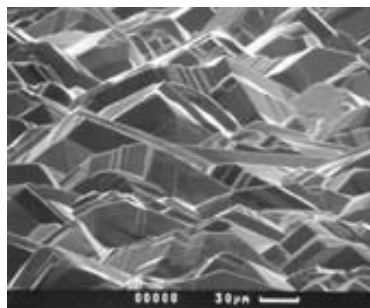




Info on CVD Diamond



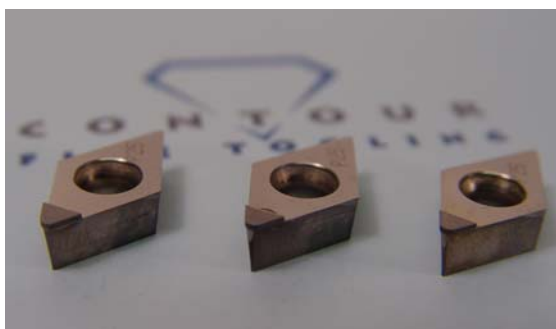
Surface morphology of a polycrystalline CVD diamond

The CVD-Diamond is a polycrystalline diamond grown by plasma-assisted Chemical Vapor Deposition (CVD) technology. CVD is grown on a substrate surface and the grains grow larger as the layer gets thicker. The grain size on the substrate surface is below 1 μ , on the opposite side, the growing side, it goes to about 20 μ m. As the substrate side is used as the cutting edge, the grain size is less than 1 μ m. In contrast to PCD and Tungsten Carbide with a grain size of 2-4 μ m, the cutting edge is therefore finer, making it possible to make a sharper cutting edge. The hardness of CVD is about 60 % higher than PCD. In contrast to PCD, CVD consists of 100 % diamond with direct crystal-connections which results in a high thermal conductivity and resistance against chemical wear.

Applications

CVD is generally recommended for machining non-ferrous materials where high abrasion resistance is required. This means it can be used on a wide range of materials : aluminium-, copper-, brass- and bronze alloys, metal matrix composites, graphite, glass-reinforced plastics and carbon fibre-based materials, sintered and pre-sintered tungsten carbide and plastics and rubber. In these cases the surface quality as well as the tool life of CVD will exceed those of PCD. For example on AISi and Al-bronze alloys the CVD has a 1,5 to 2 times longer tool life than PCD. On graphite it has even a tool life up to 3 times better combined with a better surface quality.

CVD Diamond blanks



CVD Diamond brazed on an insert for Turning

Comparison PCD, CVD and Natural Diamond

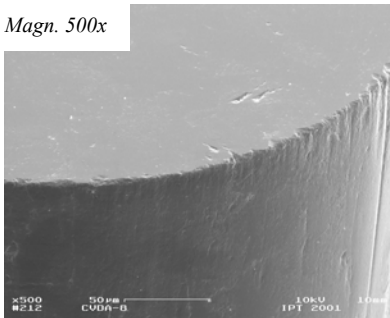
CVD and PCD are both polycrystalline, compared to natural diamond which is a single crystal. This single crystal has soft and hard grains in different directions which has affects the wear characteristics. CVD and PCD have a random orientation of diamond particles, and therefore, a more uniform hardness and are more abrasive resistant in all directions. This results in a more constant wear character of CVD and PCD diamond.



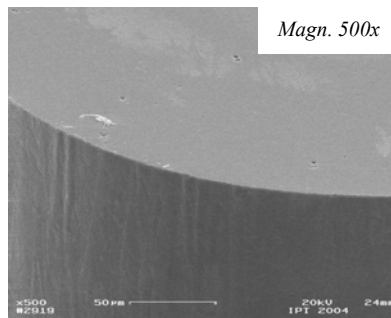
CVD Diamond Milling Tool

Comparing sharpness of cutting edge, CVD is positioned between PCD and Single Crystal Diamond. The Natural Diamond tools give the sharpest edge possible and are used for finishing surface to highest optical quality. PCD tools can only be ground with a diamond bound grinding wheel, which results in an less sharp cutting edge. Contour is able to manufacture CVD tools with a new technology, which gives a much sharper cutting edge than the traditional edge preparation. The sharper cutting edge of Contour CVD tools is a distinct advantage over PCD tools and traditional ground CVD tools.

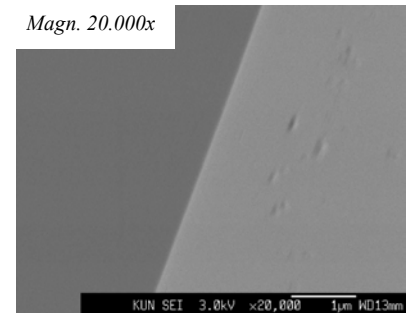
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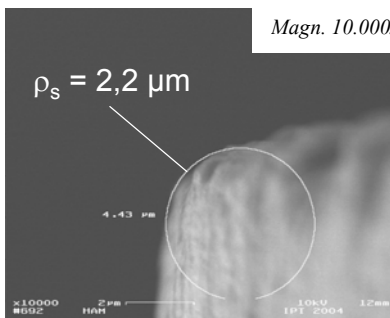
Magn. 500x



Magn. 20.000x

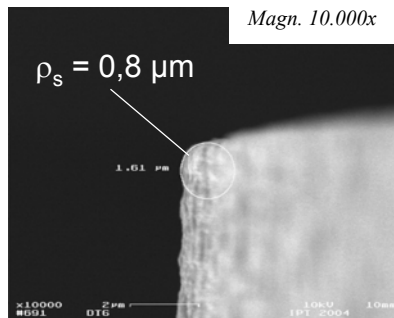


Magn. 10.000x

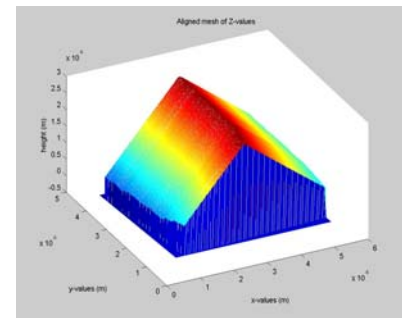


*Traditional Ground CVD-Diamond..
Cutting edge radius is 2,2µm*

Magn. 10.000x



*Contour Fine Tooling CVD-Diamond.
Cutting edge radius is 0,8µm*



*Contour Fine Tooling Natural Diamond.
Cutting edge radius is 0,03µm*

The cutting edge preparation of the CVD diamond developed by Contour Fine Tooling offers the highest possible edge sharpness in combination with high wear resistance. Compared to PCD and Tungsten Carbide this will result in a much better surface finish in combination with a longer tool life.