

Conprofe *Ultrasonic* Machine Tools

Innovative Application Cases



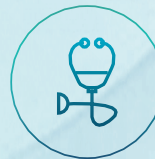
3C



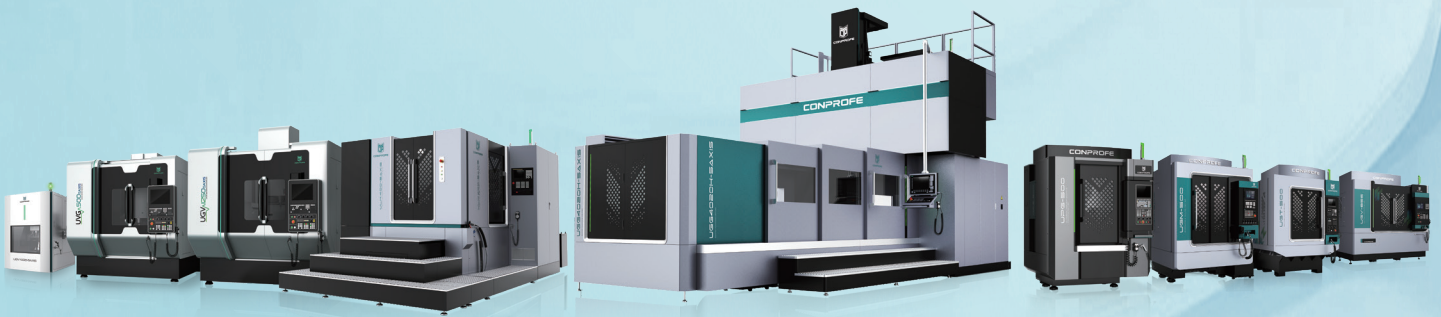
Semiconductors



Aviation



Medical



Converging Global Resources, Professional as Industry Leader

Single Crystal Showerhead Hole Drilling

Challenges

- Hole wall roughness $\geq Ra\ 6.54\mu m$
- Hole roundness $\geq 0.025mm$

Conprofe Solution

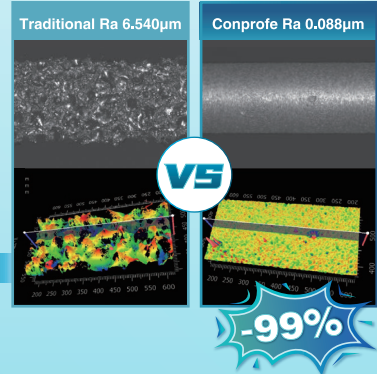
- **Ultrasonic Precision Engraving and Milling Center ULM-600**
- + Ultrasonic Machining System
- + Solid PCD Drill

Conprofe Benefits

- Continuous machining of over **2,000** D0.45x23mm ultra-deep holes
- No obvious chipping around hole edges
- Hole roundness **0.003mm**
- Hole wall roughness down by **99%**, from Ra 6.54 μm to Ra **0.088 μm**



Material: Single-Crystal Silicon



AlSiC Threaded Hole Machining

Challenges

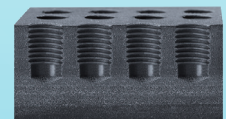
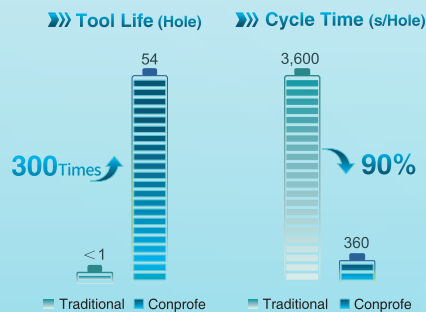
- Long cycle time with manual tapping: 3,600s+
- High scrap rate from poor thread quality
- 6 taps needed to machine one hole • Manual operation

Conprofe Solution

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

Conprofe Benefits

- Tool life improved by **300 times** (54 holes/tool)
- Cycle time shortened by **90%**, from 3600s/hole to 360s/hole
- Replacing manual operation to CNC thread milling



Material: AlSiC Silicon



Stainless Steel Flight Engine Chiller Hole Drilling

Challenges

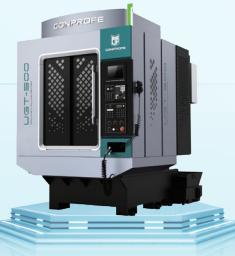
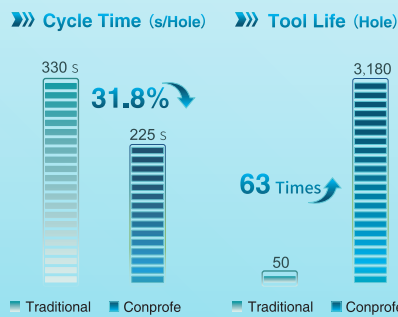
- Poor hole perpendicularity
- Inefficient machining
- Hole wall cutter mark from two-sided drilling
- Short tool life

Conprofe Solution

- **Ultrasonic Drilling & Milling Center**
UGT-500
- + **Ultrasonic** Machining System

Conprofe Benefits

- Cycle time down by **31.8%**
- Tool life up by **63 times** to 3,180 holes/tool
- Qualified hole dimensional accuracy



Material: 304 Stainless Steel
φ2x30mm Holes
Depth-Diameter Ratio 15:1

Carbon-Ceramic Brake Hole Drilling

Challenges

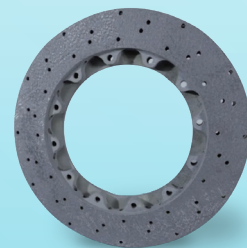
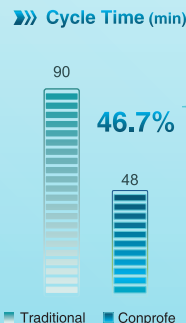
- Severe tool wear from grinding high-hardness material
- Chipping, delamination, fiber pull-out and hole edge chipping
- Inefficient machining (C/T 120min)

Conprofe Solution

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

Conprofe Benefits

- **Improved surface quality**, no obvious chipping, cracking, delamination or fiber pull-out
- Cycle time down by **46.7%**, from 90 min to 48 min



Material:
Carbon-Ceramic Composite

PEEK (Polyetheretherketone) Cervical Cage

Challenges

- Severe burrs, low efficiency and high machining cost due to manual deburring
- Machining cost increased due to post-CNC cleaning

Conprofe Solution

- **Ultrasonic Engraving and Milling Center**
UGM-500
- + **Ultrasonic** Machining System

Conprofe Benefits

- **80%** burr reduction and lower costs with no post-CNC manual deburring
- Tool life up by **30%+**
- Clean and cost-saving machining by replacing traditional cutting fluids



>>> Cervical Cage <<<

Material: PEEK
(Polyetheretherketone)

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

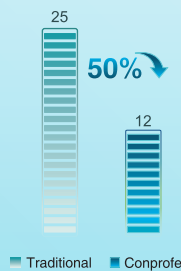
Conprofe Solution

- **Ultrasonic Vertical 5-Axis Machining Center**
UGV200-5AXIS
- + **Ultrasonic** Machining System
- + Supercritical CO₂ Cryogenic Spindle-Through Cooling System (ScCO₂)

Conprofe Benefits

- Cycle time down by over **50%**, from 25min to 12min
- Tool life up by **50%+**
- Surface roughness **Ra<0.6μm**
- Significant burr reduction, no need for manual deburring
- Lower scrap rate

>>> Cycle Time (min)



>>> Spinal Cage Milling <<<

Material:
3D-Printed Titanium Alloy TC4

Sapphire Through-Hole Machining

Challenges

- Poor hole wall surface quality
- Polishing time too long for mass production

Conprofe Solution

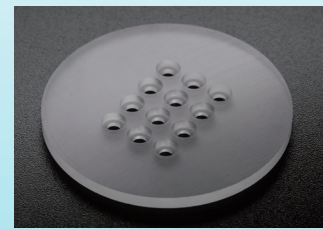
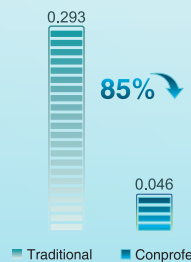
- **Ultrasonic Engraving and Milling Center**
ULM-400
- + **Ultrasonic** Machining System
- + **Solid PCD Micro-Edge** Cutting Tool

Conprofe Benefits

- Hole wall roughness Ra improved by **85%**, from 0.293 μ m to 0.046 μ m
- No need for polishing



Hole Sidewall Roughness Ra (μ 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

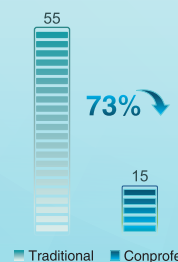
- **Ultrasonic Drilling and Tapping Center**
UGT-500
- + **Ultrasonic** Machining System
- + **Through-Spindle Cooling**
- + **Smartguy 5-Axis Rotary Table**

Conprofe Benefits

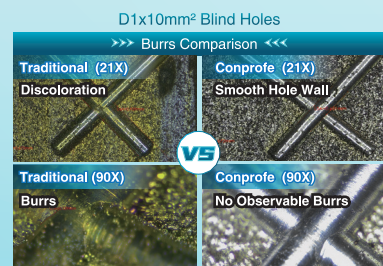
- Cycle time down by **73%**, from 55 seconds to 15 seconds
- Smooth hole wall without discoloration
- No observable burrs and no need for manual deburring



Cycle Time (s)



Material: Titanium Alloy





Conprofe Technology Group Co., Ltd.

Website: www.conprofecnc.com

E-mail: 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.

VE1.0

The information given is not binding. Actual products and mutual agreement shall prevail. Reprinting of any text and illustrations requires written authorization of Conprofe.