



# Greenleaf®

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## WHISKER-REINFORCED CERAMIC INSERTS



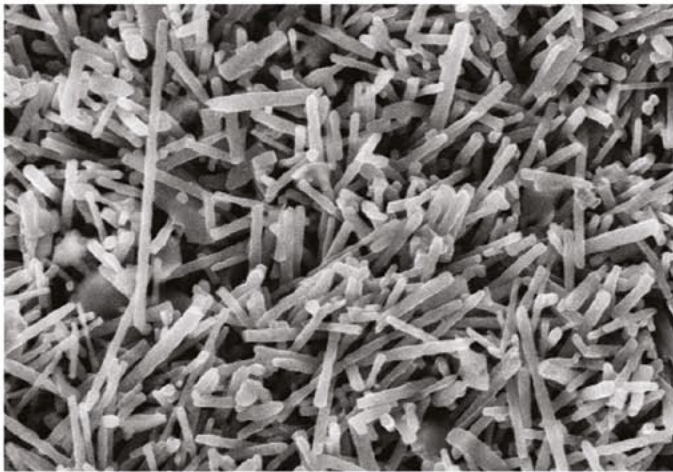
## WG-300®, WG-600®, WG-700™

### The world's most productive whisker-reinforced ceramic inserts.

Greenleaf whisker-reinforced ceramic inserts are extremely successful at machining hard materials such as hard steels and nickel- and cobalt-based super alloys, and offer excellent wear and shock resistance at high surface speeds. In fact, they are capable of operating up to 10 times the speed used for uncoated carbide tools!

### What is WG-300®?

WG-300®, developed by Greenleaf Corporation, holds the distinction of being the first commercially available ceramic composite using the technology of whisker reinforcement. The basic concept of whisker reinforcement involves strengthening a hard ceramic matrix with exceptionally 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!



SEM PHOTOMICROGRAPH

The super-strong whiskers are then 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 ceramic matrix.

### What is WG-600®?

WG-600® is a premium coated whisker-reinforced ceramic cutting tool. Greenleaf's proprietary coating gives WG-600® the advantage of offering 2-3 times longer tool life over uncoated whiskered ceramics. WG-600® excels at machining high-strength alloy materials, hardened steels and other difficult-to-cut materials; and, it is particularly well suited for demanding applications in which extended tool life is critical. *U.S. Patent No. 6,447,896 B1.*



### What is WG-700™?

WG-700™ is the world's most advanced whisker-reinforced ceramic insert. WG-700™ features an improved, tougher Al<sub>2</sub>O<sub>3</sub> substrate 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™ is capable of greater feed rates and higher speed machining than any other whisker grade while maintaining exceptional tool life. *U.S. Patent No. 6,447,896 B1.*



### Suggested Materials for:

- Turning and Grooving with WG-300®, WG-600® & WG-700™
- Milling with WG-600®

<b>Nickel-Based Alloys</b>	Inconel, Hastelloy, Haynes Alloys, Rene, Udimet, Waspaloy
<b>Weld Overlays</b>	Stellite, Colmonoy, Inconel Weld, Hard Weld
<b>Hardened Steels 45 Rc+</b>	Alloy Steels, Tool and Die Steels (H-13, D2, S7)
<b>Stainless Steels</b>	400 Series Stainless, 17-4 PH, 5-5 PH

Greenleaf whiskered ceramics are available in all ANSI/ISO standard insert geometries and styles, as well as special geometries custom designed for your unique needs. Simply put, whether it's through dramatic reductions in cycle time or extended tool life – or both – Greenleaf whiskered ceramics will help take your shop's productivity to new levels.



## Special Inserts Custom Designed For Your Application

Most applications can be machined with standard geometries, but sometimes to get the most productivity out of an operation, you need something special. With over 60 years of experience as an industry leader in special tool design, Greenleaf routinely develops custom-engineered geometries for whisker-reinforced ceramic grades to maximize productivity of challenging applications.

From heat-resistant aerospace alloys to hardened steels and irons, there is a Greenleaf whiskered ceramic insert that will push your productivity to new heights.



## TECHNICAL SUPPORT

In addition to pioneering the engineering and manufacturing of these top-quality inserts, Greenleaf Corporation offers over three decades of application expertise in the machining technology of whisker reinforcement. Greenleaf developed the world's first whisker-reinforced ceramic insert over 30 years ago and has mastered both the art and science of producing and applying whisker-reinforced ceramics.

Worldwide in 56 countries, Greenleaf Corporation has over 100 trained sales and technical experts ready to provide free support for all of our products and services.

## CALL FOR A DEMONSTRATION TODAY!

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### SAEGERTOWN, PA USA

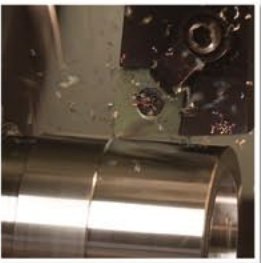
From its headquarters in Saegertown, Pennsylvania and a facility in North Carolina, Greenleaf maintains its commitment to pioneering breakthroughs in cutting tool technology and delivering innovative solutions to customers around the world.

## GROOVING, CUT-OFF & PROFILING SYSTEMS



Each Greenleaf tool has the option to utilize 248 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, straight shank holders and bars, are all part of this tooling system.

## TURNING & BORING



Greenleaf has extensive experience in the design and manufacture of turning and boring systems for a variety of industries worldwide. Using 4140 and 4150 alloy steel and both ceramic and carbide inserts, Greenleaf turning and boring tools will meet your specific needs.

## HEAVY TURNING



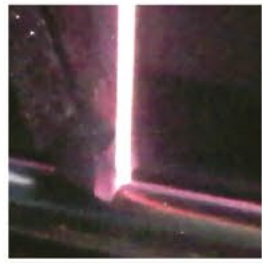
Ceramic cutting tools such as Greenleaf GEM-7™ composite material and WG-300® whiskered material combine with rigid, well-designed holding systems to produce Greenleaf's heavy-turning tooling systems.

## MILLING



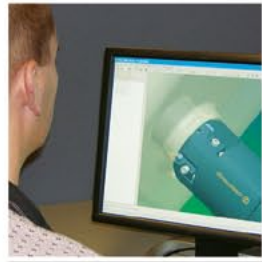
From heavy-duty cutting in severe interruptions to high-performance milling in hard materials and heat resistant superalloys, Greenleaf's comprehensive line of milling cutters and inserts is designed for outstanding performance and durability in the most demanding applications.

## TUBE SCARFING



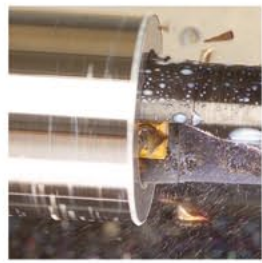
Greenleaf's modern tube scarfing system using indexable inserts offers greatly increased productivity potential from decreased downtime, longer tool life, faster tool change time, decreased tool costs and elimination of regrinding problems. In addition, a superior seam can be expected since an accurate radius form is always available on each side of the insert.

## SPECIAL ENGINEERING



Worldwide customers look to Greenleaf's superior cutting tool technology, high-performance tungsten carbide and ceramic inserts, and inventive tool-holding systems to meet their specific and often complex requirements.

## INDEXABLE DRILLING



The Holemill™ is an indexable drill utilizing Greenleaf's advanced coated-carbide grades for higher speeds, quieter cutting, longer tool life and reduced horsepower consumption. Inserts are positive squares for four indexes per insert.

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