

Machining

## 5 Things You Should Know About Micro Tools

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*KYOCERA SGS Precision Tools' Marketing Coordinator Dan Ott Explains Micro Machining*

1. Micromachining is the machining process of remarkably small components with a tool that has a cutting diameter smaller than 0.015 inches and no more than a few tenths tolerance. Micro tools can create very small and complex parts used in specific applications, more notably in the electronics and medical industry. It takes a specific machine with both sufficient spindle speed and high-quality cutting tools to produce the consistency and strength to run at high speeds. Micro tools can be as small as 0.001 inches in diameter to achieve the high precision and intricate detail needed.
2. The primary benefit of Micromachining is that it allows for the reliable repeatability of the production of small and intricate components that have extremely tight tolerances. Micromachining is ideal for machining complex prototypes and components with micro features in ceramics, plastics, and metals, and has a plethora of challenging applications. The application of high-quality micro tools to machines with high spindle speeds or Swiss-type lathes can create cleaner cuts, more precise dimensions, and tighter tolerances to fit their desired application in the electronics and medical industries. The addition of high-quality micro tools to your precision machining application provides the opportunity to take on more distinct components.
3. Generally, micro drilling can be described as drilling holes smaller than 3mm in diameter. Successful micro drilling requires an extremely sensitive machine with a precise spindle and very low runout. The accuracy of your micro drilling operations will benefit largely from precision tool holders, typically hand clamped to avoid positioning errors that can occur with an automatic tool change system. Ultra-fine coolant channels can move their way through the body of these tools as far as the cutting edges, allowing for the optimal operating temperature. Aluminum titanium nitride coating on these tools can counteract wear and increase overall tool life. Remember that with drills of this size to pay attention to the wear indicators. Because of the low tool volume, heat absorption is minimal. Therefore, the price for overloading the tool beyond its predetermined recommendations will be paid in the way of total tool failure.
4. Trochoidal milling is a milling technique defined by a circular, or trochoidal, tool path. This technique is proven to offer substantial machining benefits, such as increasing tool life, reducing machining cycle times, and fewer tools required for a job. However, it is crucial to have a precision machine and optimal software capable of dynamic speeds and feeds to avoid critical tool failure. While micro tools can still benefit from the trochoidal milling technique, the risk of tool breakage must be considered carefully. Although trochoidal milling can increase your machining efficiency in many applications, it is vital that the micro tool involved is of high quality.
5. The demand for smaller and more intricate machined components increases as more and more industries transition to smaller, more complex components. Micromachining will become vitally important and a significant facet of a precision manufacturing company's work. This demand has caused KYOCERA SGS Precision Tools to increase production of these high-quality micro tools with a product expansion of over 1,100 new 3-flute micro end mills to keep up with growing industry demands.

*Previously Featured on KYOCERA SGS Precision Tools' blog.*