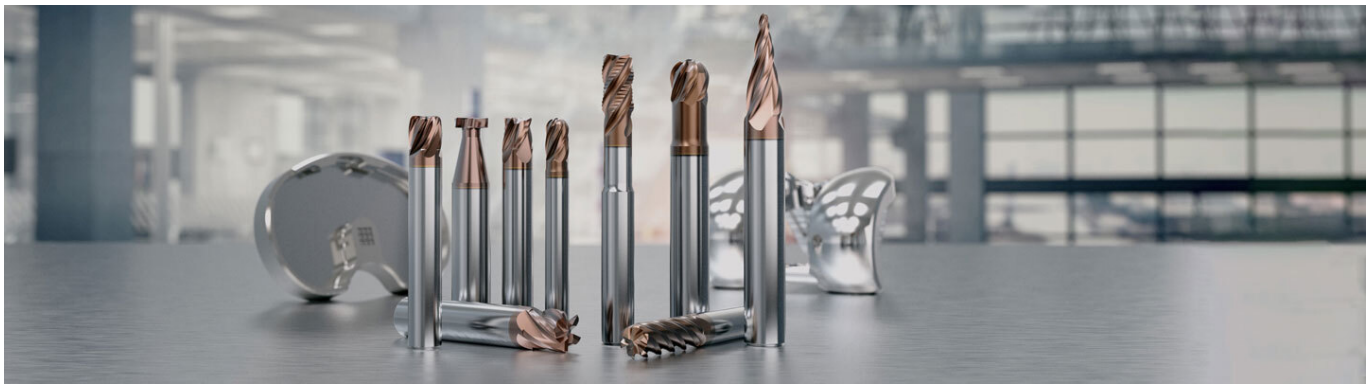

Machining

5 Ways Cutting Tools Benefit Medical Implant Manufacturers

Matt Morgan | Sep 21, 2023

Improved joint replacement technology is giving more people the option to have surgery for a better quality of life, free from pain and limited mobility. The *increased demand of joint replacements* also holds potential for manufacturers of medical implant parts.

To capitalize on the booming business, medical part manufacturers must overcome a number of hurdles in their operation, including tool selection, hardened materials, tight tolerances and regulatory requirements.

Where the tool meets the metal is only one of many defining moments for a manufacturer. Choosing the right cutting tools, however, can make a critical difference in production.

Here are five ways that a quality tool can positively affect a medical implant manufacturer's business.

Simplified Tool Selection

When evaluating companies to do business with, manufacturers would do well to focus on experience, especially when it comes to medical implant parts, with its quickly changing technology and regulatory requirements.

> **"If we're optimizing the cutting parameters for the tool to the component, the machine kinematics and also the software capabilities, we can improve tool life dramatically."**
> Joe Mecus
> Seco Tools

"Seco was on the ground floor, decades ago, when orthopedic implant manufacturing started to boom," says Joe Mecus, business development manager for medical manufacturing in the Americas for

Seco Tools. This experience has allowed the company first to develop tools to machine orthopedic implants and then to refine the tools over time.

"We design tools at a micro level with the geometries at the cutting edge and the processes between—post grinding, finishing, polishing and coating—that produce 30 to 70 percent tool life improvement over our own tools that were just developed five or 10 years ago."

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Besides these improvements, the cutting tool manufacturer has developed a full range of standard products for orthopedic knee implants. "The features we've developed in those tools far surpass the performance of the special custom tools that we had developed in the original process," Mecus says. "With fewer specials required, their supply chain becomes easier to manage."

Experience with Hard-to-Work Material

Experience in a specialized industry such as orthopedic implants pays off in knowing how to handle hard-to-work material.

Cobalt chrome has been the industry standard for knee replacement parts, and titanium is increasingly being used. Both materials are hard to machine and harder on cutting tools.

"It's not just knowing the cutting tool, and it's not just knowing the workpiece material," Mecus explains. "It's knowing there could be variations in the workpiece material. It's knowing how to apply it and how to utilize the strengths of the software that you're partnered with to do that."

Efficiencies Across the Manufacturing Process

In an effort to optimize the direction of their individual companies, machine tool builders, software programmers and cutting tool manufacturers have become focused on their own core strengths, to the exclusion of others in the manufacturing process, Mecus says.

The key to improving the process for medical manufacturers, however, is for the various industry partners to work together. Seco makes this a regular practice, he says.

"It's better for the end customer if each of those disciplines is working together to optimize their strengths," he says. "If one of them is working alone, they're going to be weak. If you get all of those disciplines working together, you can come up with unique solutions that individually they would never achieve by themselves."

Read more: 'Lives Are at Stake': Mastering the Critical Details of Machining Medical Parts

Seco often works with machine tool builders to optimize the performance of their cutting tools.

"Machine tool builders are developing the fixtures and how they hold the part in the machine," says Jay Ball, product manager for solid tooling at Seco. "I've seen it where they design a fixture that limits the rigidity, and then we struggle to get the customer's results, because of the way they're holding out of the component. Instead, we can help the machine tool builder understand that by designing certain features in the fixtures, they're going to make the part more rigid, so it's going to be able to produce a better part more consistently for the end customer."

Working with software programmers, too, Seco has been able to improve results for manufacturers.

"If we're optimizing the cutting parameters for the tool to the component, the machine kinematics and

also the software capabilities, we can improve tool life dramatically," Mecus says. "We've gone from, say, 35 parts or 100 minutes in cut up to several hundred parts or several hundred minutes in cut, just by doing that alone."

Recently, Seco ***collaborated with GF Machining Solutions and Open Mind*** to create a milling strategy for a femoral component in a knee replacement that reduces machining time and surface roughness.

Exacting Surface Finish Requirements

Tight tolerances and unique visual surface finish requirements are common for orthopedic implant manufacturing, Mecus says.

Take tibial trays, for example. As one of the critical components of an artificial knee, the tibial tray replaces the damaged part of the tibia bone (shinbone) and must have no sharp edges for patient comfort and safety.

The tray floor must also have proper surface topography and minimal toolpath marks that otherwise require secondary polishing. Seco has precisely designed solid carbide cutting tools to ***finish the tibial tray floor*** and ***finish the inner walls and outer surfaces*** to conform to specified tolerances.

"Critical surface finishes are very important in medical, far more than in some other markets," and it goes beyond meeting technical specifications, Mecus says.

"In the medical market, it's a visual thing," he says. "Mechanically, the surface could be fine. But if a doctor sees a difference in the surface, he or she will view that as a defect and throw the part away, even though mechanically it meets requirements."

WATCH: *See how Seco helps companies overcome the challenges that come with manufacturing orthopedic knee implants such as tibial trays and femoral components.*

Reduced Production Time and Scrap Rates

Unsatisfactory parts at any point of the process—but especially near the end, when the most work has been done—is wasteful and costly to a manufacturing business.

When the manufacturing process is optimized to improve cutting tool life, part surface finishes and machining tolerances, it reduces the need for manual intervention and secondary processes, which lengthens production time and can lead to errors, both of which drive up cost per unit.

"Quality is improved, tool life is improved, the general overall production of the component is improved, and the component itself is better," Mecus says.

"With many of these components, the current process has a lot of manual human intervention," Ball says. "We can improve the finish quality if we can eliminate the potential of human error of ***scrapping parts***, because that's very prominent in medical. So anytime we can reduce the amount of human interaction with those components, you can have a more sustainable process."

What are the biggest challenges you've overcome in medical implant manufacturing? Let us know in the comments below.

