



Metalworking

How Mitsubishi's MC6100 Turning Inserts Tame Tricky Steel-Machining Jobs

James Langford | Dec 09, 2024

You know you've built a good machining tool when workers start hiding it from acquisitive colleagues as soon as their shifts are over.

That's what happened when Mitsubishi Materials, a maker of machining equipment, gave some samples of its 6100-series steel-turning inserts to participants in a turning class, says Brian Jewell, technical support and training specialist with Mitsubishi.

"They said that understanding how the chip-breakers matched up to the grades and being able to apply them correctly had really increased their productivity to the point that they were putting them back in their toolboxes at the end of each shift, then bringing them out the next day and running them again," he adds.

Launched in 2020, the 6100 series is the second generation of turning grades for ISO-P workpiece materials, a category that includes steel and steel alloys and **can be tricky** to machine because of variations in heat resistance, abrasiveness and adhesion that are more consistent in other letter-designated metal groups.

"For example, a sharp-edged tool engineered to counter the adhesion tendencies of a low-alloy steel may not be able to withstand the abrasive characteristics of another steel composition," an article in *Metalworking World Magazine* explains. "In addition, development of specialized steel alloys continues unabated as manufacturers seek materials matched to the particular performance demands of their customers' parts."

Variants in Mitsubishi's 6100 series include the 6115 for high-speed turning, the 6125 that offers stable tool life over a wider range of machining applications and the more recent 6135, engineered for fracture resistance.

The last two digits in the insert's name indicate the amount of interruption due to factors such as resistance and pinch points that the tool can handle, a quality that increases as the numbers rise, Jewell says.

Increasing Wear Resistance

The MC6135, introduced in October, is built with what Mitsubishi calls super nano texture technology that enables thicker coatings of aluminum oxide for heat resistance than conventional chemical vapor deposition techniques, in which grain size and growth direction are uneven.

Essentially, by providing better alignment of aluminum oxide crystals, super nano texture technology allows room for more of them, Jewell says.

"The way I explain it to people is that I can generally get more stuff in a box if I stack it neatly instead of just tossing it in randomly," he adds. The technological improvements increase wear resistance and cutting-edge toughness, leading to longer tool life, Mitsubishi says.

The inserts are built with an assortment of chip-breakers—patterns of grooves and steps that cause chips produced during machining to break into more manageable sizes—to handle a variety of cutting needs on materials from mild steel to carbon steel and alloy steel.

Innovating to Improve Productivity

The 6100 series is well-suited for turning operations such as those used in industries including traditional ***automotive manufacturing*** and production of agricultural equipment, Jewell says.

Innovations like the MC6100 series that prolong tool life and increase material removal rates are vital to bolstering productivity in the machining and manufacturing industries, which are grappling with challenges from higher inflation to a labor shortage expected to leave as many as 2.1 million jobs unfilled by 2030.

Such improvements allow machine shops to take fuller advantage of equipment that can run faster and longer, which is difficult to do with older tools that don't last as long and are more susceptible to breakage, potentially forcing the scrapping of entire workpieces.

"Your machine time is your biggest expense, so you want to be able to run at the highest productivity levels possible," Jewell says. "That's why we're always striving to make improvements, which leads to different generations of turning insert grades as we discover ways that we can do even better."

The toolmaking industry's rapid technological development is "all driven by the need to be faster, better and more precise," he adds. "That fuels it on all sides, whether it's the machines, the tools themselves or measurement equipment. That's what always drives the progress."

What are your biggest challenges in steel-turning jobs? Tell us in the comments below.

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