

Tiny TOOLS

Canadian Metalworking asks Mark Thum of Kyocera Micro Tools about maximizing micro tooling performance

Doctors, dentists and others working in the medical field rely on their skills to perform the critical tasks at hand. Indeed, any professional working with small precision parts must do the same. And while their skills are critical, the tools they use to do their work are equally important.

So there's no room for error when machining such parts and manufacturers supplying these industries understand the importance of producing high quality, high precision parts. Parts manufacturers, in turn, must rely on the micro tools in their machines to help them meet these stringent market demands. Maintaining optimum performance of your machine tools and the cutting tools you use is a given, but how to achieve that isn't always so clear.

So *Canadian Metalworking* approached Kyocera Micro Tools (www.kyoceramicrotools.com) to discuss what manufacturers can do. Here's what Mark Thum, business development manager advises.

TOP FIVE TIPS

The following are five things that I would recommend for manufacturers struggling with micro machining.

1. Make sure you are using the appropriate micro tool for your application. This generally means two things: Use of a micro tool made with the optimal sub-micron carbide grade and optimal geometry for a particular application.

Choosing the optimal carbide grade for an application means selecting a Tungsten Carbide grade with the ideal amount of Cobalt binder for your application.

The selection process takes into account that Tungsten Carbide cutting tools with more Cobalt binder have less wear resistance, less hardness, and greater toughness. Conversely, decreased Cobalt binder will mean increased wear resistance and reduced toughness.

Additionally, be sure that your cutting tool supplier is using premium grade carbides with demonstrated quality consistency.

After choosing the best Tungsten Carbide option, the cutting tool manufacturer must then develop the ideal cutting tool geometries and surface finishes for the application. Knowledge of these geometries comes from test data and experience.

PRODUCT REPORT



Kyocera Micro Tools: Solid Carbide Threading

Kyocera Micro Tool's new line of solid carbide threading tools are designed for dental implant manufacturers for titanium implant production. The tools use a single flute design and varies the number of flutes by diameter. Used in a whirl threading process, they're a faster method for producing threads compared to more traditional machining methods.

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2. Be sure to use the appropriate spindle and machine tool for your application. We receive countless calls each month from end users that are not able to achieve desired results simply because they don't have the spindle rpm required for such small diameter cutting tools to achieve optimized surface feet per minute cutting rates. We can help end users somewhat to get through an immediate requirement, but it is never a replacement for having the proper spindle capability for this type of tooling. Additional note, there are available retrofit high rpm spindle options that work very well. I recommend you consult your local distributor regarding these options.

3. In addition to the speeds and feeds mentioned in the second point, machine condition and tool holding plays a pivotal role. Using high performing collets with minimal runout is also a critical parameter in controlling bit breakage and part surface finish.

Given that Tungsten Carbide is a brittle material compared to other cutting tool materials like high speed

steel, and considering the micro size of these cutting tools, you quickly gain an appreciation of their fragile nature.

There have been cases where we come to end users with older custom built machining equipment, and we invariably find that after equipment is re-furbished, cutting tool life always improves and breakage decreases. Therefore, even though these bits are tiny, machine rigidity is still very important, as is minimal collet runout.

4. Tool coatings also play an important role in machining harder or more abrasive materials as well as using the correct coolants for the application. Typical coatings for micro tools are AlTiN and DLC. The most appropriate coating for your application depends on a host of factors.

In very general terms, managing the amount of heat

during machining plays a large part in the selection of coatings and or coolants that are used.

5. For those manufacturers that have the appropriate machines/spindles and correct parameters yet continue to struggle, custom designed cutting tools are almost always the answer as designs are made to address end user process specifics. Again, I recommend getting in touch with your local distributor to get technical assistance. If they can't solve the problem first hand, they always have the option of consulting with the manufacturer to develop the solution. We always entertain specialized tooling requests as we understand that micro machining isn't exactly a standard type of process. **CM**

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