



Polycrystalline Diamond Products

The standard range of Kemet Diamond Compounds and Liquid Diamond are manufactured from the highest quality synthetic monocrystalline diamond powder or natural diamond powder, graded to the strictest tolerances.

For the majority of applications, these products have proved to give excellent results in terms of technical performance and cost effectiveness.

For certain applications, in particular polishing hard or sintered materials, the use of polycrystalline diamond has proved to give outstanding stock removal and polishing performance superior to that of monocrystalline diamond.

The reason for the superior performance of polycrystalline diamond over monocrystalline results from the structure of the diamond particles. Monocrystalline diamond contains a single crystal structure which has distinct cleavage planes causing the diamond to fracture under stress.

Polycrystalline diamond contains up to several thousand particles less than 0.01 μm in size bonded together in a random structure. When high stress produces microfractures, these are limited to small groups of crystallites on the perimeter. Major cleavage of the diamond cannot occur.

This random structure gives polycrystalline diamond toughness in all directions resulting in less subsurface damage.

Advantages of Polycrystalline Diamond

Ultra Fast Cutting:

Polycrystalline diamond particles are ultra rough with three times the surface area of Monocrystalline particles.

- More cutting edges
- Faster stock removal rate
- Fewer polishing steps

Finest Surface Finishes:

Polycrystalline diamond particles abrade a workpiece uniformly regardless of orientation. They produce none of the random scratches and microcracking sometimes caused by monocrystalline particles.

- Smoother finishes
- Fewer random scratches
- Less subsurface damage

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Fewer Polishing Operations:

Polycrystalline particles are tough and equally strong in all directions. This permits the use of higher unit pressures for lapping and polishing, often reducing the number of steps required.

Maintains Surface Integrity:

Polycrystalline diamond works well with materials that contain various soft / hard / brittle domains such as complex cermets, ceramics and metallographic or petrographic specimens. Polycrystalline diamond preserves the integrity of the surface by not plucking out the brittle areas or aggressively abrading non homogeneous areas.

Blocky Shape with Self Sharpening Particles:

The polycrystalline structure lends itself to the creation of particles that are blocky in shape. As tiny monocrystallites break off, they reveal more equally rough sharp monocrystallites with equally effective multifaceted cutting edges. Blocky mass and shape are preserved.

Faster and Smoother:

Even under low pressure loading of parts, the many small crystallite groups that contact the workpiece achieve extremely high unit pressures which remove material from the surface in small bites. The net effect is both faster stock removal and a smoother polished surface.

Applications

Kemet polycrystalline Diamond Products are particularly recommended for the following applications:

- Sapphire – lapping and polishing of sapphire wafers
- Ceramic products including hip joints and other technical ceramic products where a high quality finish is required
- Fibre optics – in particular for communications terminations
- Metallographic and petrographic applications for polishing sintered materials – for example tungsten carbide and ceramics
- Readrite heads for Disc drives and magnetic recording heads

Kemet Polycrystalline Diamond Products can be tailormade to suit a particular application. Please ask for further details

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