

(15) Brief Introduction about Diamond & CBN Materials

Diamond & Cubic Boron Nitride (CBN) Materials

All grinding wheels with an abrasive layer of Synthetic Diamond or Cubic Boron Nitride (CBN) are grinding tools in the sense of DIN 8589. Their “cutting edges” are formed by the abrasive grits of Diamond or CBN.

Diamond and CBN grinding wheels are known and Diamond abrasives feature unsurpassed hardness and resistance to wear; hence their usage in the abrasive machining of hard, brittle and short-chipping materials such as glass, ceramics, quartz, ferrites, semiconductor materials, graphite, wear-resistant spray-on or weld-on alloys, glass fibre reinforced plastics and similar hard-to-machine materials. In special cases diamond tools may also be economical for machining cast steel and cast iron.

The properties of grinding wheels can be modified to enable them to perform both rough grinding and finish and fine grinding. Diamond wheels feature low wear even at high material removal rates; thus they can achieve the required shape, dimensional and surface tolerances even with difficult-to-grind materials.

Cost comparisons between conventional abrasives (aluminium oxide and silicon carbide) and diamond show that diamond used on appropriate grinding machines is more economical for the grinding of cemented carbides and similar hard-to-grind materials.

Cutting fluid should be used wherever possible in order to achieve high material removal rates coupled with low wear of the diamond grinding wheels.

Cubic Boron Nitride (CBN), like synthetic diamond, is produced high-pressure, high-temperature synthesis. The process used for incorporating it in grinding wheels is almost identical with that used for diamond.

CBN is the second hardest abrasive, surpassed only by diamond. Compared with diamond it offers economic advantages in the grinding of ferrous materials, such as steel. Compared with conventional abrasives it offers advantages especially in the grinding of hard-to-machine steels with large proportions of alloy and hardness ratings of 55 HRC and above, e.g. high-speed steels and chrome steels.

CBN wheels feature considerably lower wear, making it easier to achieve the necessary shape and dimension accuracies. A particular advantage in the grinding of hard-to-machine materials is that CBN wheels cause less damage to the surface integrity of the workpiece; thus HSS tools ground with CBN wheel often have longer life than those ground with conventional abrasives.