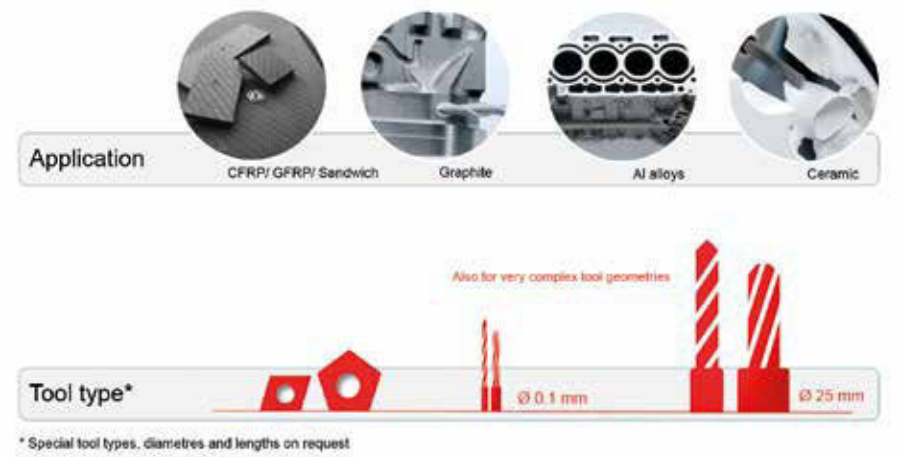
EVER LIGHTER, EVER HARDER

Diamond coated tools work highly demanding special materials

The materials employed in the aerospace, automotive and medical industries present toolmakers with increasingly demanding requirements. What's more, there are challenging processes such as micromachining in which tools with a diameter of 0.03 to 1 millimetre process components with dimensions in the 1 mm to 1 cm range. Matched tools and application-specific surface solutions such as the Balinit Diamond family of coatings from Oerlikon Balzers can not only meet these challenges, but can also minimize costs.

Machining carbon-fibre composites (CFRP), aluminium alloys and other materials such as highly abrasive, non-ferrous metals, graphite and ceramics poses ever-new challenges for manufacturers of aircraft and automobile components as well as in the area of medical technology. This includes precision drill diameters to comply with the tightest tolerances in the aerospace industry, tool lifetimes that are as long as possible for economical and competitive machining processes as well as biocompatible coatings for efficient machining of ceramics in the world of medical technology, both for green-body and sintered ceramics.



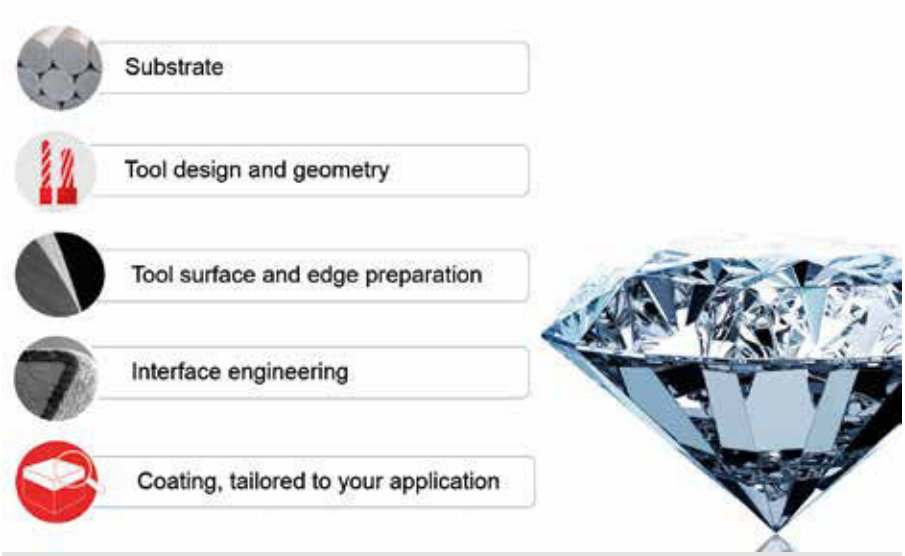
The Balinit Diamond coating is adapted to the machining and tool type.

Tailor-made

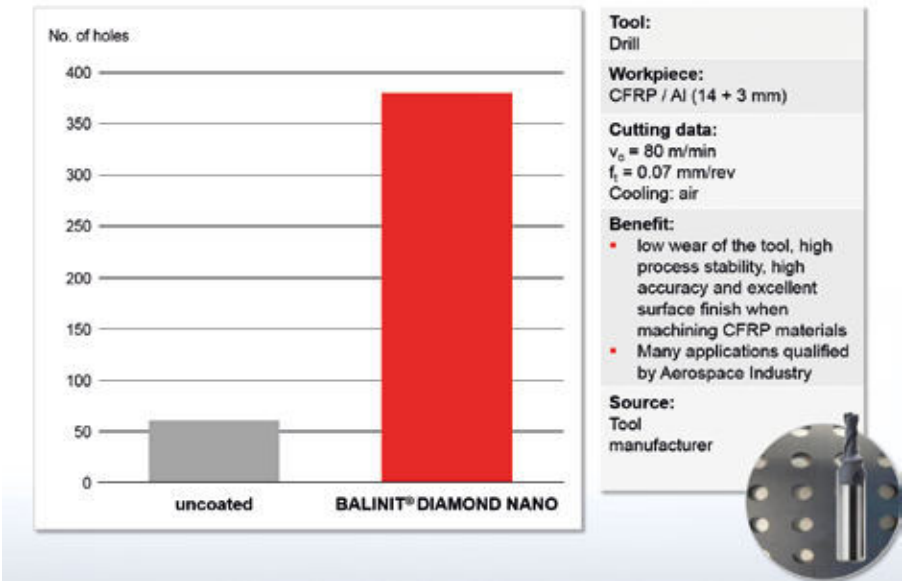
Just as significant as the cutter material and the tool design are the surface and edge treatment, the interface engineering and an optimal tool coating. Oerlikon Balzers announces their new Balinit Diamond coatings to "open up a new dimension in terms of the variety of carbide types, higher coating thicknesses and increased reliability during machining: Their design is focused on the special requirements connected with machining CFRP, GFRP, sandwich materials, graphite, aluminium alloys and ceramics".

Oerlikon Balzers offers tailored interface engineering for these demanding applications. "Our new Advanced Interface Engineering ensures even better coating adhesion. It is oriented towards use with a great number of carbides and we are able to match the coating to the customer's individual application with absolute perfection," explains Marco Schuite, Global Business Development Manager Diamond at Oerlikon Balzers.

Moreover, the coating variant which is optimal for the application (nanocrystalline or microcrystalline) is defined along with the ideal coating thickness. Standard options are 6, 8 or 12 microns. "The issue is optimizing the performance of the respective combination of workpiece, tool and application", Schuite points out.



The best conditions must be created for high-performance cutting tools.



Balinit diamond nano for machining composite materials in the aerospace industry.

Hard as diamond

Deposited by means of the CVD process (Chemical Vapour Deposition), the Balinit Diamond coatings attain a hardness of up to 100 HIT GPa. "That makes our coatings as hard as diamond – the hardest material in the world," explains Marco Schuite. Balinit Diamond coatings thus ensure the highest wear resistance for all applications, can be employed at working temperatures of up to 600 degrees Celsius and improve the performance of cutting tools significantly.

Processing CFRP / composite materials

Composite materials are employed especially in the automotive and aerospace industries. For example, the new Airbus A350 uses a significant number of carbon fibre reinforced plastics (CFRP) components in order to save weight. However: These composite materials promote abrasive wear.
Reliable and economical machining of glass fibre and carbon fibre reinforced plastics (GFRP, CFRP) becomes possible using tools coated with Balinit Diamond Nano. Its nanocrystalline structure provides exceptionally smooth coating properties and an excellent coefficient of friction.

Furthermore, this surface solution allows expensive and geometrically limited PCD tools to be replaced with significantly more economical, coated carbide tools. Advanced Interface Engineering and selection of the ideal coating thickness prevent burring and delamination, facilitate the chip flow and prevent the formation of built-up edges. Thus, abrasive and adhesive wear are significantly reduced. Longer service life and better surface quality minimize production costs markedly.

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