

## 3C Industry

### Sapphire Through-Hole Machining

#### Challenges

- Poor hole wall surface quality
- Long polishing time for mass production

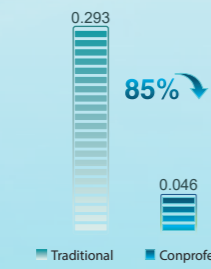
#### Conprofe Solution

- Ultrasonic Engraving and Milling Center** ULM-400
- + **Ultrasonic** Machining System
- + **Solid PCD Micro-Edge** Cutting Tool

#### Conprofe Benefits

- Hole wall roughness Ra down by **85%**, from 0.293 $\mu$ m to 0.046 $\mu$ m
- No need for polishing

Hole Sidewall Roughness Ra ( $\mu$ m)



Material: Sapphire  
Hole: D2.5x0.8mm



### Forged Titanium Alloy Deep Blind Cross-Hole Drilling

#### Challenges

- Long cycle time
- Poor hole wall quality: heat discoloration, high roughness and severe burring

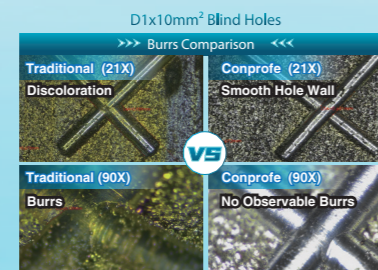
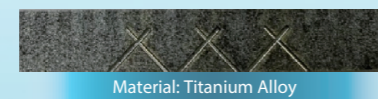
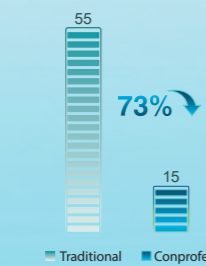
#### Conprofe Solution

- Ultrasonic Drilling and Milling Center** UGT-500
- + **Ultrasonic** Machining System
- + Through-Spindle Cooling System
- + **Smartguy 5-Axis** Rotary Table

#### Conprofe Benefits

- Cycle time down by **73%**, from 55 seconds to 15 seconds
- Smooth hole wall without discoloration
- No observable burrs and no need for manual deburring

Cycle Time (s)



## Automotive Industry

### Carbon-Ceramic Brake Disc for New Energy Vehicle

#### Challenges

- Severe tool wear
- Low machining efficiency (C/T 120 min)
- Chipping, delamination and fiber pull-out and hole edge cracking

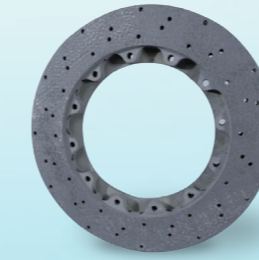
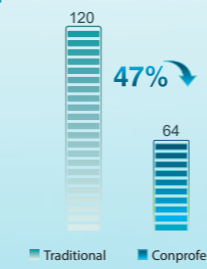
#### Conprofe Solution

- Ultrasonic Precision Engraving and Milling Center** UGM-600
- + **Ultrasonic** Machining System
- + **Solid PCD Drill**

#### Conprofe Benefits

- Improved surface quality without obvious chipping, cracking, delamination or fiber pull-out
- Cycle time down by **47%**, from 120 min to 64 min

Cycle Time (min)



Material: Carbon-Ceramic Composite  
Dimension: D380x20.5mm  
Features: LD, Contouring, Step Milling and Hole Drilling



## General Precision Manufacturing

### Deep Hole Drilling in Quartz Glass Optical Fiber Preform

#### Challenges

- Poor hole side-wall surface quality
- Poor hole parallelism
- Hole edge chipping
- Machining failure due to tool breakage

#### Conprofe Solution

- Ultrasonic Drilling and Milling Center** UGT-500
- + **Ultrasonic** Machining System
- + Through-Spindle Cooling System

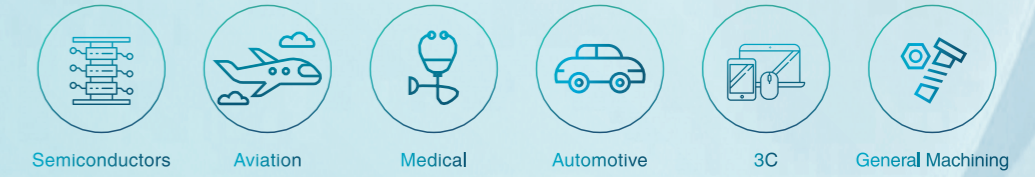
#### Conprofe Benefits

- Hole wall roughness **Sa < 0.122 $\mu$ m**
- Hole parallelism **< 0.0385mm**, meeting customers' requirements



# Conprofe Ultrasonic-Green Machine Tools

## Innovative Application Cases



### Conprofe Technology Group Co., Ltd.

Website: [www.conprofecnc.com](http://www.conprofecnc.com)  
E-mail: [sales-international@conprofetech.com](mailto:sales-international@conprofetech.com)  
Tel: +86-20 3861 9084

Address: No.6, 2nd Nanyun Road, Science City, Hi-tech Development Zone, Guangzhou, 510663, P.R.C



Website YouTube LinkedIn

© 2024 Conprofe Technology Group Co., Ltd. All Rights Reserved.

## Semiconductor Industry

### Curved Electrode of Single Crystal Silicon

#### Challenges

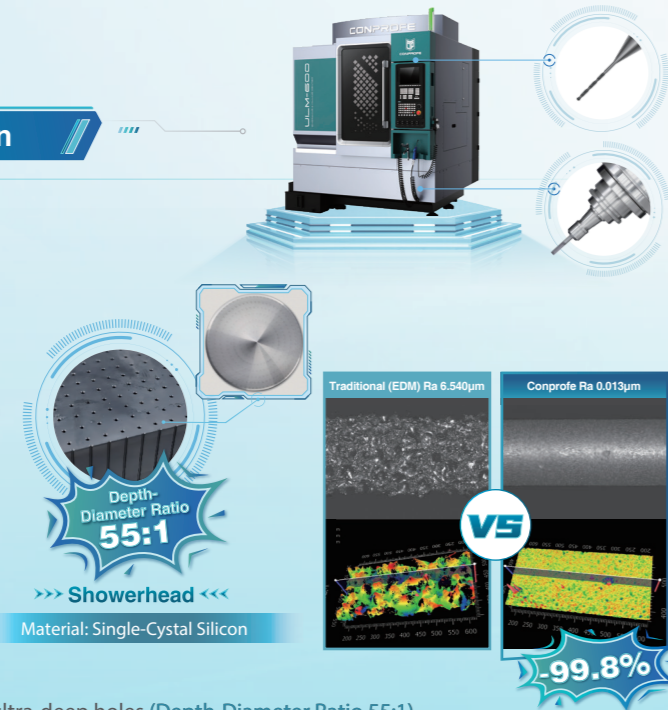
- Immature machining solution
- Hole wall roughness  $\geq Ra\ 6.54\mu m$
- Hole roundness  $\geq 0.025mm$
- Hard to control hole perpendicularity

#### Conprofe Solution

- **Ultrasonic Precision Engraving and Milling Center** ULM-600
- + **Ultrasonic** Machining System
- + **Solid PCD Drill**

#### Conprofe Benefits

- Continuous machining of over **1,000** D0.45x24.75mm ultra-deep holes (Depth-Diameter Ratio 55:1)
- With ultra-deep micro-hole drilling, no obvious chipping around hole edges
- Hole roundness **0.003mm**
- Hole wall roughness down by **99.8%**, from Ra 6.54 $\mu m$  to Ra **0.013 $\mu m$**



## Aviation and Aerospace Industry

### Nomex Honeycomb Contouring

#### Challenges

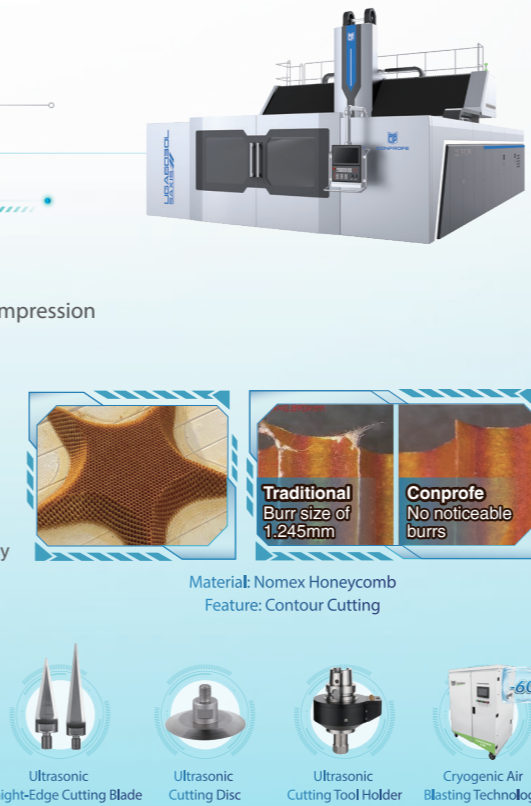
- Uneven machined surface, severe burrs and excessive dust
- Vulnerable to workpiece deformation, tearing and buckling due to compression

#### Conprofe Solution

- **Ultrasonic Gantry 5-Axis Machining Center** UGA6030L-5AXIS
- + **Ultrasonic** Machining System
- + **Ultrasonic** Cutting Disc
- + **Ultrasonic** Straight-Edge Cutting Blade
- + **Cryogenic** Air Blasting Technology

#### Conprofe Benefits

- Efficient 3D contouring of complicated shapes with angles  $< 18^\circ$ .
- Mitigated dusting and no observable burrs
- Effectively lower cutting force with even stress on the workpiece
- Flat and smooth cutting surface without buckling



## Medical Industry

### Tibial Plateau Machining

#### Challenges

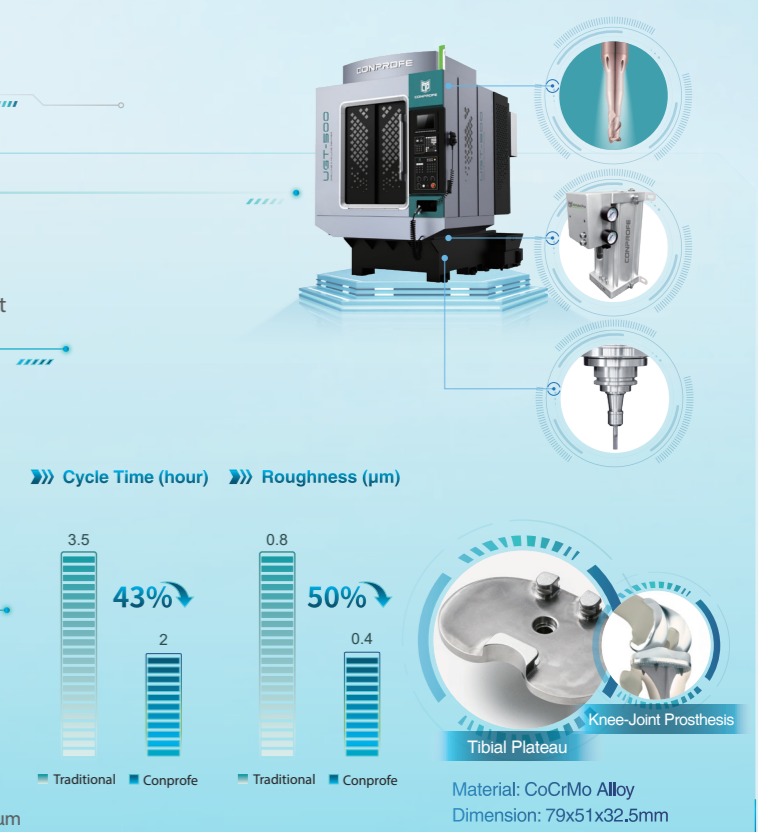
- Long cycle time
- Short tool life
- Low polishing efficiency and high manual labor cost

#### Conprofe Solution

- **Ultrasonic Drilling and Milling Center** UGT-500
- + **Ultrasonic** Machining System
- + **Minimum Quantity Lubrication (MQL)**
- + **Spindle-Through** Cutting Tool

#### Conprofe Benefits

- Only very slight observable cutter marks on the surface
- Grinding and polishing cost down by **45%** vs. traditional machining
- Cycle time shortened by **43%**, from 3.5h to 2h
- Surface roughness down by **50%**, from Ra 0.8 $\mu m$  to Ra 0.4 $\mu m$



### AISIc Threaded Hole Machining

#### Challenges

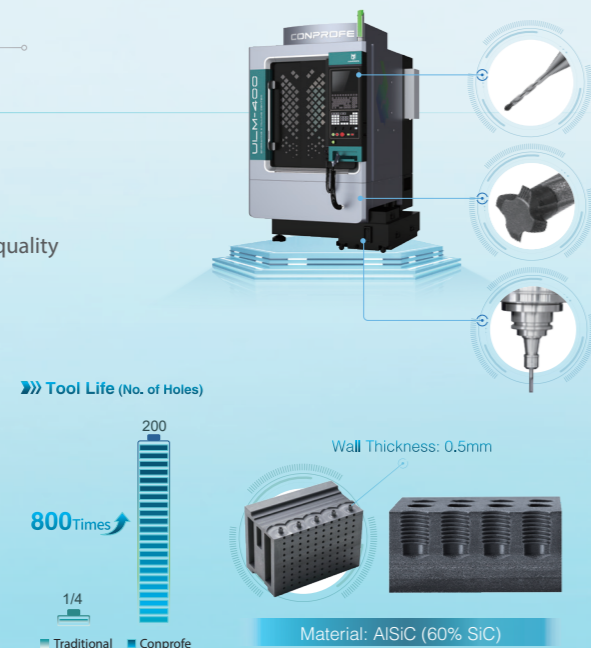
- Cycle time  $> 180s$ /hole
- Unstable workpiece quality
- Vulnerable to hole edge chipping
- Low precision
- High cost (Tool life  $< 1$  hole)

#### Conprofe Solution

- **Ultrasonic Precision Engraving and Milling Center** ULM-400
- + **Ultrasonic** Machining System
- + **Solid PCD Drill and Thread Mill**

#### Conprofe Benefits

- M3 threaded holes **without cracking or chipping**
- Tool life improved by **800 times**, from 1/4 hole to 200 holes



### Superalloy Blisk Milling

#### Challenges

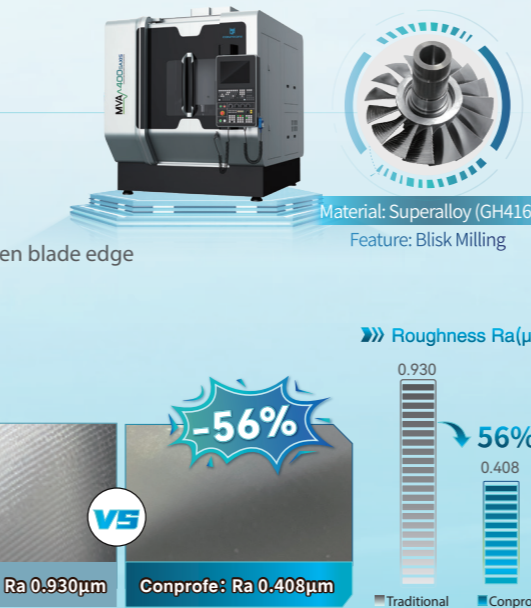
- Thin-wall (chord-thickness ratio  $> 40:1$ ), with obvious chatter marks
- Poor surface roughness (Ra 0.93 $\mu m$ )
- Blade displacement
- Uneven blade edge

#### Conprofe Solution

- **Ultrasonic Vertical 5-Axis Simultaneous Machining Center** MVA400-5AXIS
- + **Ultrasonic** Machining System
- + **Supercritical CO<sub>2</sub> (-78°C)** Cryogenic Cooling System
- + **Minimum Quantity Lubrication (MQL)**
- + **Ultrasonic** Shrink-Fit Tool Holders
- + **Coolant-Through** Cutting Tools

#### Conprofe Benefits

- 3-in-1 technology reduces chatter marks on the blade surface and improves contour accuracy
- Blade surface roughness down by **56%**, from Ra 0.930 $\mu m$  to Ra 0.408 $\mu m$ , shortening after-polishing time



### 3D-Printed Titanium Alloy Spinal Cage Milling

#### Challenges

- Long cycle time
- No cutting fluids allowed
- Short tool life
- Severe burring and poor surface quality with dry cutting

#### Conprofe Solution

- **Ultrasonic Vertical 5-Axis Machining Center** UGV200-5AXIS
- + **Ultrasonic** Machining System
- + **Supercritical CO<sub>2</sub>** Cryogenic Spindle-Through Cooling System (**ScCO<sub>2</sub>**)

#### Conprofe Benefits

- Surface roughness **Ra  $< 0.6\mu m$**
- Significant burr reduction, no need for manual deburring
- Achieve efficient, high-quality green processing and reduce workpiece scrap rate

