Advanced Diamond Products

PCD & PCBN

PCD

Polycrystalline diamond is synthesized using high temperatures and pressures, and is known universally as PCD. For such materials, diamond particles on the order of 1-30 microns are sintered together in the presence of a cobalt catalyst to produce an inter-grown mass of diamond grains. The cobalt allows for the PCD to be electro-discharge machinable, and imparts a significant degree of toughening so as to provide a more robust machining blank. The PCD is sintered directly to a tungsten carbide backing.

We have a number of grades of PCD available to provide the optimum combination of properties for different applications. Diamond content and diamond grain size distribution provide the correct balance of wear resistance and toughness. Some grades have superior abrasion and chip resistance without significant loss in the electro-discharge machinability or grindability.

The applications for PCD include the machining of non-ferrous metals, alloys, composites, reinforced plastics, aluminium-silicon alloys, cast-irons, titanium alloys, ceramics and tungsten carbide. Grey and high strength cast irons can also be machined with PCD as long as temperature is kept below 700°C, otherwise PCBN is a better option.

PCD grades with finer grain sizes have higher strength in comparison to grades with coarser grain sizes, although are generally less abrasion resistant. Finer grained PCD is more easily machined and ground. We have access to a PCD material with grain size less than 1 micron which provides the optimum combination of strength, machinability, and surface finish.

PCD tools mounted on ISO inserts are offered in a wide range of shapes and sizes. We can also braze PCD onto virtually any carbide-forming shank material in the size and shape that you require. We are capable of creating extremely small features and profiles in PCD with our manufacturing equipment including a wire-erosion machine with a smallest wire diameter of 0.05 mm.

PCBN

Diamond, cubic carbon, is the hardest, most abrasive-resistant material known to man. It is therefore an ideal tool material. However, in the presence of extreme heat and a catalyst such as iron, nickel or cobalt, diamond transforms to the hexagonal carbon form graphite. This is why ferrous materials are not generally machined with diamond.

The second hardest material, Cubic Boron Nitride (CBN), is created by man using temperatures and pressures similar to those used for diamond synthesis, and does not have this inherent weakness when it comes to the machining of ferrous materials.

The principal application areas for PCBN are rough and finish machining of steels greater than 45HRC, grey cast irons and hard cast iron as well as finished turning of sintered irons and powders and powder metallurgy components.

PCBN with a high CBN content (50%-90%) is designed for heavy machining applications, including heavy interrupted cutting, where high stock removal rates provide an attractive alternative to conventional techniques.

PCBN with a low CBN content (below 50%) is designed for finishing a nd s emi-finishing ap plications, fo r co ntinuous an d lightly to moderate interrupted cutting, where grinding with conventional abrasives proves difficult or time-consuming.

Like PCD tools. PCBN tools are also offered mounted onto ISO inserts or shanks according to customer specifications. We are capable of creating extremely small features and profiles in PCBN with our manufacturing equipment including a wire-erosion machine with a smallest wire diameter of 0.05 mm.

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