MICRO-TURNING AND MICRO-EDM
Micro Turning

• Turning of micro-shafts below 50µm is difficult due to radial direction of cutting force.
• Radial direction causes damage to the workpiece.
• Radial direction is brought about by larger tool nose radius.

Commercial Cutting Tool

Shaft fabricated with commercial cutting tool
Micro Turning

- If the tool nose is replaced by a sharp tool tip, radial cutting force can be reduced and micro turning will allow for fabrication of smaller micro shafts.
Fabrication Sharp Tool Using Hybrid Processes

- PCD Tool can be modified in-situ using EDM/EDG process.
- Sharp tool tip with less than 5µm tool nose can be fabricated.

(a) EDG Process  (b) After EDG

(a) Commercial PCD Tool  (b) Modified PCD Tool
Use of Ultra Sharp Tool

A Hair on the Left and a 19µm Graphite Shaft on the Right (Same Magnification and Same Image Size for Comparison)
Fabricating Tiny Holes with Micro-turned Electrode

6.5µm hole machined on 50µm stainless steel plate, probably the world’s smallest hole with highest aspect ratio