer breakage or cracking from intermittent coolant use.

Figure 25 – Coolant



The coolant does not decrease the temperature in the interface area; however, coolant often doubles tool life.

It is important to use clean coolant. This is not a problem when a central coolant system is used. With a stand-alone machine, the coolant must be checked very closely. Water evaporates faster than oil at these high temperatures. Adding more coolant will increase the soluble oil content, which leads to smoking, less cooling effect and shorter tool life. Contamination of the coolant from any material such as cigarette butts, coffee, etc., has proven very detrimental and should be monitored.

High coolant pressure on nickel-based alloys is not as important as volume. A minimum of a 3/8" (10 mm) inside diameter pipe is recommended.

The coolant must be directed exactly on the cutting area without any interference from clamps, screws, or otherwise. Oil-based, water-soluble, emulsion-type coolants have proven to be the best.

The use of straight oils is to be avoided since the hazards of oil smoke and fire exist.

Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
CN +86-731-89954796 • info@greenleafcorporation.com.cn
www.greenleafglobalsupport.com • www.greenleafcorporation.com

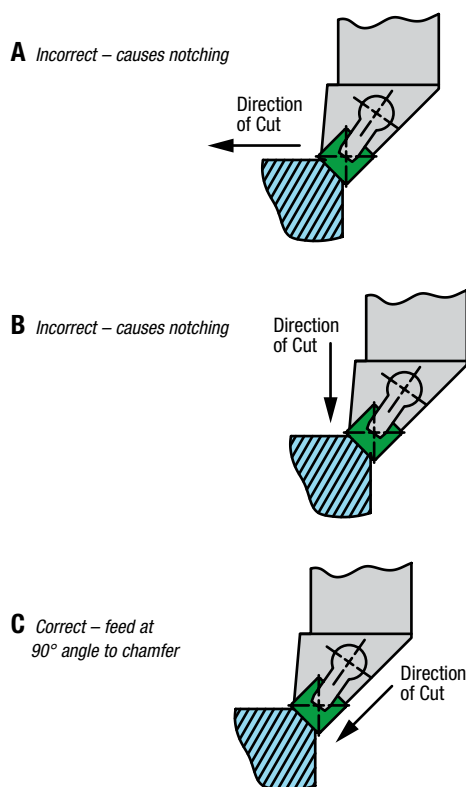
Notching and Correct Tool Path

Of all the precautions that can be taken to reduce or eliminate notching, none are as important as programming the most desirable tool path. It is very important that machine programmers, along with operators and tool engineers, are aware of the programming options. We will examine a series of circumstances that represent standard procedures for carbide tools but produce rapid failure in a notch-sensitive, ceramic material.

Pre-Chamfer Parts Whenever Possible

Pre-chamfering trues the part and ensures a progressive entry onto a true running surface. It also provides a regressive exit from the part and in both cases protects the cutting edge from damage. When using separate pre-chamfer operations as illustrated (Figure 26), the direction of feed is important to eliminate notching. Moving on a single axis, as in examples **A** and **B**, will cause notching. The direction should be at 90° to the chamfer as shown in example **C** to eliminate notching and increase tool life.

Figure 26 – Chamfering Techniques



The Chamfer Ramp Approach

In the illustration (Figure 27) which shows an actual operation on a jet engine rotor, we can see that feeding straight in will produce rapid notch wear. This notch will become a stress-concentration point leading to early failure.

A simple change in the programming of the part (Figure 28) can accomplish chamfering and facing of the part effectively in one continuous operation without any measurable difference in cutting time. This eliminates the separate pre-chamfer operation.

It is important that the program provide a “continuous move” around the part-piece edge. This will keep the material ahead of the cutting edge in a plasticized state, which is desirable for ceramic cutting methods. Another benefit is the elimination of the burr normally created with two operations, i.e. chamfer after or before the turning or facing operation.

Figure 27 – Straight Facing

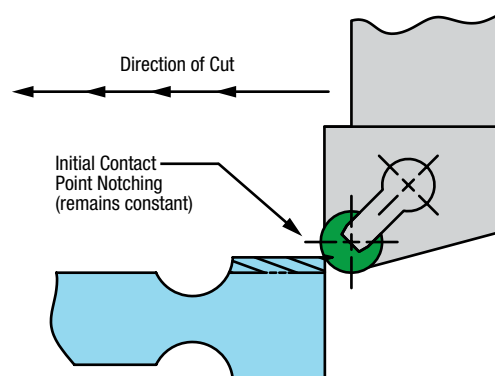
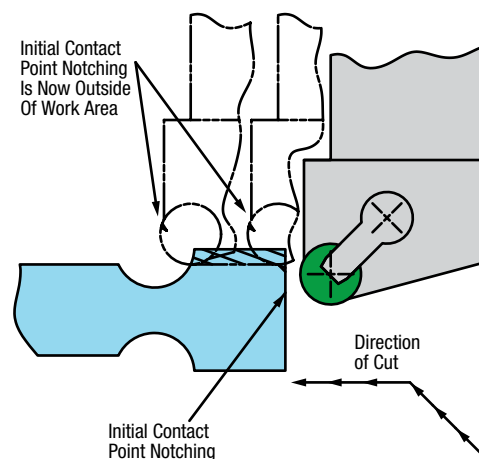


Figure 28 – Chamfering and Facing



Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
 EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
 CN +86-731-89954796 • info@greenleafcorporation.com.cn
 www.greenleafglobalsupport.com • www.greenleafcorporation.com

continued

The technique of generating a chamfer with the same tool used for the turning operation is valid and equally effective in terms of enhanced tool life with any shape of insert, any lead-angle tool and any given insert-corner radius.

In *Figure 29* we show a roughing operation using a square insert. Here we have programmed a 45° move to pre-chamfer the corner prior to the turning operation. This is done in one continuous motion with the 45° move transitioning into the straight turning. In this way, the section of insert in initial contact with the junction of two work-hardened surfaces is now outside the cut path. This will greatly reduce further notching tendencies.

The second example (*Figure 30*) shows a light finishing cut working on the radius of a tool. Once again, the 45° approach to the finish turned surface will reduce any notching effect initiated by the first contact. This programming approach can be used to leave a chamfer on the corner of the workpiece as well as either a radius or a sharp corner. (See *Figure 31*)

Chamfer advantages:

1. Increased tool life
2. No deburr time
3. Chips cannot hang up
4. Higher safety factor

Figure 29 – Producing a Sharp Corner

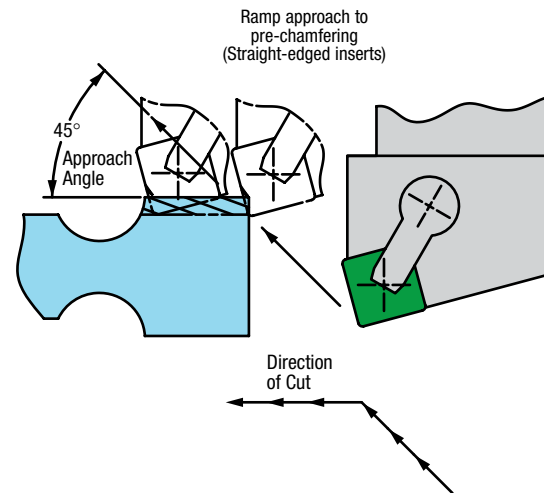


Figure 30 – Producing a Sharp Corner

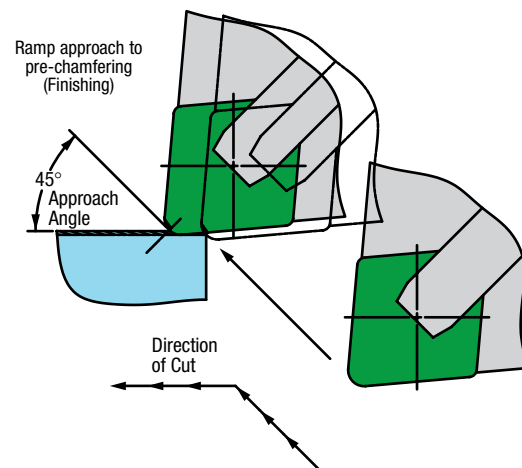
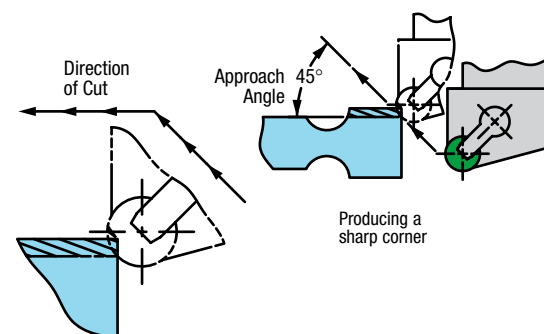


Figure 31 – Ramp Approach for Entry of Nickel-Based Alloys (Round Inserts)



Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
 EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
 CN +86-731-89954796 • info@greenleafcorporation.com.cn
 www.greenleafglobalsupport.com • www.greenleafcorporation.com

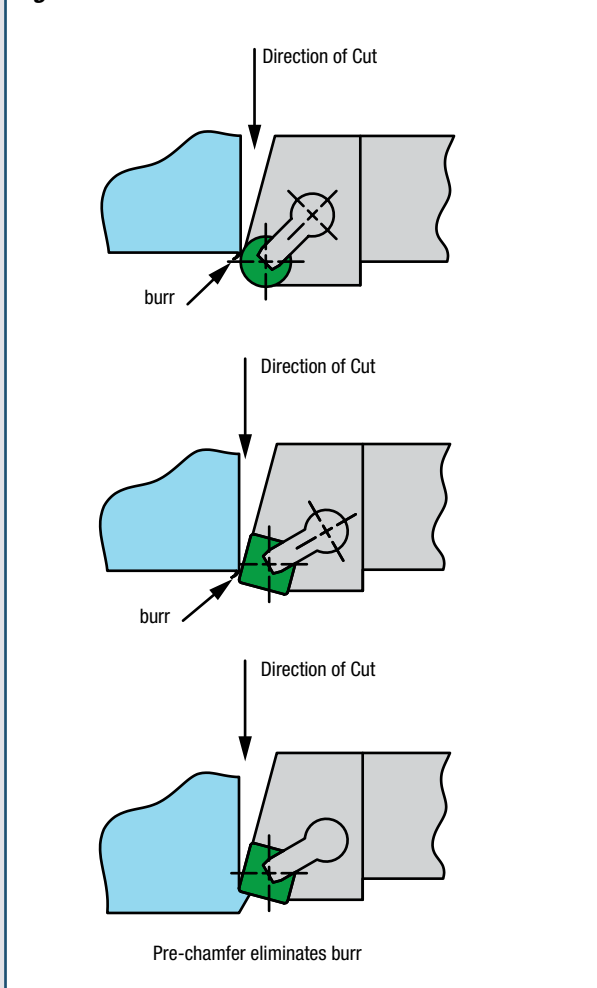
To Exit a Cut

Potential problems exist on exiting the cut if a chamfer preparation has not been made. If the exit is made on a sharp corner, on high-nickel materials in particular, a burr will result.

The burr will tend to constantly deflect or roll over and cause chipping or breakage of the cutting edge upon exit. In addition, the burr needs to be removed by a secondary operation.

The problem described tends to be more pronounced when cutting at high speeds since high heat is maintained ahead of the tool. This will mean that the material is in a more plastic condition and the rollover tendency is greater. Pre-chamfering helps correct this problem as shown. (Figure 32)

Figure 32 – Pre-Chamfer to Eliminate Burrs



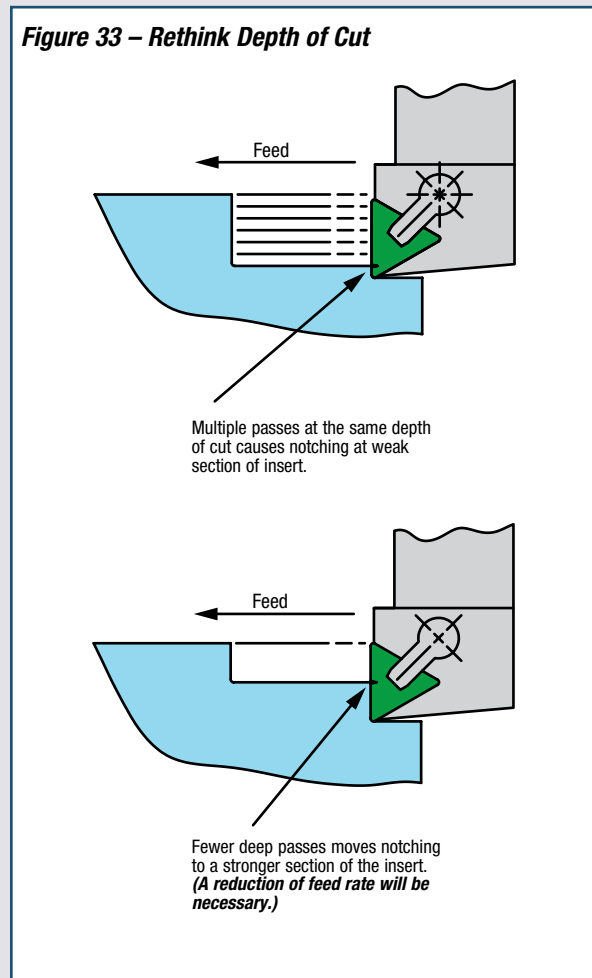
Programming Alternatives for Roughing Operations

Avoid or reduce multiple passes by taking deeper depths of cut

The strength of Greenleaf whisker-reinforced ceramics will enable much greater depths of cuts than other ceramic materials. For example, when turning with a Triangle or Diamond insert, take the greatest depth possible, even to the extent of 1/2 of the cutting edge. This not only reduces the number of passes required, it also will place any notch formed in a stronger section of the insert, leaving the tool radius area often unscathed and available for subsequent finish operations. (Figure 33)

A reduction of feed rate will be necessary in this case, and the feed rate recommendation chart should be used (Figure 21).

Figure 33 – Rethink Depth of Cut



Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
 EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
 CN +86-731-89954796 • info@greenleafcorporation.com.cn
 www.greenleafglobalsupport.com • www.greenleafcorporation.com

Preserving Tool Life

When a large amount of stock has to be removed, it is often done by taking multiple passes at the same depth of cut. (Figure 34) This is not a good practice. A very rapid development of severe notching will result since the same point on the cutting edge is subjected to the depth-of-cut line. Consequently, many indexes are required, escalating costs due to downtime and tool costs.

Vary the depth-of-cut contact point at the workpiece/ insert interface. This can be best accomplished by two techniques:

Variation in the depth of cut from pass to pass

Gradually decrease the depth of cut per pass. This may take a very small amount of time but will be more than compensated for by increased tool life, less indexing of the insert, and less downtime. (Figure 35)

Ramping

Of all the techniques readily available on a CNC machine, “ramping” has proven to be the most important. By gradually feeding out while traversing the work, depth-of-cut notching can be, for all practical purposes, eliminated. The next cut is then programmed at a constant depth since the surface itself is now ramped. A similar effect is achieved. (Figure 36)

Figure 34 – Multiple Passes at the Same Depth of Cut

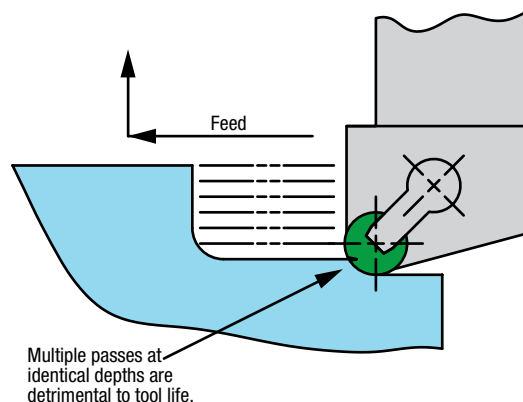


Figure 35 – Multiple Passes at Varying Depths of Cut

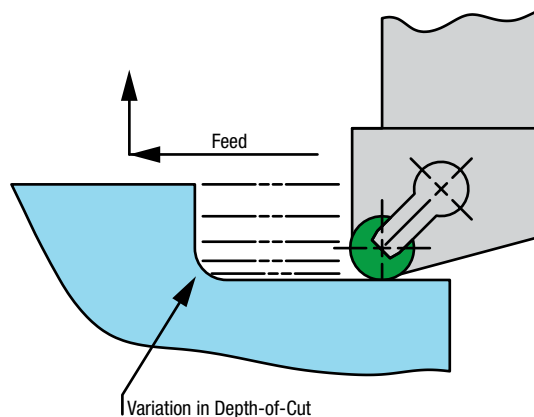
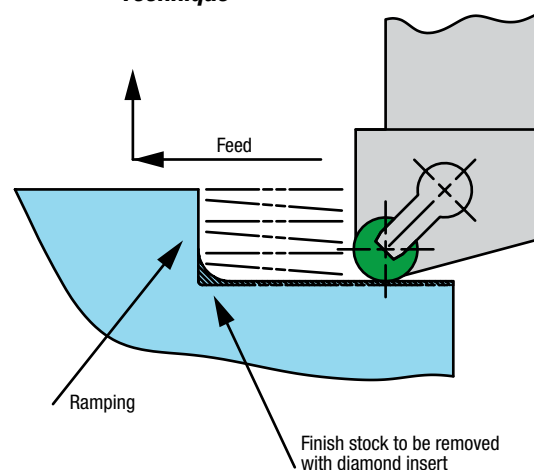


Figure 36 – Multiple Passes Using Ramping Technique



Greenleaf Sales

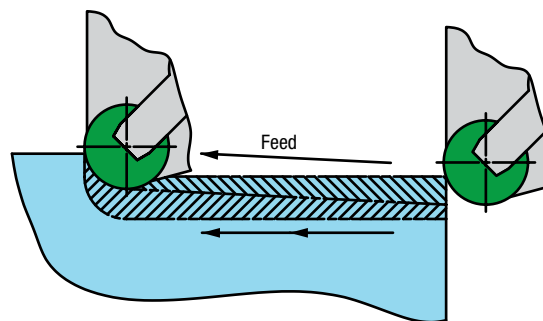
US +814-763-2915 • sales@greenleafcorporation.com
EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
CN +86-731-89954796 • info@greenleafcorporation.com.cn
www.greenleafglobalsupport.com • www.greenleafcorporation.com

Ramping with negative round inserts

The ramp **must** start out with a deep cut, then the depth of cut must diminish. This constantly lifts the insert higher and more out of the cut, creating a ramp. The second cut is programmed straight and in the same direction, effectively removing the ramped surface left by the first cut. (Figure 37)

Tool life on the first cut is longer than on the second since the damaged cutting edge from the work-hardened surface is lifted out of the cut. Tool life on the second cut is shorter since the damaged cutting edge at the depth-of-cut line is buried more and more as it continues cutting straight and the ramp gets higher. However, tool life in both described ramped cuts is longer than in straight cuts.

Figure 37 – Ramping/Negative Inserts/RNGN

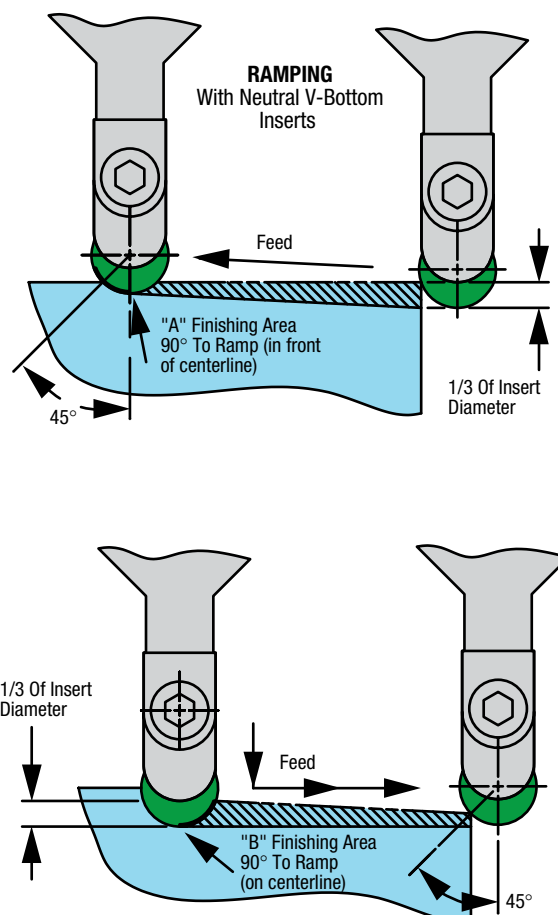


Ramping with positive round inserts

When using RPGN or RCGN inserts, ramping can be done in both directions without indexing (Figure 38). Area "B," which is the bottom of the inserts, is constantly lifted out of the cut on the first pass, and the insert finishes with area "A". The second pass in the opposite direction will then use area "B" for finishing.

The above is not possible if the ramping is started from the lesser depth of cut then moves to the deeper depth of cut. Ramping is always better from a deep to a shallow depth.

Figure 38 – Ramping/Positive Inserts/RPGN-RCGN



Greenleaf Sales

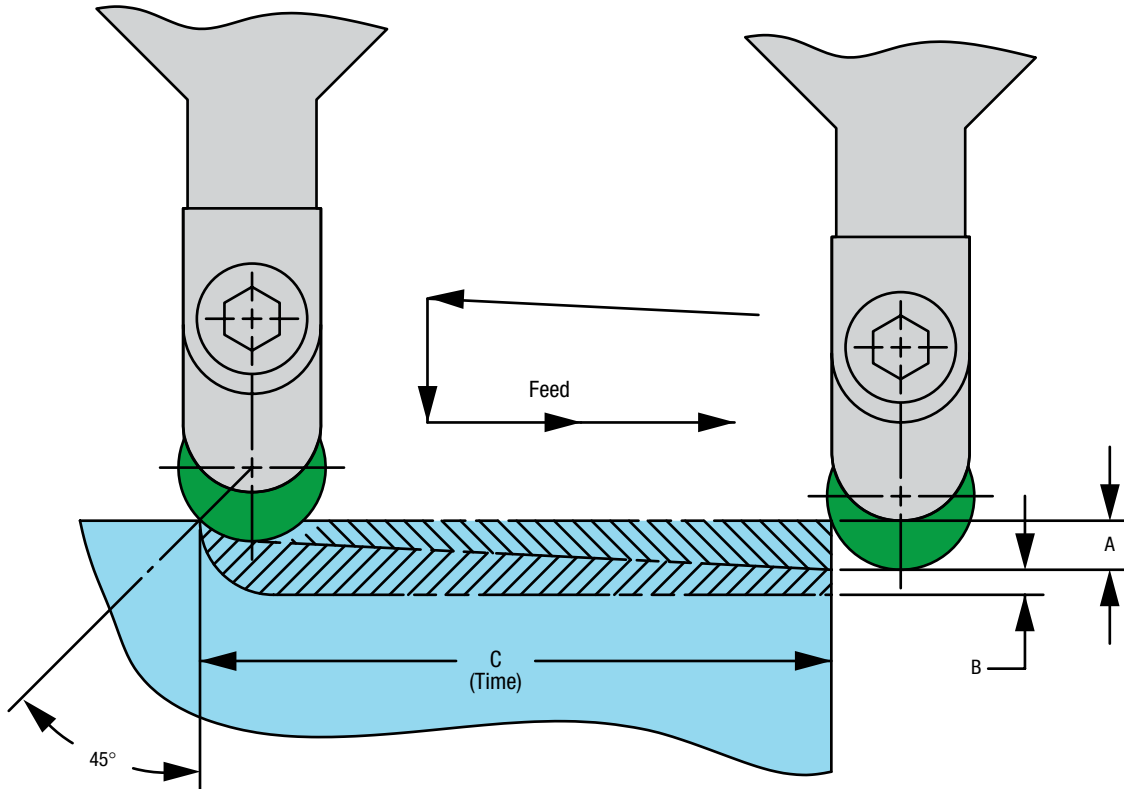
US +814-763-2915 • sales@greenleafcorporation.com
 EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
 CN +86-731-89954796 • info@greenleafcorporation.com.cn
 www.greenleafglobalsupport.com • www.greenleafcorporation.com

To Optimize Tool Life in a Ramping Mode

The time "C" is a maximum value in minutes. The actual length of the cut represented by "C" will vary with part piece diameter. The smaller the diameter of the workpiece,

the longer the length of cut. We suggest that time be limited to approximately five minutes for a .500" diameter (12,7 mm) insert. (Figure 39)

Figure 39 – Optimized Ramping Technique



DIAMETER		"A"		"B"		"C"
inches	mm	inches	mm	inches	mm	minutes
.250	6,3	.080	2,0	.040	1,0	3
.375	9,5	.120	3,0	.060	1,5	4
.500	12,7	.160	4,0	.080	2,0	5

Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
 EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
 CN +86-731-89954796 • info@greenleafcorporation.com.cn
 www.greenleafglobalsupport.com • www.greenleafcorporation.com

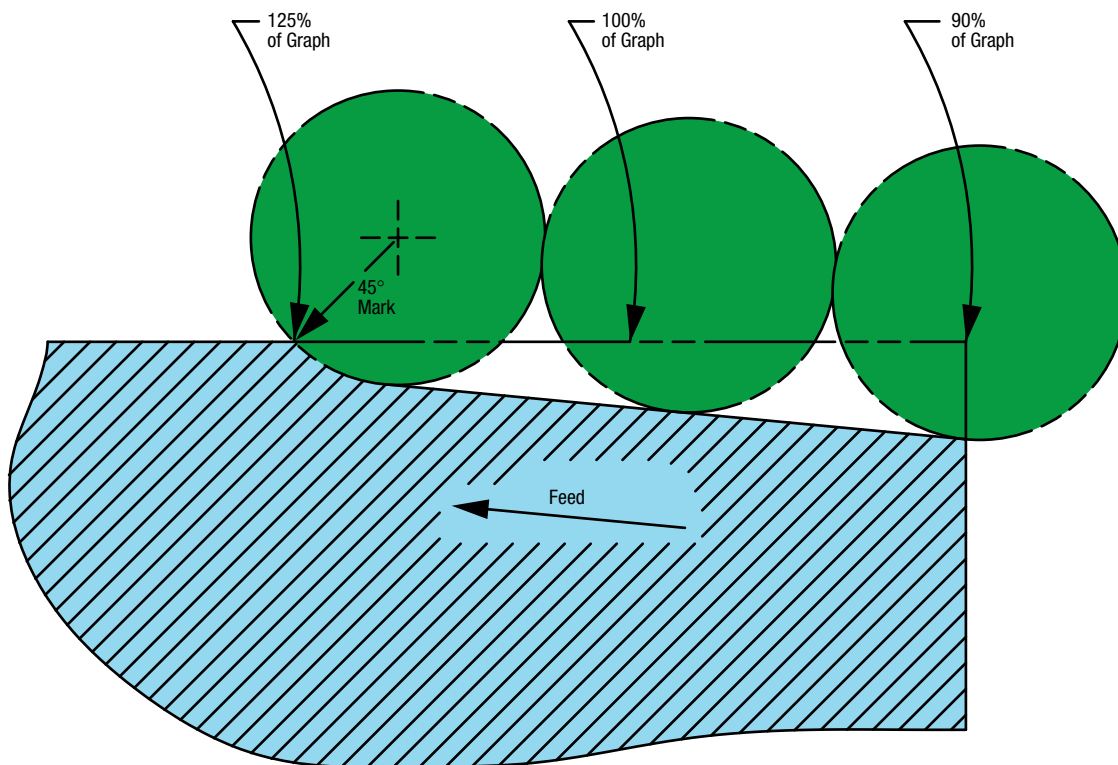
To Optimize Ramping Technique (Figure 40)

- Using a .500 diameter (12,7 mm) round insert, select recommended feed and speed from graph (Figure 13). This will equal 100% of feed, speed and a .125" (3,18 mm) depth of cut at the mid-point of the ramp.
- Start the ramping cut at a depth of approximately 1/3 the diameter (.160") (4,0 mm) and select the appropriate speed and feed percentage (%). (Figures 15 and 16)
- Proceed with ramping cut until the depth of cut is approximately .080" (2,0 mm). This is the 45° mark on a .500" (12,7 mm) diameter round insert. During the cut,

the feed and speed should be incrementally or continuously increased. At the conclusion of the cut, the parameters should be at the appropriate speed and feed percentage (%). (Figures 15 and 16).

- Cutting distance is measured in minutes and can be programmed for five minutes with a .500" diameter (12,7 mm) round insert. (Figure 14)

Figure 40 – Optimization of Ramping Technique with 1/2" (12,7 mm) Round Inserts



Greenleaf Sales

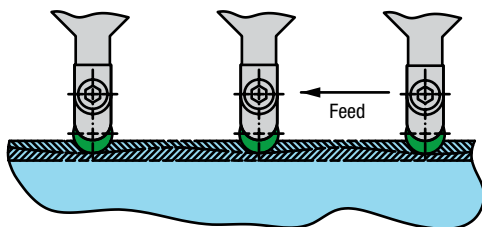
US +814-763-2915 • sales@greenleafcorporation.com
 EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
 CN +86-731-89954796 • info@greenleafcorporation.com.cn
 www.greenleafglobalsupport.com • www.greenleafcorporation.com

To achieve the desired effect of a constantly changing depth of cut to eliminate notching, it is not necessary to think of ramping in terms of a straight line. For example, a wavy line achieves the same objective, perhaps more efficiently, by moving the hardened surface back and forth on the cutting edge. On both the first and second cuts, the material is gradually increased and then gradually decreased. (Figure 41)

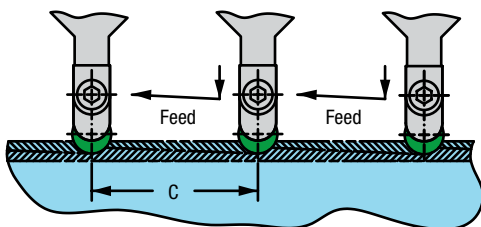
Also illustrated are examples of plunging in and then ramping using a positive round insert or producing a ramp with a lead-angle tool using a straight-edged insert.

Figure 41 – Various Ramping Methods

A Wavy line



B Plunging and ramping



C Ramping with lead-angle tool

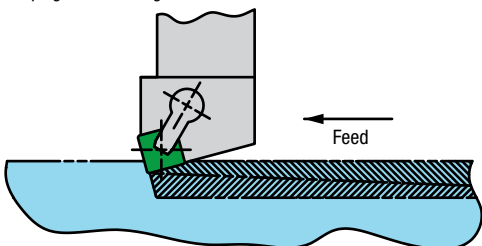
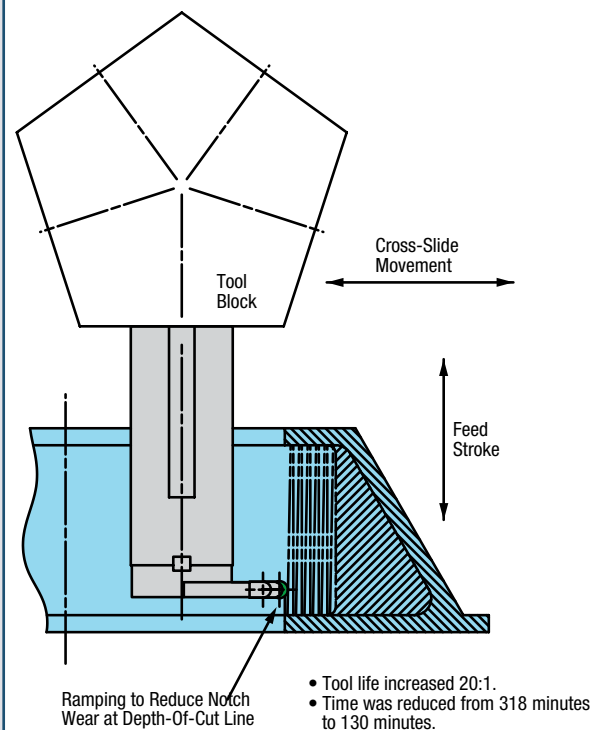


Figure 42 shows an operation boring a cavity on an Inconel 718 part on a Vertical Turret Lathe. As originally programmed, this operation required five tool indexes to bore out all of the material. Five times the tool returned to “home” position and was out of the cut.

By changing to a new program and converting from carbide to Greenleaf WG-300 with “ramping,” the entire cavity was machined without a tool change. Productivity increased three (3) times and tool life increased by a factor of 20 to 1. Actual machine time was reduced from 318 minutes to 130 minutes.

Our files contain numerous cases of productivity gains of this magnitude by “ramping”.

Figure 42 – Boring a Cavity with Ceramics



Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
CN +86-731-89954796 • info@greenleafcorporation.com.cn
www.greenleafglobalsupport.com • www.greenleafcorporation.com

Turning to a Shoulder

When rough or finish turning into a shoulder with high velocity techniques, it is most important to observe some basic rules.

With negative inserts in particular, it should be remembered that the chips are being pushed forward. As the shoulder is approached, the chips will be trapped, giving rise to an increase in tool pressure. (Figure 43) Also tool pressures increase as insert engagement increases near shoulders. This may result in tool breakage. *It is strongly recommended that the feed rate be reduced by about 50% when the tool is within .125" (3 mm) of the shoulder.* Reduction of the feed will tend to straighten out the chip as the chip temperature increases, reducing pressure on the insert cutting edge. **This applies to any shape of insert.**

When the tool stops at the shoulder and then withdraws, a hard crystallized layer of material is left. This may produce a series of steps when a square insert is used or scallops when using a round insert. (Figure 44)

Very poor tool life will be experienced in any subsequent operation to finish machine these stepped or scalloped surfaces. The solution is to program the tool to continue moving up the shoulder face upon completion of each pass. This will remove the scallops or steps while the material is still hot ahead of the cutting edge and leave a more readily machinable surface for finishing.

Figure 43 – Chip Being Trapped Against Shoulder (increased engagement increases tool pressure)

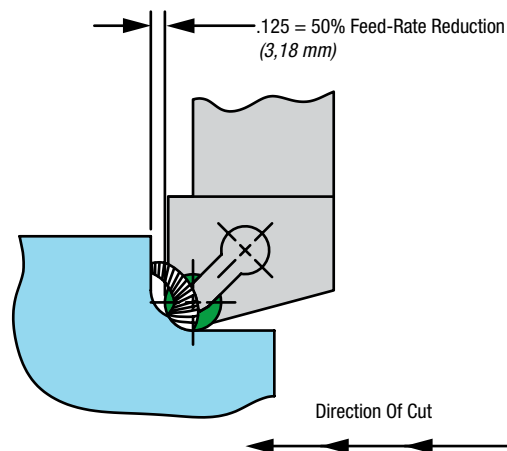


Figure 44 – Avoid Leaving Scallops at Shoulder

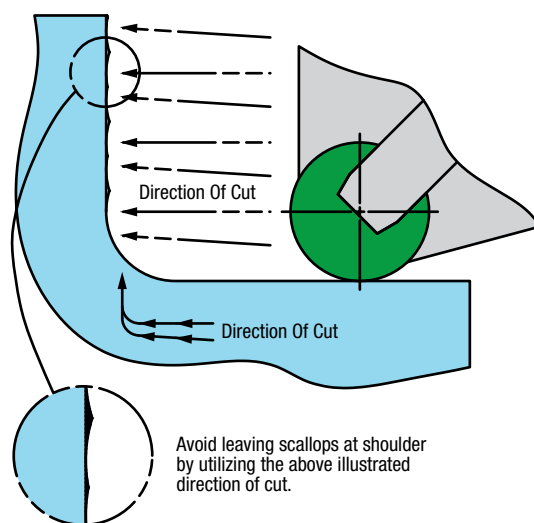
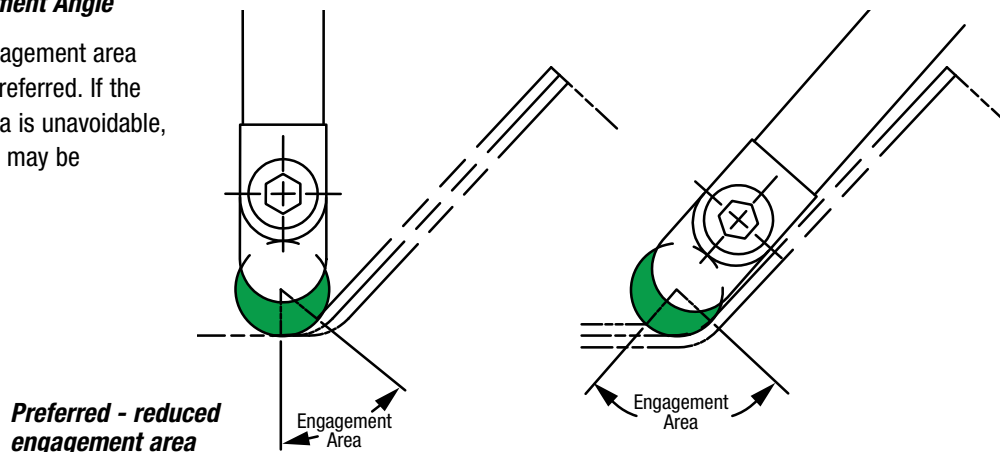


Figure 45 – Tool Engagement Angle

Maintaining a reduced engagement area as shown in Figure 45 is preferred. If the increased engagement area is unavoidable, then a 50% feed reduction may be necessary.



Greenleaf Sales

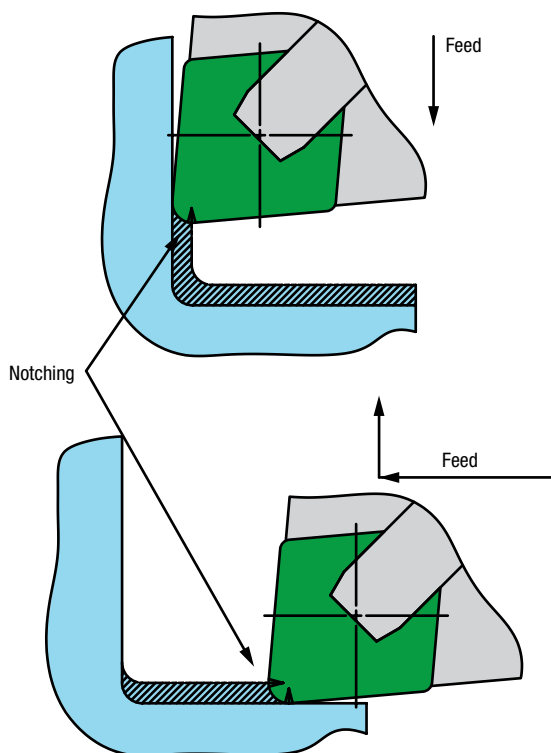
US +814-763-2915 • sales@greenleafcorporation.com
 EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
 CN +86-731-89954796 • info@greenleafcorporation.com.cn
 www.greenleafglobalsupport.com • www.greenleafcorporation.com

Double Notching – Not Recommended for Notch-Sensitive Situations

It is quite common to program a cut in both directions in CNC machining using carbide inserts. This may have been a matter of convenience to avoid a tool change. It should be noted however, that this is a very undesirable method in notch-sensitive situations such as in high-velocity machining with ceramics.

Here, the tool was fed first from the top and then along the bottom and a blend was made in the radius area. The problem is obvious. Notching has occurred on both sides of the insert. During the second cut, material jams into the first notch causing chipping. Stress may generate a failure crack from notch to notch and break off the corner. (Figure 46)

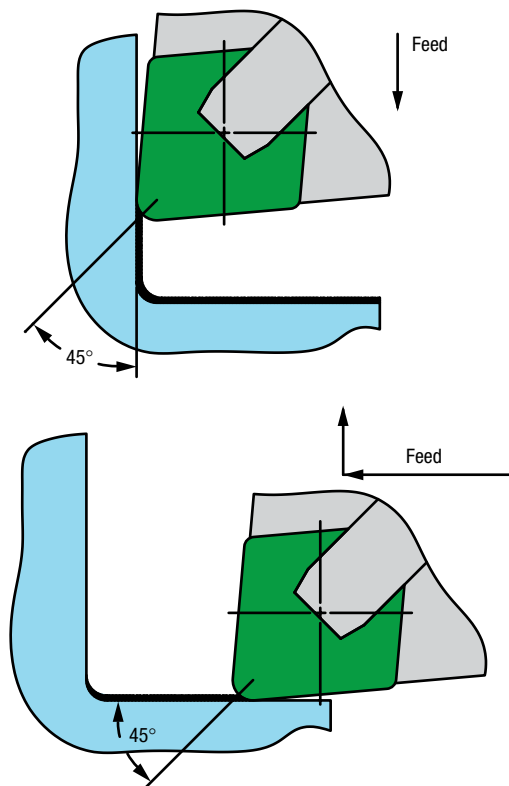
Figure 46 – Carbide Method Beware



Rethink the process

The correct procedure is to take more material off during the previous roughing application, then remove the amount of stock suitable for the nose radius of the insert (Figure 20) by staying below the 45° mark of the corner radius. This will minimize notching and allow a cut from both directions. (Figure 47)

Figure 47 – Ceramic Method



Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
CN +86-731-89954796 • info@greenleafcorporation.com.cn
www.greenleafglobalsupport.com • www.greenleafcorporation.com

Finishing a Fillet

Sound design criteria, especially on highly stressed parts such as jet engine components, calls for fillets or specific radii at the junction of most angles.

Problems encountered in finish machining of fillets can often be traced to the approach made in the rough-machine operations.

The amount of stock left for finishing and the shape and condition at the surface of this stock are affected greatly by the tool path and insert configuration used in roughing.

It is not uncommon for a programmer to call for a tool having the specific radius of the fillet and do the entire operation with this tool. This radius is usually small, therefore the tool is weak and must typically be indexed or changed to complete the operation.

There are a number of effective methods available to accomplish these corners, all of them superior to the common method of multiple passes with the weak radius tool.

Method 1 (Figure 48)

#1 – The material is roughed using a .500" (12,7 mm) diameter round insert. This leaves a .250" (6,35 mm) corner radius. In addition, stock for finishing has been left on both walls.

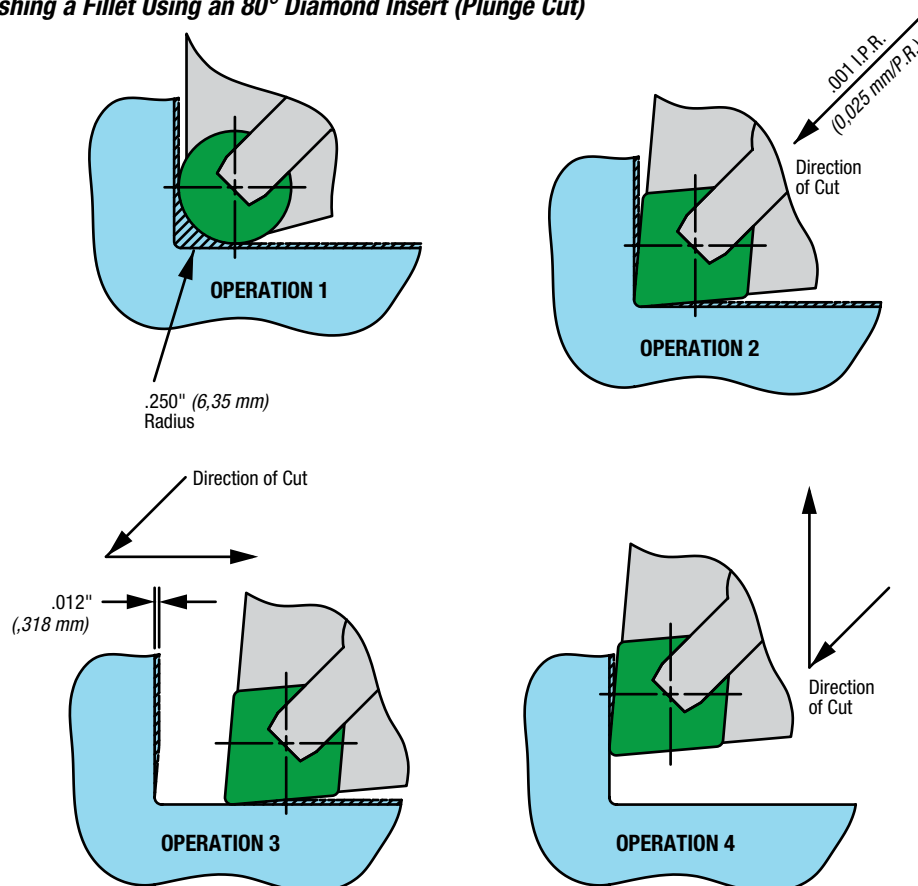
#2 – The finished radius is now generated by plunging the 80° Diamond-shaped insert finishing tool at 45° into the corner. This plunging operation spreads the effect of the work-hardened surface across the nose of the tool without notching it. In addition, the tool is supported by equalized forces on both sides. A clean, accurate radius is also produced.

#3 – The tool is then drawn across one of the faces to produce the finished surface. The long 5° reverse lead angle inherent in the 80° Diamond insert will produce a good finish without damage to the cutting edge.

#4 – The second wall is finished by turning the tool to the corner and feeding out in the other direction, again working on the long lead angle.

Method 1

Figure 48 – Finishing a Fillet Using an 80° Diamond Insert (Plunge Cut)



Greenleaf Sales

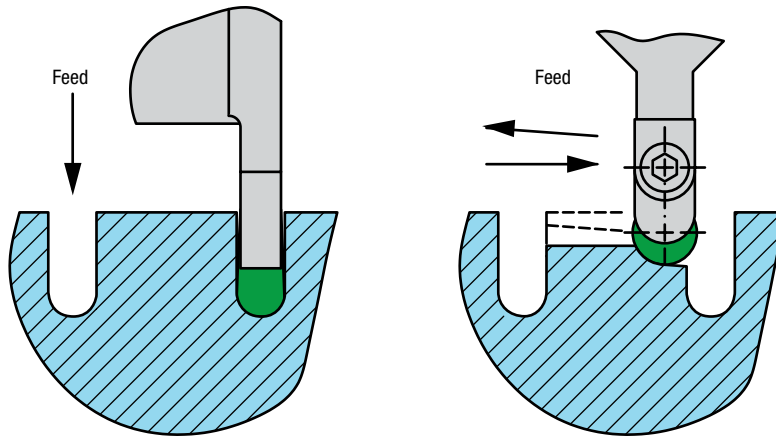
US +814-763-2915 • sales@greenleafcorporation.com
 EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
 CN +86-731-89954796 • info@greenleafcorporation.com.cn
 www.greenleafglobalsupport.com • www.greenleafcorporation.com

Method 2

Figure 49 – Finishing a Fillet Using a Grooving Tool and a Round Insert

Very small radius fillets on parts are often produced with the fewest problems by using a grooving tool on the first operation. A grooving tool is self-stabilizing and always moving forward into clean material. This results in

efficient machining without tool notching and produces an accurate corner radius. The remaining material is then removed by ramping cuts with a round insert.

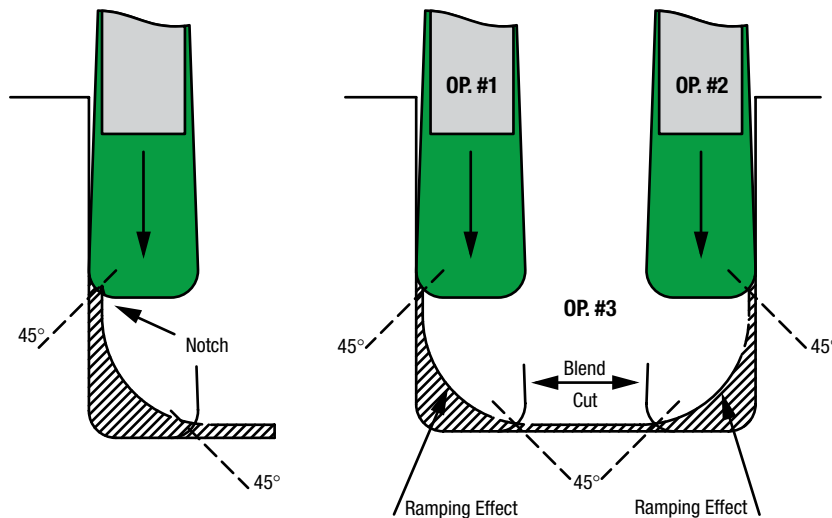


Method 3

Figure 50 – Turning to a Shoulder in Cavities with V-Bottom Grooving Inserts

This example shows the profiling of the groove or cavity using a V-bottom grooving insert. It is important to keep the finish stock very light on the sides so that the cut is below the 45° mark on the insert radius. This will vary with the radius needed. The larger the radius, the greater the stock can be. (See Figure 20)

In the corner itself, we use the “ramp” inherent in the radius left by the round insert used for roughing to reduce or eliminate “notching” of the tool. This is a further benefit of roughing with round inserts or profiling the corner in the program.



Watch the depth-of-cut line!

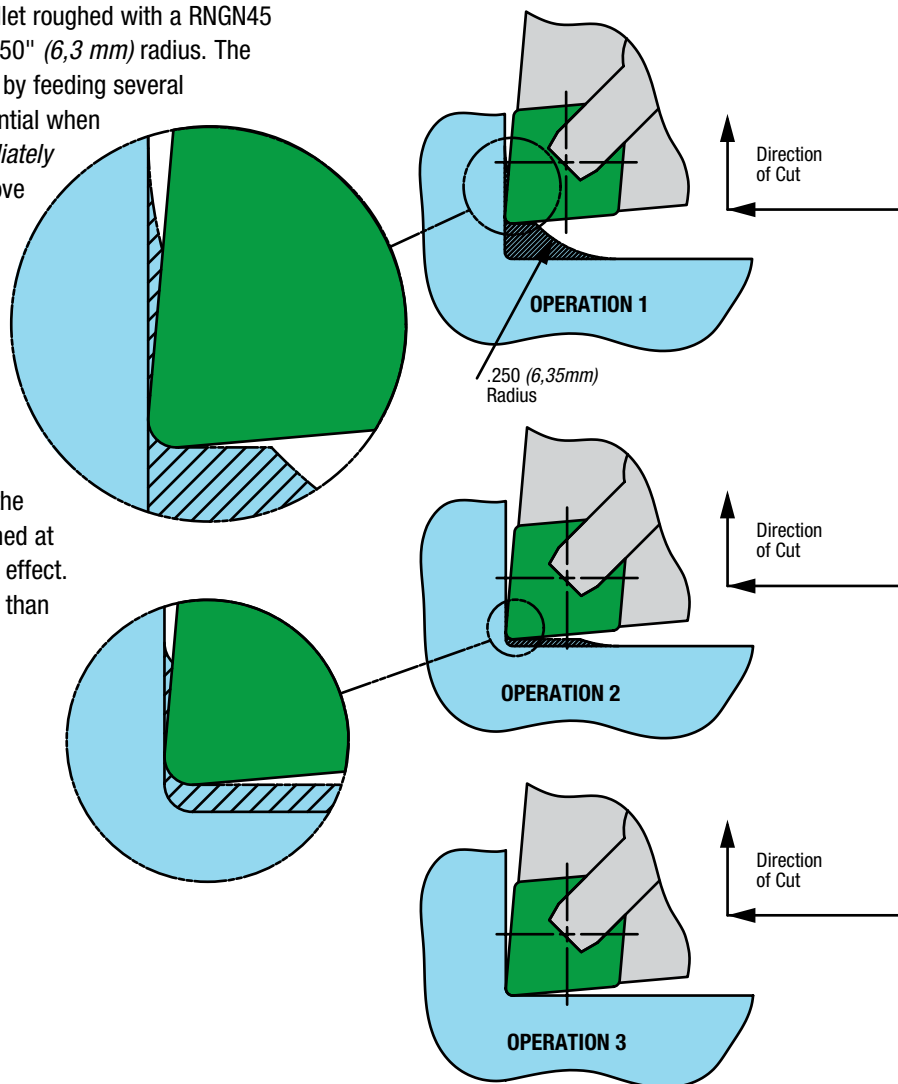
Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
CN +86-731-89954796 • info@greenleafcorporation.com.cn
www.greenleafglobalsupport.com • www.greenleafcorporation.com

Method 4

Figure 51– Ramping Effect on Shoulder Cuts

In this method, a CNGN452 (12 07 08) insert is shown in the finish operation on a fillet roughed with a RNGN45 (12 07 00) insert leaving a .250" (6,3 mm) radius. The finish operation is performed by feeding several times into the fillet. It is essential when the wall is reached to *immediately* raise the tool vertical to remove the scallop which would otherwise be left on the wall. This material will tend to cool and present a hardened, irregular surface needing a subsequent operation (Figure 43). The finish passes described will tend to notch the tool and should be programmed at various depths to reduce this effect. The final pass should be less than the 45° line of the tool nose radius (Figure 20).



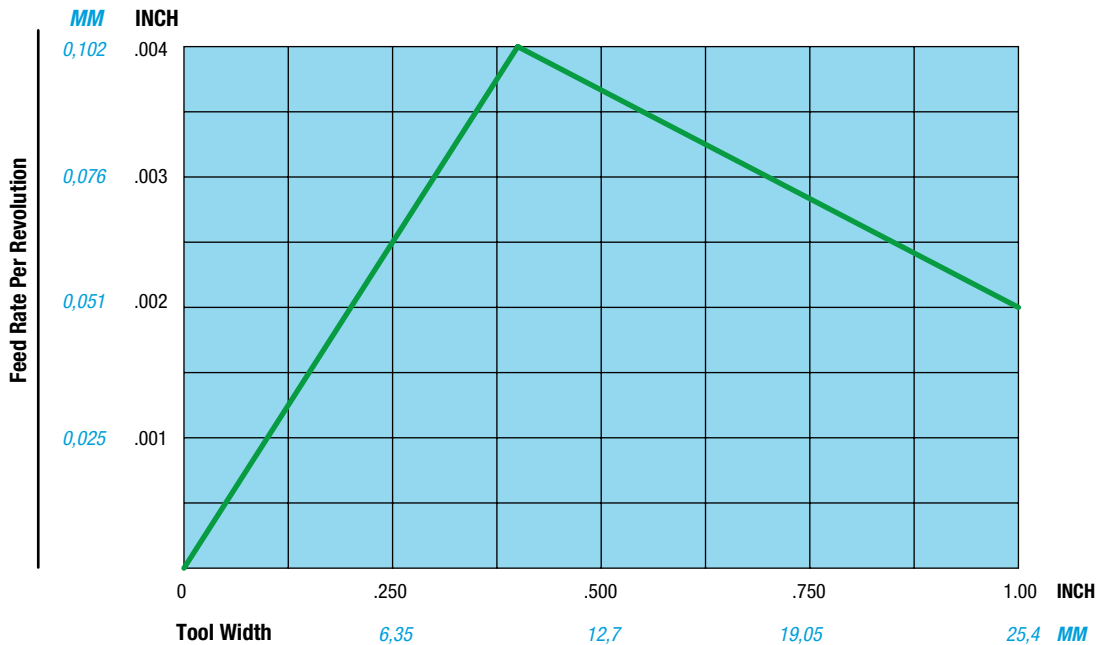
Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
 EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
 CN +86-731-89954796 • info@greenleafcorporation.com.cn
 www.greenleafglobalsupport.com • www.greenleafcorporation.com

Grooving

Feed and speed for grooving

Figure 52 – Grooving Feeds vs. Tool Width



Select the correct speed from the graph using material hardness as the basis. (Figure 13)

A good starting point for feed rates in grooving has been shown to be one percent (1%) of the tool width for widths up to .400" (10 mm). For widths over .400" (10 mm) some reduction of this feed will be required. (Figure 52)

Case history

Material Rene 95

Part 19" (483 mm) diameter

Application .375" (9.53 mm) wide O.D. Groove
.500" (12.7 mm) deep

Surface speed per minute 400 feet (122 meters)

Feed rate per revolution 0.0035" (0.09 mm)

	Carbide	WG-300®
Cost \$		Cost \$
Cycle time	35 min.	3.5 min.
Burden rate	@ \$60/hr=\$35.00	@ \$60/hr.=\$3.50
Insert cost	\$15.00	\$50.00
Sub total	\$50.00	\$53.50
Time saved	0	31.5 min.
\$= 0		@ \$60/hr.= \$31.50
Total cost	\$50.00	\$22.00

Greenleaf Sales

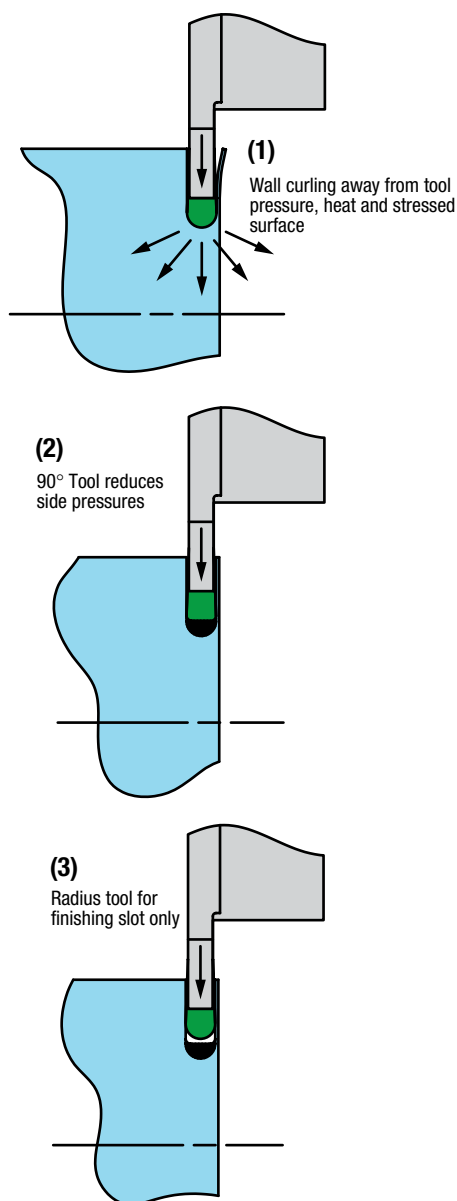
US +814-763-2915 • sales@greenleafcorporation.com
EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
CN +86-731-89954796 • info@greenleafcorporation.com.cn
www.greenleafglobalsupport.com • www.greenleafcorporation.com

Grooving Thin-Wall Sections

A problem may occur when attempting to machine deep grooves, leaving a thin wall standing. If the groove form calls for a radius in the root, then the heat and pressure generated by cutting the entire groove with the radius tool will cause the wall to curve away from the tool. (Figure 53,1) This is a combined reaction of the actual pressure and heat of the cut plus the formation of a stressed surface layer.

Good practice dictates roughing the groove with a straight-edged tool (2) and finishing the radius area only with the radius tool. (3) (Figures 53, 2 and 3)

Figure 53 – Thin-Wall Grooving



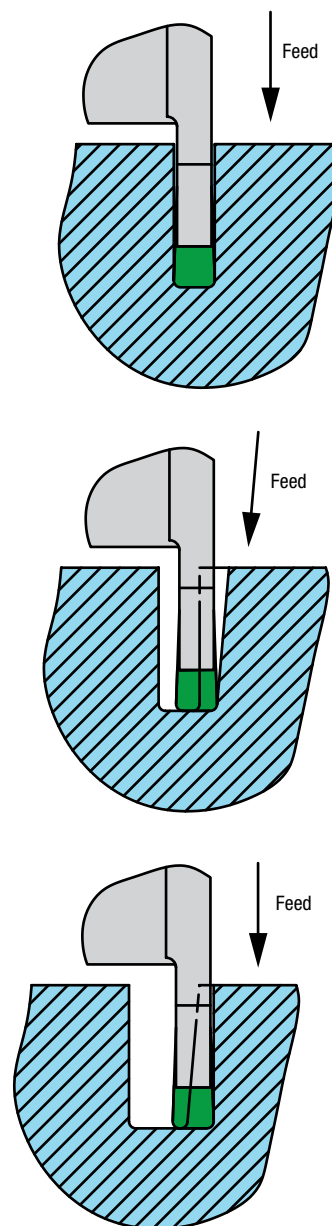
Machining Cavities with Grooving Tools

There are several proven approaches to the machining of cavities using grooving tools. All of the methods shown are satisfactory, however, Methods B and D are the most effective.

Method A (Figure 54)

The grooving tool is used to produce a groove in the normal manner by plunging straight into the work. The groove is then widened by using a ramping technique.

Figure 54 – Widening Cavity Techniques



Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
 EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
 CN +86-731-89954796 • info@greenleafcorporation.com.cn
 www.greenleafglobalsupport.com • www.greenleafcorporation.com

Method B (Figure 55)

Two grooves have been produced by plunging straight in. This allows both finished sidewalls and corner radii to be generated. The material between the grooves is removed with a round insert making a straight plunge cut to finish the cavity.

Method C (Figure 56)

The cavity is produced by a series of plunge cuts. In this case it is very important to keep the work-hardened surface of the previous cut working on the radius at or beyond the 45° mark to reduce notching. If this is disregarded, rapid notch wear will develop leading to the fracture of the insert corner.

Figure 55 – Additional Cavity Techniques

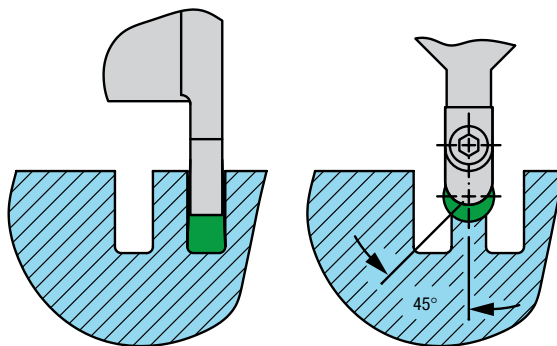
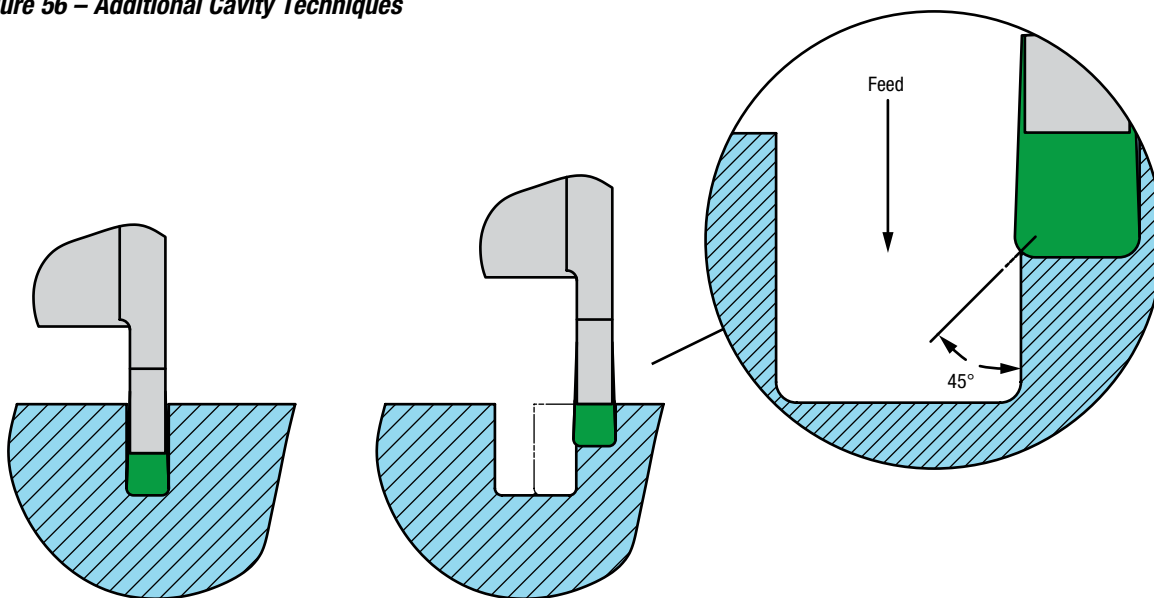


Figure 56 – Additional Cavity Techniques



Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
CN +86-731-89954796 • info@greenleafcorporation.com.cn
www.greenleafglobalsupport.com • www.greenleafcorporation.com

Method D (Figure 57)

The example shown in Figure 57 is similar to Figure 55, except the cavity is wider and the material between the two grooves may be removed by a ramping operation with round inserts. This is an effective method of approaching a wide-cavity application.

Figure 57– Ramping in Cavities

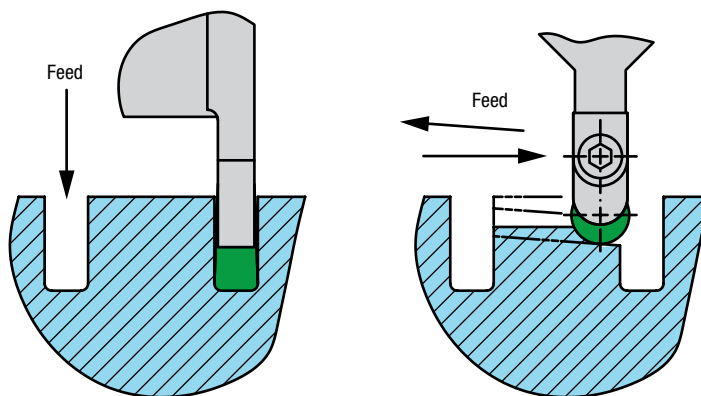
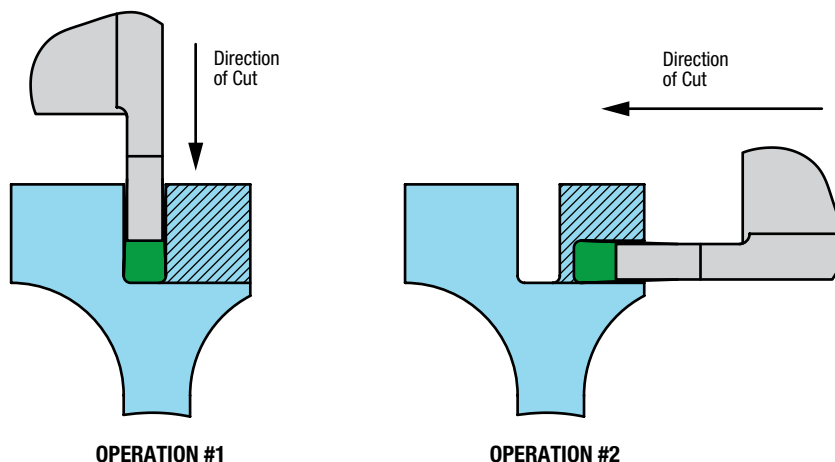


Figure 58 – Producing a Test Sample



Grooving Tools for Shoulder Cuts

It is possible to make shoulder cuts with grooving tools involving the removal of large amounts of material by producing a complete ring.

This technique is being applied in the production of large jet engine discs very effectively but requires special set-up. The method is illustrated in Figure 58.

In effect, two 90° opposing grooves are plunged into the part using a V-bottom grooving tool. This generates two clean walls and the required corner radius.

When the second groove breaks into the first one, a complete ring is produced which may be used for some other component. A fixture must be used to hold the ring as it parts from the main forging. It is worth constructing a special clamping fixture for such cases since the method itself is so economical.

Rethink the process

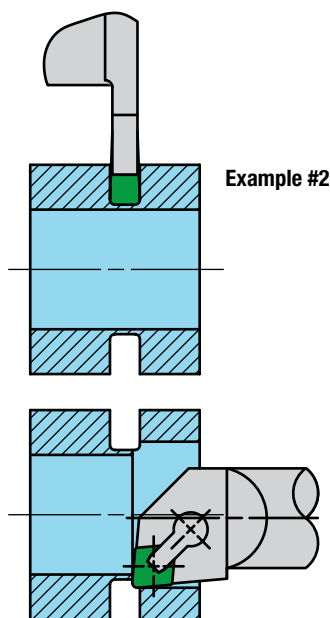
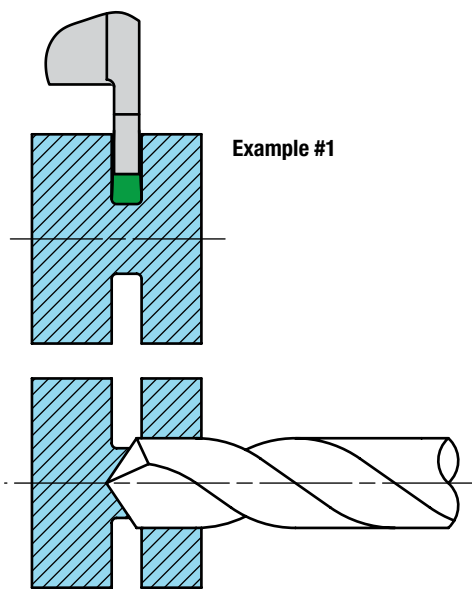
Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
 EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
 CN +86-731-89954796 • info@greenleafcorporation.com.cn
 www.greenleafglobalsupport.com • www.greenleafcorporation.com

Cut-Off Operation with Ceramic Inserts

Using a whisker-reinforced ceramic grooving tool and then completing the cut-off with a drill or boring tool in a secondary operation is illustrated in *Figure 59*. This will eliminate tool breakage which would occur if attempting to totally cut off with a ceramic tool. This technique works best with smaller components where the cut-off piece can be captured on the drill or boring tool. There are other variations of this method.

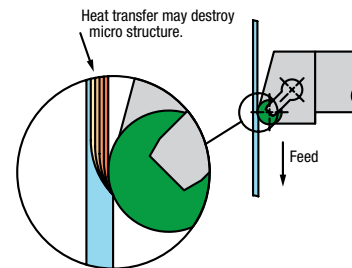
Figure 59 – Ceramic Inserts Used in Cut-Off Operations



Thin-Wall Applications

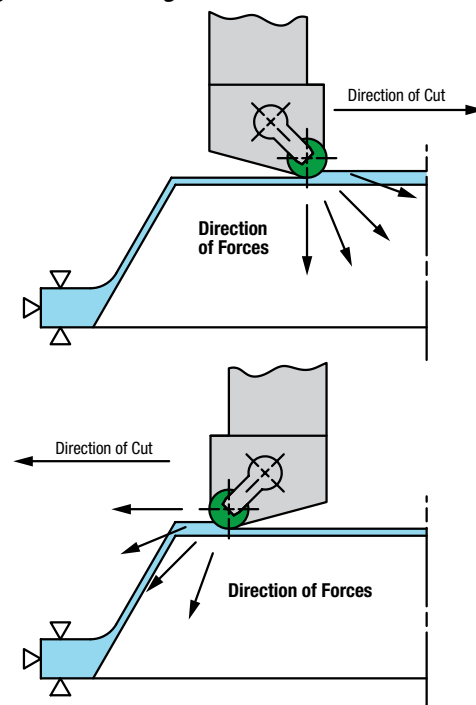
Many turbine components have very thin sections. Distortion of thin-wall parts can become a significant problem. Too much heat in the part due to excessive tool pressure and stress in the material surface due to deformed metal can be the cause of this distortion. In very thin walls, heat may penetrate an entire section causing microstructural damage in the material (*Figure 60*). In these cases, the speed reduction necessary to limit heat penetration may dictate the use of carbide insert technology.

Figure 60 – Thin-Wall Heat Penetration



In certain situations, the direction of the cut may be of extreme importance. For example, a severe chatter/deflection problem was eliminated in the illustrated aircraft part by a change to facing from the center out. Facing in this way concentrated the resultant forces into a supported section of the part. (*Figure 61*)

Figure 61 – Cutting Direction Resultant Forces



Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
CN +86-731-89954796 • info@greenleafcorporation.com.cn
www.greenleafglobalsupport.com • www.greenleafcorporation.com

Thin-Wall Applications cont'd

It is important to note the following rules of good practice for thin-walled parts:

1. Reduce the tool nose radius while maintaining the largest radius for best tool life that does not cause distortion.
2. Reduce the lead angle so that the resultant force is directed into a strong or supported section of the part piece.
3. Reduce depth of cut.
4. Do not cause the tool to dwell excessively.
5. Reduce speed.
6. If necessary, change back to carbide for lower surface speed resulting in less deflection, less surface material distortion and less heat.

Rethink the process

Interrupted Cuts

Whisker-reinforced ceramics are inherently very strong and able to withstand interruptions provided the recommended speeds (*Figure 13*) are increased. Speed is all-important in the successful cutting of parts with interruptions.

Do not give in to the temptation to reduce speed.

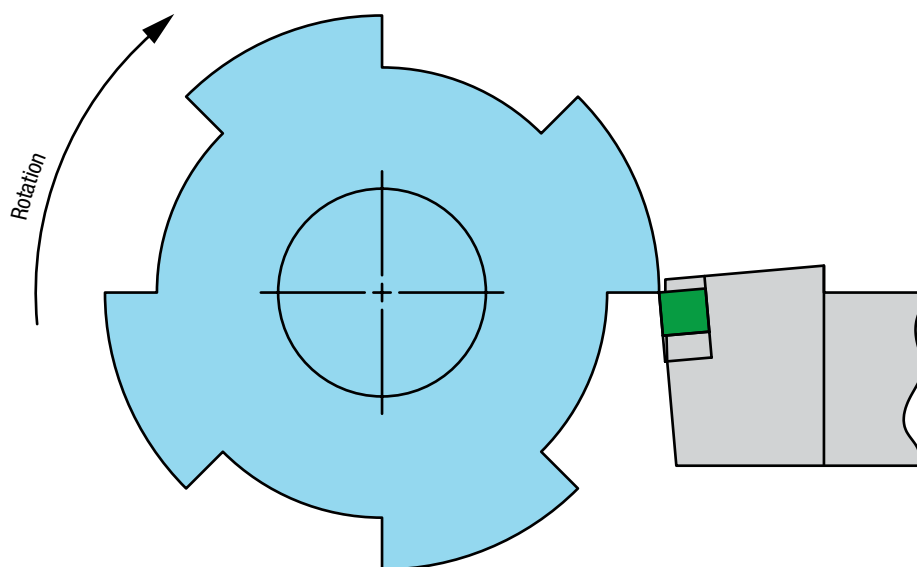
The amount of increase in the recommended speed for severely interrupted cuts can usually be calculated. It is necessary to increase the speed to get back into a temperature zone where the interruptions have lowered by virtue of the intermittent contact between tool and workpiece. First, calculate the circumference of the part and then subtract the sum total of the interruptions. This will give a smaller diameter value. Then increase the RPM so the smaller diameter value returns us to the originally recommended surface speed.

As a simple example (*Figure 62*), if 50% of the material is taken away by voids or interruptions at the surface, 50% of the surface remains in contact with the tool compared to an uninterrupted part. In this case, double the surface speed to compensate.

A simple estimate will often suffice. Look at the part. Estimate the percentage of surface missing due to interruptions and then increase the speed by at least that amount.

Rethink the process

Figure 62 – Interrupted Cuts



Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
 EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
 CN +86-731-89954796 • info@greenleafcorporation.com.cn
 www.greenleafglobalsupport.com • www.greenleafcorporation.com

Edge Preparations for Interrupted Cuts

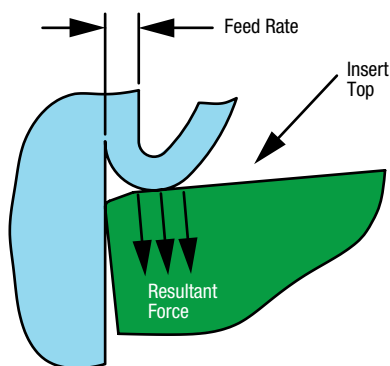
It is advantageous in interrupted cutting to ensure that the feed rate is less than the width of the negative edge preparation on the insert. This assures that the insert cutting edge is in compression at all times and not in shear, as would be the case if the feed exceeds the width of the land. For this reason the T2A or T7A edge preparation should be used.

Feed rate must be reduced on severe interruptions to get more heat into a thinner chip. This will reduce the cutting pressures. If these rules are followed, few problems will be encountered on interrupted cuts. (Figure 63)

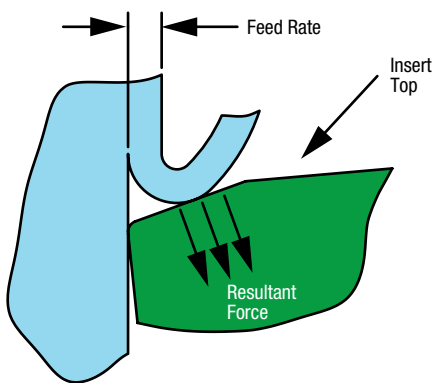
For interrupted cuts, the rules are:

1. Select a larger edge preparation
2. Reduce feed rate
3. Increase recommended speed

Figure 63 – Edge Preparations
Uninterrupted Cuts



Interrupted Cuts



Surface Hardening

Incorrect tooling practices, worn tools, tools with too much hone, etc., can cause excessive surface hardening effects during the machining of nickel-based alloys, particularly in finishing.

It has been shown that cutting with the higher speeds and feeds will decrease (not eliminate) the work-hardening effect and will be an eventual factor in tool life due to notching of the tool at the depth-of-cut line.

If a tool is allowed to dwell without feed, the workpiece will be burnished or glazed and thereby work-hardened. Sharp tools are needed for light operations to avoid burnishing.

Greenleaf whisker-reinforced ceramics have the advantage of being available without hones to accomplish finishing cuts and has the edge strength to make this possible.

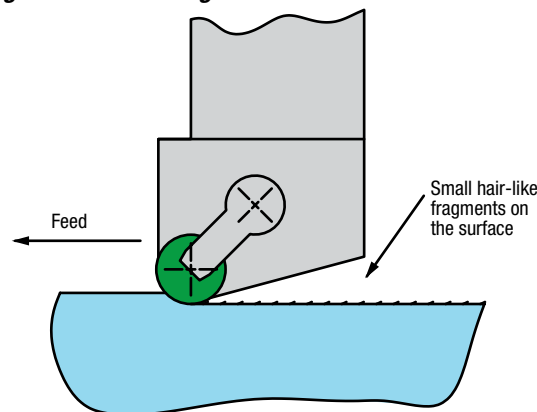
Smearing

Smearing can often be identified as small hair-like particles embedded into the finished surface. (Figure 64) This is caused by the nickel, being very gummy in nature, which is built up on the flank of the tool and then swept past a worn, chipped, or honed area of the insert under great pressure and is embedded or pressure-welded in small fragments into the finished surface.

Greenleaf advanced whisker-reinforced ceramics are strong enough that inserts are recommended and produced as standard without a hone. A clean, sharp edge is then presented to the part piece, reducing stress and eliminating the tendency to smear the material in finishing cuts.

Smearing will occur even with whisker-reinforced ceramics if the tool is allowed to wear excessively before indexing or if it chips or flakes due to side pressures caused by flank wear.

Figure 64 – Smearing



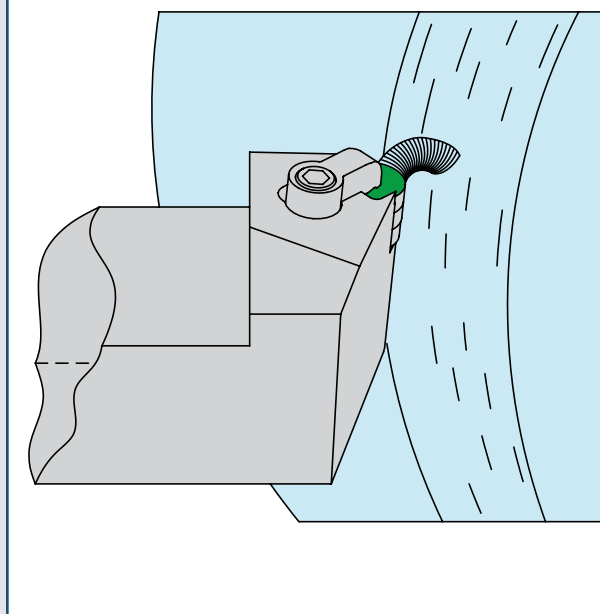
Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
CN +86-731-89954796 • info@greenleafcorporation.com.cn
www.greenleafglobalsupport.com • www.greenleafcorporation.com

Impingement

Conditions can arise where the chip is curled onto the finish surface immediately behind the tool. Under these circumstances, fragments of the hot, plasticized chip may adhere to the finished surface. (Figure 65) Every effort must be made to avoid this condition when cutting at ceramic speeds. Usually a change in tool geometry lead angle, tool radius, depth of cut, feed rate or some combination of these will redirect the chip away from the finished surface.

Figure 65 – Impingement



Boring Holes

With a quill feed machine, boring into a hole increases the spindle extension and as the tool becomes dull, the cutting forces increase (Figure 66). The cutting conditions will deteriorate as the quill becomes progressively less rigid. The results are bores that are tapered and not concentric.

Additionally, chips may accumulate in the bottom of the bore and will eventually be re-cut, further worsening conditions.

It is often advantageous to back bore a hole (Figure 67). This improves the spindle's stability as the insert wears while giving better size, finish and roundness to the bore with less chance of insert breakage and no chance of chip clogging.

Rethink the process

Figure 66 – Spindle Overhang Increasing

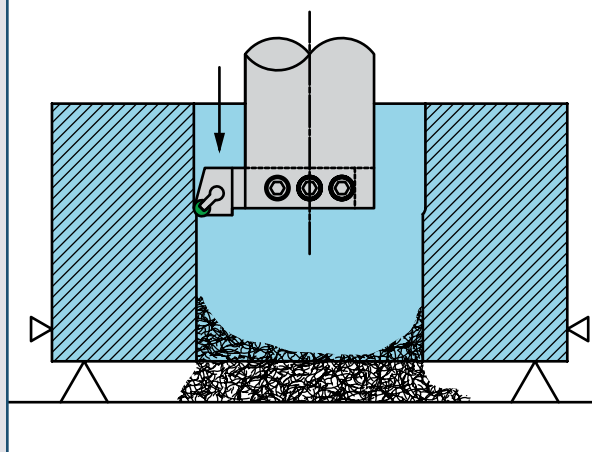
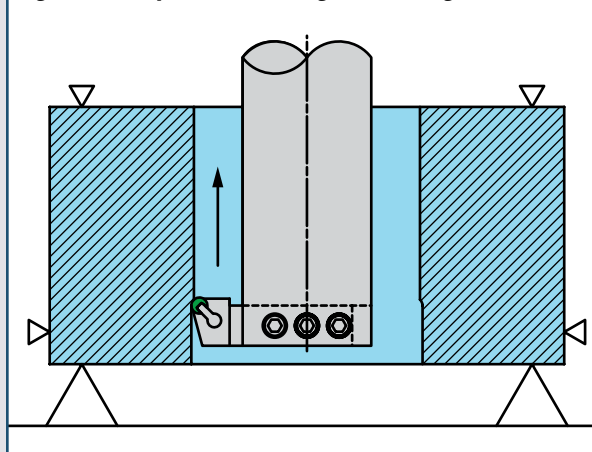


Figure 67 – Spindle Overhang Decreasing



Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
 EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
 CN +86-731-89954796 • info@greenleafcorporation.com.cn
 www.greenleafglobalsupport.com • www.greenleafcorporation.com

Wear Mechanisms

The normal wear patterns on Greenleaf advanced whisker-reinforced ceramic inserts are unlike the familiar wear patterns on carbide tools. Any attempts to analyze wear or failure mechanisms based upon that prior knowledge will result in ineffective utilization of the WG Ceramics material.

Flaking off of small pieces around the top periphery of the insert is the result of pressure caused by the development of flank wear. In **roughing operations** where surface finish is not of primary concern, this type of tool wear (Figure 68) is not usually detrimental to tool performance. In fact, as the tool flakes, a new sharp edge is produced and the tool may go on cutting for long periods in this flaked condition with satisfactory results. In finishing cuts, the flaking will be detrimental to the finish and may also lead to smearing.

At the moment of flaking, sparking can be seen mainly in an upward direction from the insert top surface. The high-temperature material now flowing over a rough top surface of the insert creates sparks. This is not a matter of concern for tool failure. We recommend that the feed rate be turned back 50% to finish the cutting operation.

Before the next operation, a tool inspection should determine whether or not the edge needs to be indexed. It is very important to use the insert to the maximum flaked condition in roughing before indexing or discarding the inserts. Do not make hasty judgment of the tool's ability to continue based upon this flaked appearance. Greenleaf whisker-reinforced ceramics are a completely different material. Continue to use the insert until some experience has been gained on where the limits actually lie in your operation.

Caution! When sparks are visibly being carried along the cutting surface, then the insert cutting edge is chipped or broken severely enough that it is not able to cut anymore. This may cause catastrophic failure. Quick action to withdraw the cutting tool is recommended.

Unlike traditional ceramics, WG Ceramics does not fail by catastrophic breakage except under conditions of severe misuse. The most commonly observed wear/failure modes are chipping of the edge, flank wear, notching and flaking.

Flank wear is a normal progressive wear phenomenon present in all cutting tools. The magnitude of this wear and the speed at which it develops are the values by which tool life should be judged.

In nickel-based alloys, notching will occur at the depth-of-cut line under almost all circumstances. The ideal tool application would be one in which the notch wear was at an acceptable maximum at exactly the same time as flank wear had developed to an acceptable maximum. However, one wear phenomenon usually develops ahead of the other.

Notch wear should not extend past 1/3 of the thickness of the insert. Rapid notch wear or chipping of the insert is often the result of insufficient heat in the shear zone ahead of the tool. Increasing the speed or decreasing the feed or a combination of both can remedy this.

Figure 68



Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
CN +86-731-89954796 • info@greenleafcorporation.com.cn
www.greenleafglobalsupport.com • www.greenleafcorporation.com

Indexing of Inserts

If the following indexing practices are observed in the application of Greenleaf whisker-reinforced ceramics, the result may be two to three times more part production per insert than when following indexing practices for traditional ceramic or carbide tools. Tooling costs may be cut in half...or better.

For Optimum Tool Life:

Method 1 (Figure 69)

When notching has reached the maximum depth of 1/3 the thickness of the insert, but the flank wear land is not

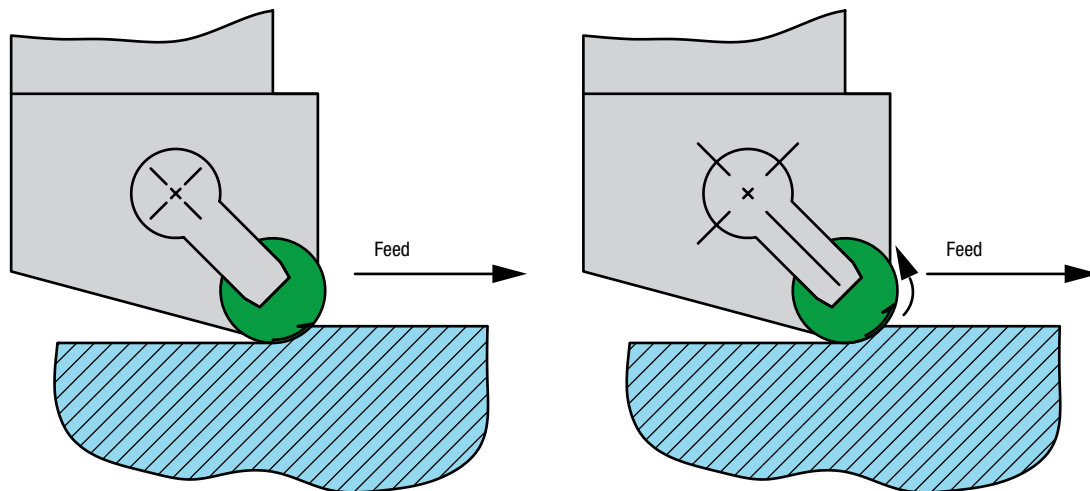
at the maximum; index the inserts as illustrated so that the next notch is developed on an area where the wear land is now present. This is done by turning the insert away from the finished surface so that the notch is clear of the hardened surface layer, but the wear land is still inside the next cutting zone.

Method 2 (Figure 70)

When both notching and flank wear land have developed at an equal pace and both are at a determined maximum, index the insert's notch towards the finished surface so that the notch is just clear of the finished surface and adjacent to the start of the toolholder pocket.

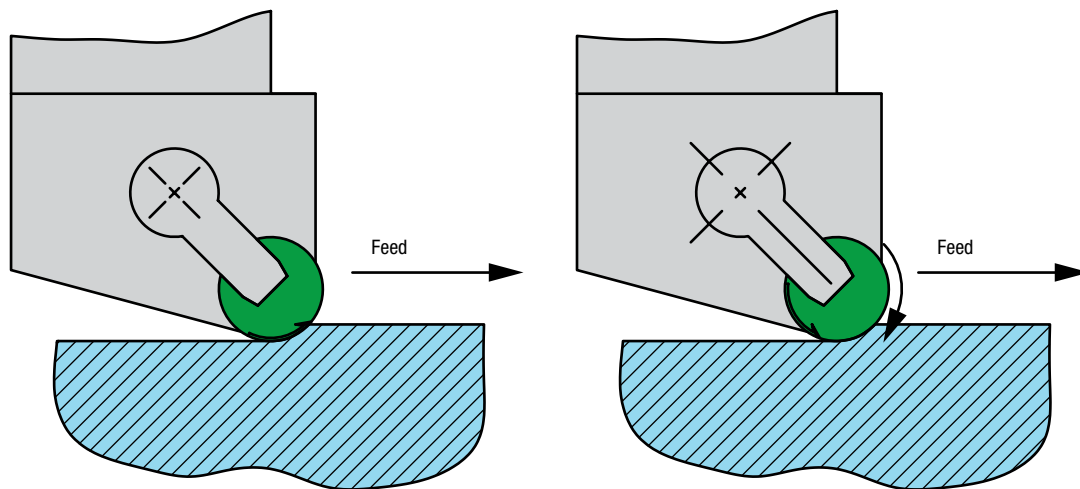
Method 1

Figure 69 – Indexing of Round Inserts (Due to Notching)



Method 2

Figure 70 – Indexing of Round Inserts (Due to Notching and Wear)



Greenleaf Sales

US +814-763-2915 • sales@greenleafcorporation.com
 EU +31-45-404-1774 • eurooffice@greenleafcorporation.com
 CN +86-731-89954796 • info@greenleafcorporation.com.cn
 www.greenleafglobalsupport.com • www.greenleafcorporation.com