



# AN INTRODUCTION TO ABRASIVE TECHNOLOGY

“Optimizing Single-Layer Tools Used  
for Cutting/Shaping Natural Fiber  
Reinforced Composite Material”

**CUTTING TOOL  
ENGINEERING®**

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# INTRODUCTIONS



**Tom Namola**, Product Development & Application Engineering

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37+ years engineering leadership for electroplated and brazed bond applications. Listed on multiple patents, published in technical trade journals, participated in funded grinding improvement projects. BS degree in Metallurgical Engineering from The Ohio State University.



**Jeremiah Wolf**, Product Development & Application Engineering

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15 years in cutting tool/machining technology with a strong focus on new product development for emerging markets. Advanced from AT's computer aided design team to Product Development and Application Engineering team. AAS degree in Mechanical Engineering Technology from Kent State University.

# ABRASIVE TECHNOLOGY: WHO WE ARE

- Global leader in superabrasive grinding and tooling
  - Founded in 1971
- Expansive portfolio of innovative products:
  - Diamond and cBN grinding wheels
  - Clearance control coatings
  - PCD and PcBN (polycrystalline diamond & cubic boron nitride) tooling
  - Two Striper® diamond dental burs
- Customized solutions designed, bonded and produced for customers' specific applications
- 140+ registered patents and trademarks



## MANUFACTURING LOCATIONS

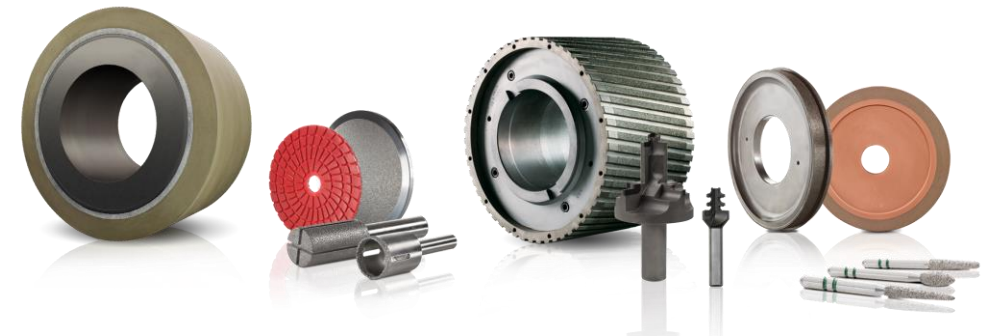
### UNITED STATES

Lewis Center, Ohio – World HQ  
Elgin, Illinois  
Cincinnati, Ohio

### UNITED KINGDOM

Colwyn Bay, Wales  
Lichfield, England

**SALES LOCATIONS:** United States, Mexico and UK



# FEATURED OVERVIEW

Single-layer diamond tools (electroplated and brazed) can be used effectively in natural-fiber-reinforced composites material.

Single-layer diamond tools:

- Blank/Core
- Bond
- Abrasive

# PRODUCTION CHALLENGE

**Challenge:** Improving life of single-layer diamond tools.

**Current State:**

Edge carbide/PCD tools: Commonly used, resistant to loading. End of life occurs with edge dulling, leading to part chipping, causing rejected parts, forcing mfg. to leave excessive materials to avoid entirely scraping part.

Single-layer: End of life occurs from burr/fuzz generation due to tool loading, burrs easily removed from parts, reducing rejects. Reduction in scrap. However, standard configuration tools have too short of a useful life.

# SINGLE-LAYER DIAMOND FEATURES POSITIVELY AFFECTING TOOL LOADING

Tool design tailored for material to be cut

Abrasive particle size

Abrasive shape

Abrasive concentration

Bond height



# OVERCOMING THE CHALLENGE OF TOOL LOADING

- Selecting the largest diamond size that the application will allow.
- Tuning the diamond concentration based on the material properties and the application parameters.
- Tuning shape based on the material properties and the application parameters.
- Bond height: Setting to the lowest level that retains diamond through tool life.

# REDUCED CONCENTRATION BENEFITS

## Single-Layer Brazed Diamond Saws vs. PCD Tipped Saw

Application: Cut-off  
Material: Wood fiber thermoplastic composite  
Size: 18" diameter  
Speed: Fixed 1,750 rpm (8,247 sfm)  
Feed rate: 200 ipm

Baseline: PCD saw 40,000 cuts

Standard-concentration brazed diamond saw = 20,000 cuts

**Adjusted diamond coverage brazed diamond saw (40% concentration) = 450,000 cuts**

### Benefits:

- **Reduced tooling cost per cut**
- **More accurate cut**
- **Better edge**
- **Cut length was reduced closer to the final specification, generating less waste material**





# ADDITIONAL TECHNICAL INTELLIGENCE

## Environmental Health & Safety

- No anti-cut gloves required
- Reduced noise
- Ease of mounting (no rotational direction issues)
- Dust easier to collect

# EXAMPLES



# CONTACT INFORMATION

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