TOOLMAKER SOLUTIONS

Micron Products

Diamond and CBN micron powders for demanding applications in polishing and lapping

HYPERION
Materials & Technologies

WELCOME TO HYPERION

Hyperion is an engineering company with more than six decades of experience in the development and manufacturing of innovative diamonds, cubic boron nitrides, and cemented carbides. In addition to innovative materials, Hyperion offers our extensive knowledge, unique services, and application development capabilities to support our customers' competitive needs.

We are over 1,600 people dedicated to creating solutions for your hard and super-hard material needs through partnership, innovation, and invention. Hyperion's offering includes diamonds and cubic boron nitrides (CBN) for lapping, polishing, and finishing in the ceramics, electro-optics, semi-conductor, metal work, hard disk drives, and metallurgical applications.

Hyperion's technical expertise and global manufacturing facilities are a foundation from which a network of local sales and customer service teams support our customers in the development of effective solutions.

FROM START TO FINISH

Hyperion's diamond micron powders are created in a single, continuous manufacturing process. Starting with the highest quality of raw materials, Hyperion uses advanced engineering methods to manufacture diamonds with specific characteristics of strength and toughness. State-of-the-art micronizing techniques assure the diamond micron powders have precisely defined sizes, shapes, and surface properties. The result is unprecedented consistency and uniformity from the initial diamond source to the final product.

CONSISTENCY THROUGH SIX SIGMA QUALITY

Hyperion is committed to focusing on creating solutions for our customers'needs. For manufacturing of our diamonds and cubic boron nitride (CBN), we have invested in proprietary Six Sigma controlled processes that bring consistency and repeatability to our micron powders. This allows our customers to save time and money.

MAGIC SIX

SOURCE
Excellent control of diamond raw materials are key for consistency

SIZE
Particle size distribution is crucial to achieve performance

SHAPE
Consistent particle shapes help achieve desired results

SLURRY

Engineered formulation allows for optimal dispersion and stability

STRENGTH
Controlled microfracture mode creates maximum productivity

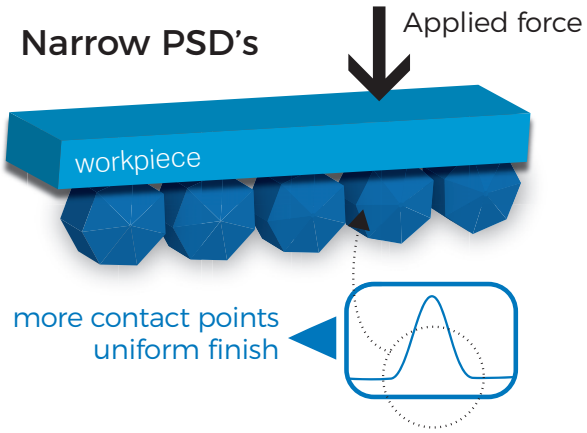
SURFACE
Consistent cleanliness produces predictable results

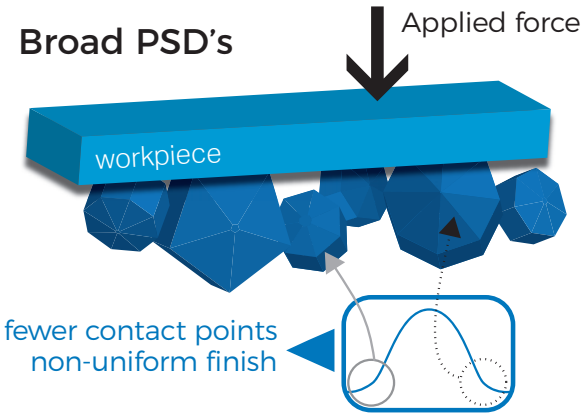
HYPERION MICRON PRODUCTS
DIAMOND MICRON POWDERS

DESIGNS FOR THE EXCLUSION OF OVERSIZE AND SUPERFINES

PARTICLE SIZE DISTRIBUTION (PSD)

PSD affects workpiece surface finishes and material removal rates in free abrasive applications. It also affects the diamond surface characteristics that are critical to chemical and mechanical interactions. This includes surface effects that manifest themselves in wetting and dispersing characteristics, propensity for agglomeration, and cohesive strength of these agglomerates. PSD also affects the amount of moisture or static charge that may impede proper mixing or blending, as well as suspension stability of diamond particles in a slurry.





Methods for particle size analysis of sub-sieve size micron powders include:

- Laser light scattering
- Electrical sensing zone
- Microscopy
- Sedimentation
- Photon correlation spectroscopy.

Hyperion powders are measured by utilizing the most appropriate sizing technique for each size range. In addition, powders are controlled through the use of a field emission scanning electron microscope (SEM) for measuring particles at the extreme ends of a distribution, where levels are too low to be detected by standard measurement techniques.

HYPERION MICRON PRODUCTS
PREMIUM CAPABILITIES & APPLICATIONS

SHAPE ANALYSIS

Hyperion offers image analysis capabilities to quantify shape attributes such as aspect ratio, roundness, and sphericity.

MICRO CLEANING

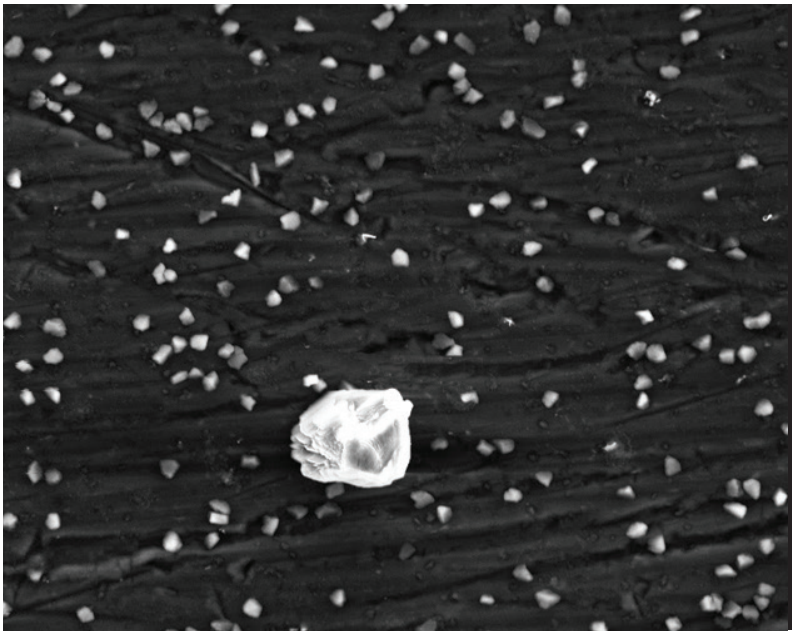
Imperfect surface chemistry can have adverse effects on the performance of micron powders including:

- Wetting (in water or with bond materials)
- Flowability/mixability
- Dispersion stability
- Susceptibility to static charge
- Plating characteristics
- Bond reactivity.

Our proprietary cleaning processes can limit or remove all residual inclusions/catalysts on the surface ensuring consistent performance characteristics in any application. Test results prove that Hyperion micron products are cleaner than competitive products as a result of our thorough cleaning processes and analysis methods.

OVERSIZE DETECTION

Standard PSD analysis techniques cannot detect oversize contamination. The detection and elimination of oversize particles is crucial in applications that cannot tolerate oversize concentrations at parts-per-million (PPM) or parts-per-billion (PPB). Our proprietary oversize test is able to detect oversize particles at PPB.



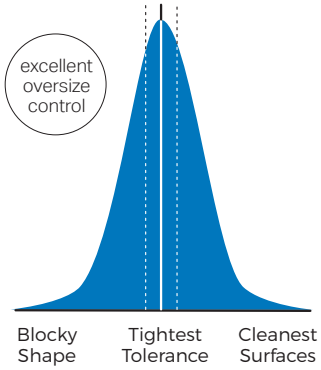
QUALITY CERTIFICATIONS

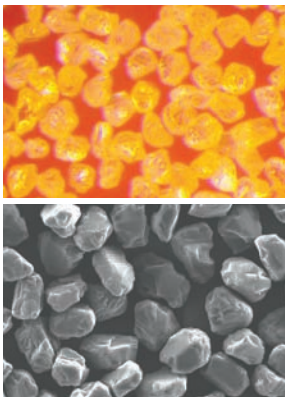
Quality reports for each batch of micron product are conveniently accessible through our customer portal at www.HyperionMT.com.

HYPERION MICRON PRODUCTS
DIAMOND MICRON POWDERS GRADES

METAL BOND DIAMOND

PREMIUM GRADE

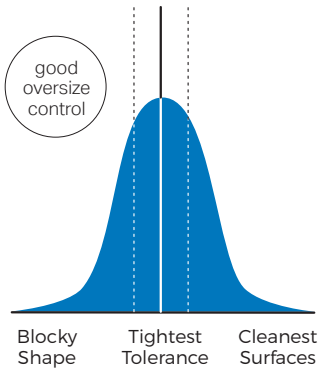


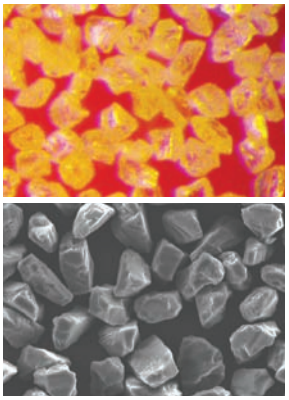


MBM DIAMOND
Available uncoated and with 30 and 56 wt % Ni and 30 wt % Ti coatings
MBM diamond offers the most tightly controlled size, shape, and surface properties. It is derived from synthesized monocrystalline diamond and is grown under conditions that create tough, uniform crystals that resist fracturing and have excellent impact resistance.

Applications
Slicing and dicing | processing Si wafer | lapping of glass and ceramics.

STANDARD GRADE

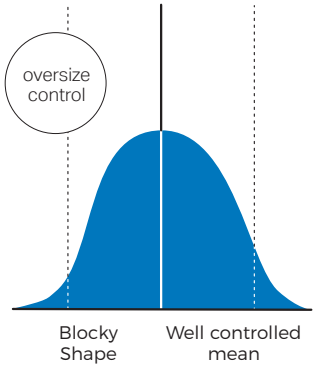


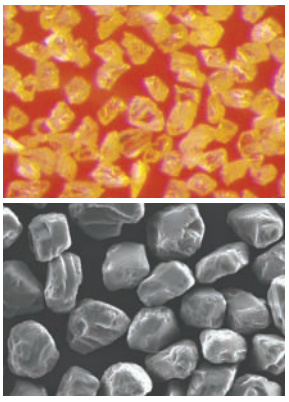


SJK-5 DIAMOND
Available uncoated and with 30 wt % Ni coating
SJK-5 diamond has well-controlled size, shape, and surface properties and is a tough, blocky diamond with high impact resistance.

Applications
Polishing | lapping of glass, wafer, and polycrystalline diamond (PCD).

ECONOMY GRADE





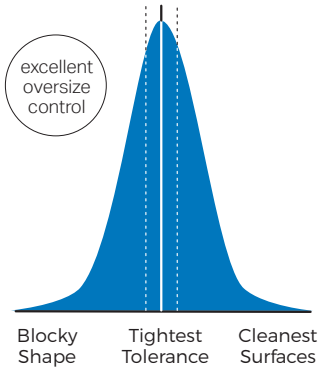
GMM DIAMOND
Uncoated
GMM diamond meets most size, shape, and surface requirements. This super abrasive is a good general purpose product designed to provide acceptable surface finish and material removal results in all applications where tight tolerances are not a requirement.

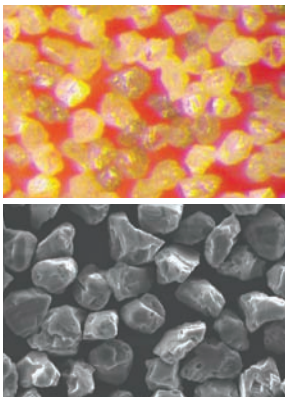
Applications
Gem polishing | precision wire saws.

HYPERION MICRON PRODUCTS
DIAMOND MICRON POWDERS GRADES

RESIN BOND DIAMOND

PREMIUM GRADE





RVM

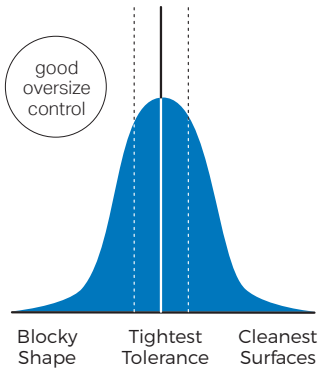
Available uncoated and with 30 and 56 wt % Ni and 30 wt % Ti coatings

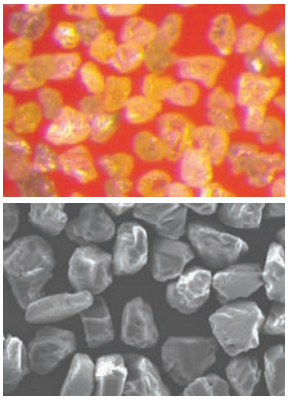
RVM diamond grains are comprised of many tightly bonded crystals, a characteristic known as multicrystallinity. These crystals are designed to microchip, producing new, sharp edges in abrasive applications.

Applications

Grinding of glass, tungsten carbide, and ceramics | package singulation.

STANDARD GRADE





RJK-1

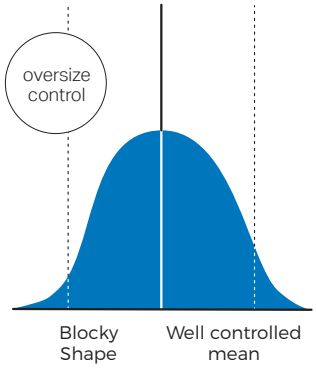
Available uncoated and with 30 and 56 wt % Ni and 30 wt % Cu coatings

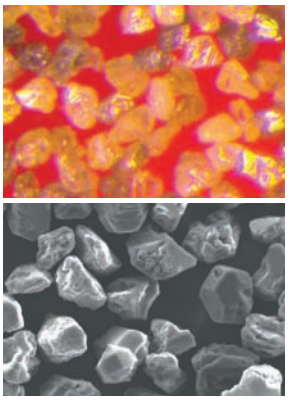
RJK-1 diamond is comprised of friable, irregular, semi-blocky particles and is designed for soft polishing and lapping applications.

Applications

Grinding of glass | lapping of crystal and PCD.

ECONOMY GRADE





GRM

Uncoated

GRM diamond satisfies a broad range of size, shape, and surface demands while providing satisfactory surface finish. GRM diamond is a desirable option if tight tolerances are not mandatory.

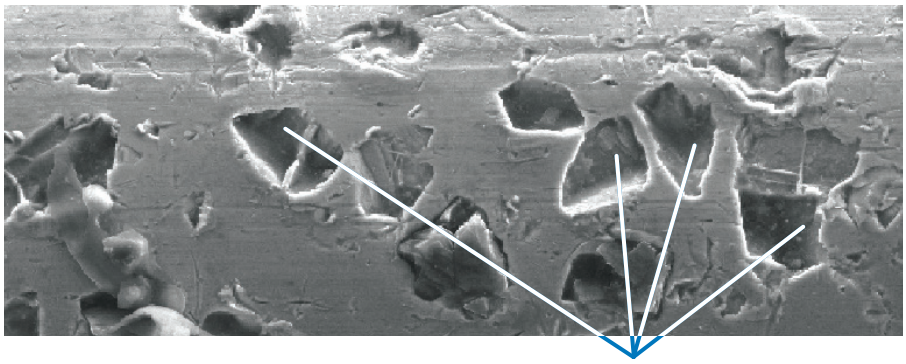
Applications

Polishing of wire dies, stones, and gems.

HYPERION MICRON PRODUCTS
COATED MICRON PRODUCTS

FOR IMPROVED CRYSTAL RETENTION

Hyperion's coated micron products were developed specifically for improved crystal retention in bond systems. Coated crystals present fewer pull outs and improved thermal dissipation. Uncoated crystals are mechanically held, subjecting crystals to more pullouts and less thermal dissipation. Our coated products are recognized as the premium choice for enhanced performance.



crystal pull outs

COPPER COATING

Copper coating provides improved chemical adhesion as well as mechanical retention of the diamond crystal. It is very effective in dry grinding applications by conducting heat away from the cutting zone. Copper coating is available in 50 wt %.

NICKEL COATING

Nickel coating is recommended for use in phenolic and polyimide resin bond systems to improve the mechanical retention of the diamond, thereby enhancing tool life and workpiece surface finish. Nickel coating is available in either 56 wt % or 30 wt %.

TITANIUM COATING

Titanium coating provides oxidation resistance, significantly improving tool life and enhancing wettability for increased diamond protrusions. It is very effective in metal bonds, and there is no deterioration of the diamond surface or strength due to the coating of titanium. The percent of titanium coating is dependent upon the crystal size (7 wt % to 25 wt %).

COATING SPECIFICATIONS

	NICKEL		TITANIUM	COPPER
	56 wt % Ni	30 wt % Ni	7 to 25 wt % Ti (size dependent)	50 wt % Cu
Premium Grade	MBM-N	MBM-N30	MBM-TI	n/a
	RVM-N	RVM-N30	RVM-TI	n/a
Standard Grade	RJK-1N	RJK-1N30	n/a	RJK-1CU

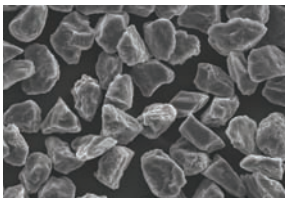
HYPERION MICRON PRODUCTS

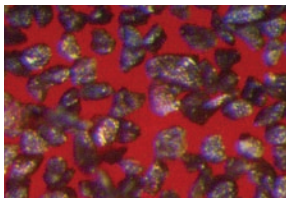
BORAZON® CBN MICRON POWDERS (BMP™ Superabrasive)

Borazon CBN is recognized as one of the greatest technological advancements for grinding hardened ferrous and superalloy materials. It is second in hardness only to diamond with twice the hardness and four times the abrasion resistance of conventional abrasives. Borazon CBN micron powders have exceptional thermal conductivity and provide improved surface integrity in the grinding of hardened alloy steels, tool steels, and dies as well as nickel- and cobalt-based superalloys. Borazon CBN micron powders achieve optimal performance in conjunction with a variety of bond systems.

BMP-500 SUPERABRASIVE

The fracture strength of this extremely tough product is the highest of any Borazon BMP product. Its shape, surface texture, and consistent toughness make it ideal for demanding high removal rate applications while providing good surface finish. Borazon BMP-550 is widely used in metal and vacuum braze bond systems for honing and grinding.



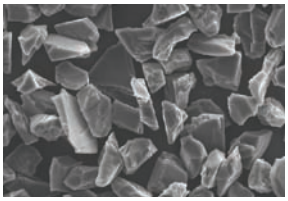


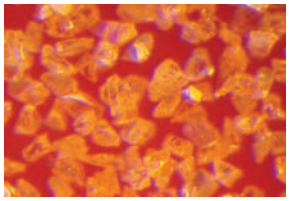
Applications
Metallic and vitrified bond systems.

Coatings
MTi (BMP-550TI) (see size chart for availability).

BMP-400 SUPERABRASIVE

The shape and unique fracture characteristics of BMP-400 provide extended wheel life and low grinding power. Borazon BMP-400 is ideally suited for automotive grinding and honing applications and ID/OD grinding of tools and dies among other applications.



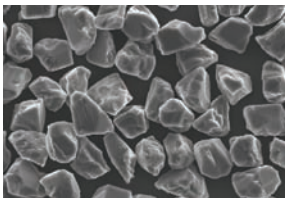


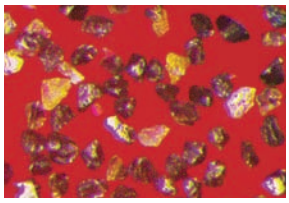
Applications
Precision grinding of automotive components.

Coatings
60 wt % Ni (BMP-400N) (see size chart for availability).

BMP-I SUPERABRASIVE

This semi-tough, semi-blocky crystal is used in vitreous bond grinding wheel systems. Optimum balance of fracture strength and breakdown characteristics enhance wheel life, surface finish, and dressing interval.





Applications
Fine ferrous grinding and lapping of tool steels.

Coatings
60 wt % Ni (BMP-II) and Ti (BMP-TI) (see size chart for availability).

HYPERION MICRON PRODUCTS

METAL BOND MICRON DIAMOND

Product Name	Mean Target	Equivalent Mesh Size	MBM	MBM-N	MBM-N30	MBM-TI	SJK-5	SJK-5 N30	GMM
0-0.2	0.1							●	
0-0.25	0.15		✓				✓		✓
0-0.5	0.25	60,000	✓				✓		✓
0-1	0.5	28,000	✓				✓		✓
0.5-1.5	0.75		●				●		●
0.5-1.5							●		●
0-2	1	14,000	✓				✓		✓
1-2	1.5	13,000	●				●		✓
0.5-3			✓				✓		●
1-3	2	12,000	✓				✓		✓
2-3	2.5		●				✓		●
2-4	3	8,000	✓				✓		✓
2-5	3.5		●				●		●
3-5	4		●				✓		●
2-6	4	6,000	✓			●	●		●
3-6	4.5	5,000	✓				✓		✓
4-6	5		✓			●	●		●
5-7	6						✓		
4-8	6	3,000	✓			✓	✓		✓
6-8	7		●				●		
5-9	7						●		●
5-10	7.5	2,200	✓	●		●	●		●
6-10	8		●				●		✓
6-12	9	1,800	✓			✓	✓		✓
8-12	10		✓		●	●	✓		✓
8-15	11.5	1,500	●				●		✓
8-16	12		✓	●		✓	●		●
10-15	12.5	1,400	✓	●	●	●	✓	●	✓
10-20	15	1,200	✓	●	●	✓	✓	●	✓
12-20	16						●		
12-22	17	1,000	✓	✓		●	●		✓
15-20	17.5	1,100	✓	●		●	✓		●
15-25	20	1,000	✓	●	●	✓	✓		●
15-30	21.5		●				●		●
20-25	22.5		✓	●		●	●		●
20-30	25	800	✓	●	●	✓	✓		✓
25-30	27.5		●				●		●
22-36	29	700	✓	●		✓	✓		✓
20-40	30		✓	●			✓		✓
30-40	35	600	✓	✓	●	✓	✓	●	✓
35-45	40		●	●		●	●		●
30-50			●				●		
40-50	45	500	✓	●		✓	●		✓
36-54	45	500	✓	✓		●	✓		●
30-60	45		●				✓		●
40-60	50		✓	✓	●	✓	✓	●	✓
50-60			●			●	✓		●
50-70	60		●			●	✓		●
40-80	60		●			●			
54-80	67		✓	●		●	✓		●
60-80	70		●				✓		●
60-100	80		●			●	●		●

RESIN BOND MICRON DIAMOND

BORAZON CBN MICRON POWDERS

RVM	RVM-N	RVM-N30	RVM-TI	RJK-1	RJK-1N	RJK-1 N30	RJK-1 CU	GRM	BMP-550	BMP-550TI	BMP-400	BMP-400N	BMP-I	BMP-II	BMP-TI
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✓ Standard Product ● Made to Order. Call for availability and lead time.

HYPERION
Materials & Technologies

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