



Milling

OSG's Next-Gen Aluminum Milling Tools Double Their Competitive Edge

James Langford | May 10, 2022

When machine shops buy milling tools, they have two primary considerations: tool life and productivity. Those parameters, unfortunately, have what engineers refer to as a negative connection.

Which is a technical way of saying that when one increases, the other decreases.

"You generally can't get both because the harder you feed a tool, the more it's going to wear," says Daniel Dominski, an applications engineer at OSG, a leading supplier of end mills and other cutting tools to industries from aerospace to automotive and heavy manufacturing.

It's a conundrum OSG addressed with its A Brand AE-N end mills, three-fluted instruments with a diamond-like carbon coating that gives heightened smoothness and wear-resistance and a larger-diameter core that enables higher operating speeds without overtaxing the tool and shortening its life span.

Longer Tool Life Yields Big Savings

That's a win-win for machine shop budgets: Not only are they saving on tool costs, which typically amount to less than 5 percent of the production expenses, they're also saving on labor and machinery, which together account for more than half.

While the tools have a higher price tag than conventional bright-coated alternatives, "the increase in tool life from our DLC coatings can result in great cost savings," Dominski says.

To show clients how, OSG visits worksites in person and compiles cost-savings documentation. Overall, the result for machine shop customers is somewhat like the consumer experience of paying more for a high-quality winter coat that lasts for 10 years rather than picking up a discount version that may survive just one season.

"You get a tool with exceptional tool life," he says. "You might require fewer tool changes and you're getting better productivity from this tool because it runs at faster speeds."

The A Brand series represents an upgrade from OSG's older Blizzard mills that offered diamond-like

carbon, or DLC, coatings only as modifications, adding a couple of weeks to delivery time.

The AE-N mills “provide a more premium solution right off the shelf, with no waiting for modifications,” Dominski says.

Rapidly Expanding Market

The speedier delivery further hones OSG’s competitive edge in the lucrative cutting tools market, which is expected to grow an average of 3.96 percent a year through 2025, an expansion of about \$4.26 billion, according to global technology research and advisory company *Technavio*. That’s roughly a third of the \$12.6 billion growth that Technavio forecasts in the metal machining market overall, with rising demand from the oil, gas and automotive industries.

“In machining, you have the issues of tool life and productivity. You generally can’t get both because the harder you feed a tool, the more it’s going to wear.”

Daniel Dominski
OSG

For machine shops vying to meet that demand while maintaining or growing profit margins, OSG’s AE-N tools have sufficient rigidity to enable one-pass finishing, carving and shaping thick aluminum slabs as easily as if they were wax.

That’s due, in part, to the three-fluted design. While it has a slower feed rate—the speed with which the mill passes along and through the workpiece—than increasingly popular five-fluted designs, it removes more cubic inches of material per minute, Dominski says.

On the long-length version of the A Brand, the AE-TL-N, the company widened the core thickness to 50 percent of diameter from 38 percent, a move that suppresses chattering and avoids the associated performance degradation.

The thicker core is better able to counter vibrational forces that increase exponentially as length grows relative to diameter, he says.

“You want the large core to help the tool stay rigid and stay where it’s supposed to be,” Dominski explains. “Otherwise, deflection will occur, resulting in a sloped wall and poor surface finish.”

Heightened rigidity also provides higher-quality finishing with fewer vibration marks, which pose an inherent challenge in milling and in machining overall.

“You can see chatter lines where the end mill is vibrating, which reduces the surface quality of the part,” Dominski says. “That larger core on the long-length tool mitigates all of that for us.”

The mill’s fluting, meanwhile, creates a closed-hook shape between the cutting edges so that in side-milling jobs, it fires planed-away chips behind the tool, much like a machine gun or a fountain, Dominski says.

On older and more conventional models with a shallower core, the pocket between flute edges was shaped like a semi-circle, which raised the likelihood of chips getting caught between a tool and a workpiece, increasing production time and lowering quality.

The A Brand's VTS-N variant, whose center cutting edge can be used for plunge-milling, dampens vibration further with variable leads and unequal spacing between the cutting teeth, according to OSG. The wiper-like effect of its flat edges yields a higher precision-machined surface quality.

OSG's business case for developing the AE-N series was addressing the gap that previously existed between its general-purpose end mills and the top-of-the-line AERO series, designed especially for aerospace companies whose CNC machines have high horsepower and correspondingly high feed rates.

"Not everyone has a multi-million dollar CNC machine," Dominski says. "It's a very niche product. The AE-N Series builds off of the AERO-DLC but bridges the gap, allowing usage on any horsepower machine."

How do you balance the need to extend tool life as much as possible with demand for higher productivity? Tell us in the comments below.

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