

PremaDia

PDA600S - The natural alternative.

Element Six has launched a new product within its PremaDia range of diamond wheel grits. PDA600S is a synthetic abrasive that can be used in grinding applications where natural diamond has traditionally been employed.

Careful control of synthesis and subsequent processing has allowed Element Six to ensure that the key characteristics of PDA600S closely match that of natural diamond.

This means Element Six can offer a product whose performance is reproducible time after time, guaranteed by stringent manufacturing controls.

PRODUCT CHARACTERISTICS

Considering the four key product characteristics: particle shape, particle strength, oxidation behaviour and surface chemistry, PDA600S compares favourably against natural diamond grits.

Particle Shape

Irregularity and sharpness are two desirable properties of particle shape that contribute to improved bond retention and a free cutting performance.

The scanning electron micrographs of PDA600S against the natural diamond product, PDA665, clearly demonstrate the similarities in particle shape.

Advantages

- Irregular and sharp particle shape for improved bond retention and free cutting performance.
- Friable product, with strength retained after high temperature tool manufacture.
- Oxidation behaviour suitable for vitreous bond wheel manufacture.
- High surface purity suitable for manufacture of electroplated wheels.

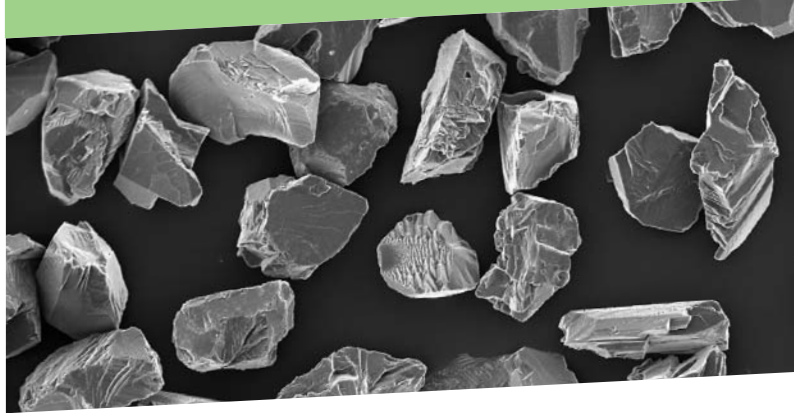


Fig. 1 Scanning electron micrograph of PDA600S - synthetic diamond.

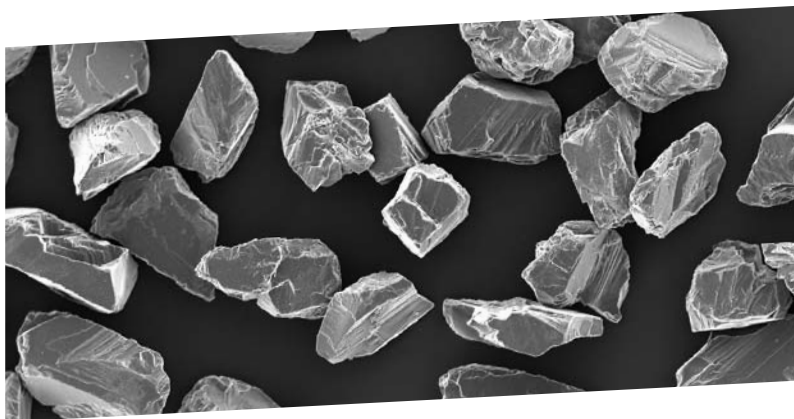


Fig. 2 Scanning electron micrograph of PDA665 - natural diamond.

These similarities may be confirmed quantitatively using computerised optical image analysis.

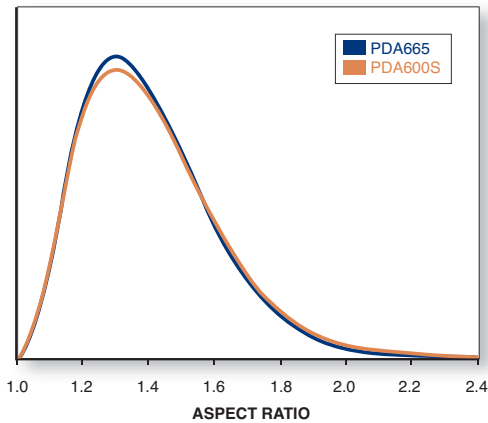


Fig. 3 Probability distributions of particle aspect ratio (elongation). Lower values indicate more uniform particles.

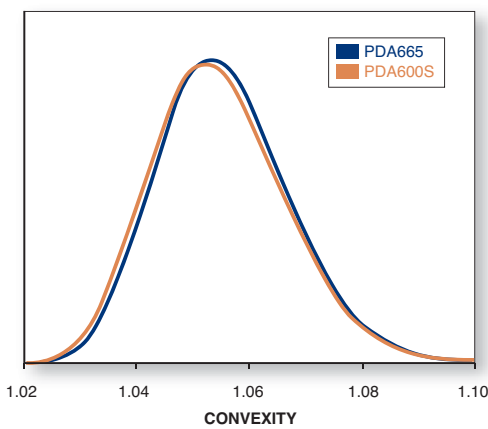


Fig. 4 Probability distributions of particle convexity (roughness). Lower values indicate fuller (more convex) particles.

Particle Strength

The friability associated with natural diamond grits contributes to their free-cutting behaviour. Natural products also retain their strength following tool manufacture at high temperatures. Friability strength tests demonstrate that PDA600S retains the room temperature and high temperature strength characteristics of PDA665.

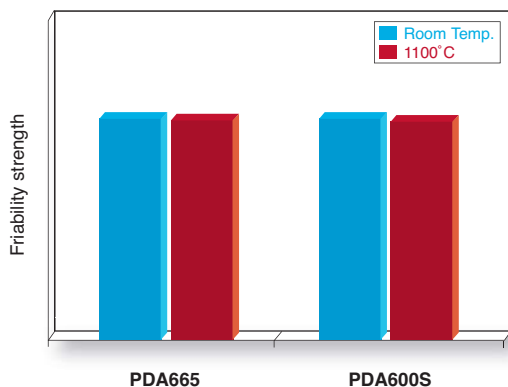


Fig. 5 Friability strengths of PDA600S and PDA665 at room temperature and elevated temperature.

Oxidation Behaviour

Oxidation resistance is important to the behaviour of diamond products in the presence of air and at elevated temperatures found in vitreous bond manufacture. Thermogravimetric analyses (studies of sample mass as a function of temperature) of PDA600S and PDA665, performed in static air, show that PDA600S is slightly more oxidation-resistant than PDA665.

Consequently, at any given tool manufacturing temperature above 650°C the synthetic diamond product PDA600S is expected to lose less of its initial mass.

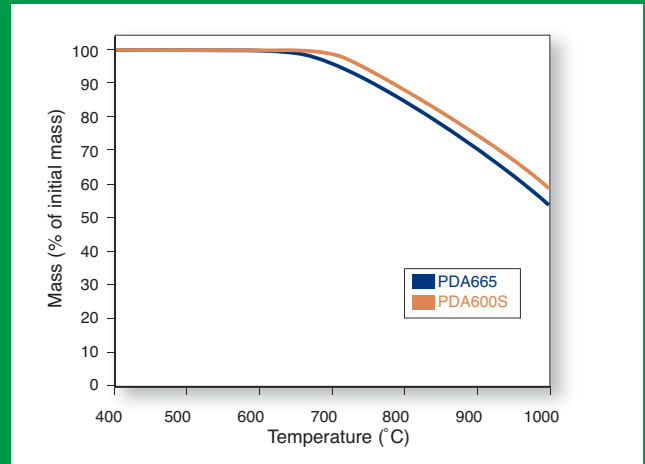


Fig. 6 Thermogravimetric analyses of PDA600S and PDA665.

Surface Chemistry

The purity of the diamond surface is an important factor in electroplating, since any metallisation of the surface can lead to overplating. With PDA600S the presence of surface impurities is carefully controlled, enabling impurity levels to be as low as those found in natural diamond products.

AVAILABILITY

PDA600S is available in the following sizes:

PRODUCT	SIZE
PDA600S	80/100 through to 500/600