Innovative tool design delivers high-rate metal removal rates with low torque for titanium machining

Max-Flute high-performance end mills enable machining of internal structures in titanium, Inconel and stainless steel components with removal rates of up to 8 in3/min with only 25 ft lb of torque.

MAG's CYCLO CUT® Max-Flute end mills innovate titanium roughing with a 16-flute design capable of high removal rates at low torque. The high-density end mills run at 2037 rpm and 5.8 m/min (231 ipm) to achieve removal rates of up to 131 cm3/min (8 in3/min) with only 33.8 Nm (25 ft lb) of torque and 6.7 kW (9 hp).

When cutting titanium, 60 to 70 percent of the heat generated is normally transferred to the tool, dramatically reducing tool life. Max-Flute tools use shallow, radial widths of cut, which transfers less heat to the cutting tool and allows higher surface speeds for roughing titanium, Inconel and other high temperature alloys that have traditionally required high torque at low rpm to achieve desired removal rates.

Used in conjunction with TrueMill® software, Max-Flute end mills maintain a constant angle of engagement, making the radial cuts more consistent throughout the cutter path, increasing material removal rates and decreasing cycle times, while

extending tool life. "The current approach to high-speed machining involves taking very light cuts," said Dan Cooper, CYCLO CUT® Product Manager for MAG Global Services. "The Max-Flute/TrueMill enables the machine to make heavier cuts at high speeds, and by using the maximum flute density available, maximum feed rates are achievable."

Max-Flute tools are designed with a differential pitch on the tool flutes to break up harmonics and reduce chatter. "Titanium is very prone to chatter, which affects part quality, and can cause unpredictable tool failure," added Cooper. "By using extremely high feed rates and light radial cuts, we can remove a lot of material with very little risk of scrapping parts."

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