Machining abrasive materials with diamond coating

Coating – Diamond-coated carbide tools are suitable for the cost-effective machining of abrasive materials such as graphite and composites. With its extensive range of SC milling cutters, tool manufacturer Inovatools offers its HQ line for a diverse range of applications. Thanks to specially modified geometries and an ultra-smooth diamond coating, the high-precision HSC milling cutters can be used for machining composite materials and creating even highly complex 3D contours of the kind found on graphite moulds and electrodes, the company explains.

When cutting highly abrasive material, conventional tools quickly reach their limits — after all, to machine graphite reliably and cost-effectively, high cutting speeds are essential for generating the high level of friction required in the cutting zone. Abrasion and, in particular, the temperatures generated in the intervention zone during cutting can cause significant problems for conventional milling cutters, even during the machining of composites such as glass or carbon fibre-reinforced plastic.

Coating benefits

Take carbon fibre-reinforced plastic, for example: The hard carbon causes extreme wear during cutting procedures. This is the reason why Inovatools equips its HQ milling cutters with a special CVD diamond coating. Not only is it almost completely chemically inert at low and medium temperatures, its minimal adhesion tendency and high thermal conductivity also significantly boost the performance of cutting tools, according to the company.

Tobias Eckerle, product manager at the company, explains: "Only by using high-quality, premium tools can cutters comply with narrow tolerance zones while milling materials quickly and cost-effectively. The diamond coating, which is specially tailored to our tools, is characterised by strong adhesion to the low-tension, warp-free carbide specially chosen for this application. Its unique material properties offer major potential for enhancing system performance during the machining of highly abrasive graphite and composite materials as well as non-ferrous metals such as aluminium."

Dissipating heat

The diamond coating not only ensures chip evacuation and the quick removal of graphite particles, it also swiftly dissipates the cutting heat from the contact zone. This ensures reliable milling in dry machining processes and minimum lubrication, according to Inovatools.

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Source: Inovatools

Diamond HQ line edition: Left, SC end mill with corner radius, two teeth; right: SC end mill with full radius, two teeth.