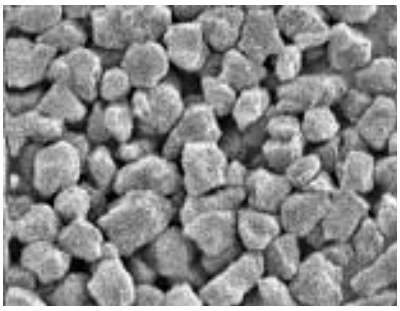
Polycrystalline Diamond Abrasives

PACE TECHNOLOGIES

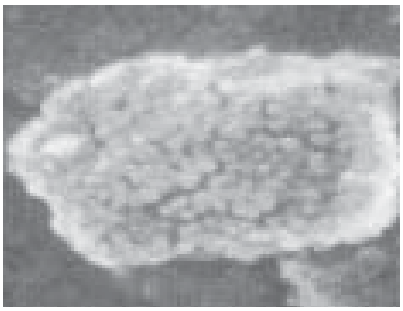
Polycrystalline Diamond

-Superior Finishes
-Higher cut rates
- Repeatability

Polycrystalline diamond abrasives are manufacturered by transforming graphite into diamond via a high temperature and high pressure explosion process. The resulting particle is comprised of numerous microcrystallites bonded together. Particle sizing is accomplished by milling or grinding the aggregate particle.



HSEM (High Resolution Scanning Electronic Microscope) picture of our powder size 0.05-0.2 mcm at 10,000 times magnification.

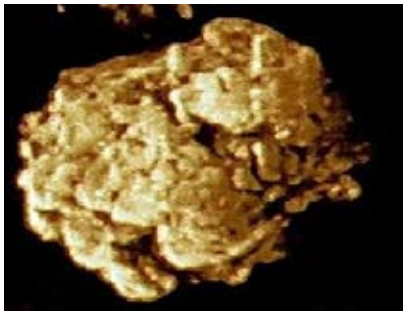


HSEM (High Resolution Scanning Electronic Microscope) picture of our powder size 0.05-0.2 mcm at 600,000 times magnification.

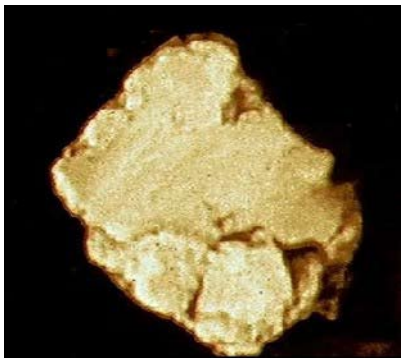
Polycrystalline diamond as compared to synthetic and natural monocrystalline diamond provides better surface finishes and higher removal rates for metallographic specimen preparation. The features and advantages of polycrystalline diamond include the following:

- Higher cutting rates
- Very uniform surface finish
- More uniform particle size distribution
- Higher removal rates (self sharpening abrasives)
- Harder/tougher particles
- Blocky shaped
- Hexagonal microcrystallites (equally hard in all directions)
- Extremely rough surface (more cutting points)
- Surface area 300% greater than monocrystalline diamond
- No abrasion-resistant directionality (abrasion independent of particle orientation)

The performance and consistency of polishing with polycrystalline diamond is a function of the hardness (friability), particle size and particle size distribution. The friability of polycrystalline diamond is a function of the grinding or milling operation. Less grinding produces polycrystalline diamond with higher friability, whereas



Polycrystalline Diamond - High Friability



Polycrystalline Diamond - Low Friability

increased grinding breaks down the structure resulting in a lower surface area and fewer cutting points. In general higher friability diamond produces improved surface finishes, however controlling the diamond friability produces less lot to lot variablity, resulting in more uniform and consistent performance for critical surface finishing operations.

Polycrystalline Diamond Technical Data

Appearance (dry state)	Color	Gray
Chemical composition	Carbon	99%
	Hydrogen	<1%
	Nitrogen	<1%
	Oxygen	<1%
Physical Data	Particle sizes available (microns)	0.05-0.15; 0.05-0.2; 0-0.25; 0-0.50; 0.50-5; 0-1; 0.5-1.5; 1-5; 1-3; 0-10
	Specific gravity	3.45
	Friabiltiy index	75-80%
	Structure	Polycrystalline with block size under 0.1 micron
	Decomposition	Decomposes with heat over 500°C
	Electrical conductivity	Non-conductive

Sub-micron Polycrystalline Diamond Technical Data

Appearance (dry state)	Color	Gray
Chemical composition	Carbon	<88%
	Hydrogen	<1%
	Nitrogen	<2.5%
	Oxygen	<10%
Physical Data	Surface area	300 m^2/gram
	Particle size	<0.4 microns
	Specific gravity	2 grams/cc
	Oxidation temperature	977°C
	Electrical conductivity	Non-conductive

Product Information

Diamond	Particle size (microns)	Carrier	Viscosity (cps)	Part Number
Polycrystalline (submicron)	0.05 - <1.0	-Glycol -Glycerin -Water -Oil	15-20 15-30 1 20-30	PC series PGY series PCW series PCO series
Polycrystalline	1.0 - 45	-Glycol -Glycerin -Water -Oil	15-20 15-30 1 20-30	PC series PGY series PCW series PCO series
Monocrystalline	1.0 - 45	-Glycol -Glycerin -Water -Oil	15-20 15-30 1 20-30	PC series PGY series PCW series PCO series

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