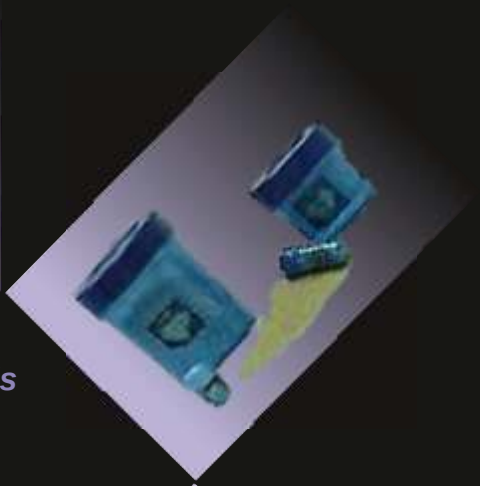
Gem Diamond Products



Diamond / CBN Electroplated Tools

Diamond Lapping Compounds

Synthetic Diamond Powder / CBN

Diamond Shaped / Dressing Tools

Diamond / CBN Resin Bonded Tools

Diamond and CBN Electrodeposited Tools

Electrodeposited or Electroplated Superabrasive Tools involve a single layer of highly concentrated ultra-hard abrasive material such as diamond or CBN electrodeposited onto a metal substrate of the requisite form / profile using a hard and durable nickel layer.

Advantages of Electrodeposited Tools

- Due to the fact that the abrasive is exposed above the surface of the tool, the cutting action is aggressive.
  - Because of the high concentration of exposed abrasives, the tools will cut freely and are less likely to load.
  - As they are less likely to load, no dressing operations are required which increases productivity.
  - Use of coolant, though advisable, is not essential.
  - Chip clearance and cutting action can be manipulated by varying exposure level of abrasive.
  - Virtually any profile may be produced, resulting in high versatility of tool design.
  - If used carefully, used tools can be stripped and recoated with fresh layer of abrasive for reuse.
  - Flexibility of abrasive type, and range of grit sizes available.
  - Flexibility of diamond concentration.
  - Low cost.

Choice of Abrasive: Shape and Crystal Structure

Sourcing the abrasives that are most suitable for this type of bond system is essential to the performance of electroplated tools. Blocky yet angular diamonds are preferred over cubic type crystals, and yet the type of diamonds that are flat, (such as shales) are avoided. Rounded cubic diamonds are stronger due to the absence of sharp edges, but they provide inferior retention in the bond, with more of a rubbing than cutting phenomenon being observed.

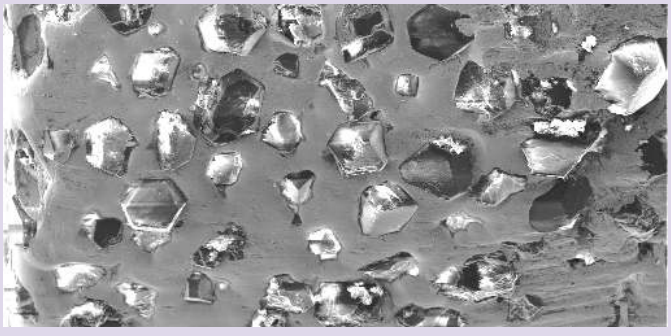
For dressing applications and CNC machining where retention of form or tool dimensions is important, very strong diamond crystals are recommended. Conversely, in applications where production rate is important and machining of hard substances is involved, friable diamonds are preferred where micro-fracturing presents continually new sharp edges for cutting.

Diamond Concentration

Another advantage of electrodeposited tools is the flexibility offered in terms of diamond concentration. Our electroplated tools, by default, have “standard” concentration of diamond although upon special request, “high” concentration diamond tools can also be manufactured where the stress on the abrasive is expected to be high. In this case, the increased number of diamond points on the surface reduces the stress per individual grain of abrasive, yielding better life than a tool with lower abrasive concentration.

Bond Quality

And finally, with our commitment to manufacture high performance electroplated tools, the next most important parameter is the quality of the bond. Hard composite nickel deposits are used to hold the diamonds firmly to the substrate. Standard hardness of the nickel deposit is maintained at 500 VHN. Further, the strength, quality and health of the deposit is routinely checked by our quality control department who check for appropriate diamond concentration and exposure, and deposit hardness using our state of the art stereo microscopes and scanning electron microscopes.



Check for Deposit Hardness and Characteristics at 25 x

Check for Deposit Hardness and Characteristics at 100 x

Product List

A one-stop-shop for Electrodeposited diamond and CBN tools, our exhaustive product list ranges from Diamond Hand Files, Internal Grinding Pins, Mounted Points, Cone Points, Straight / Profiled Dressing Wheels, Straight / Profiled Grinding Wheels, Cup Wheels, Dressing Blocks, Lapping Discs, Continuous / Interrupted Slitting Saws, Wire Saw Beads, Core Drills, Routers for Marble Edge Finishing, Drums for Stone Polishing and many more. Our product list is limited only by our collective imaginations and we pride ourselves in developing tools for our

Diamond Hand Files:
Diamond Electroplated Files are used on a variety of materials such as Tungsten Carbide, Gold, Hardened Steels, Ceramics, Glass etc. These are manufactured using highly friable diamond powders that continuously micro-fracture, continuously exposing new and sharp cutting edges for fast cutting in hand-held operations. These are available in a variety of standard as well as non-standard shapes and in a variety of sizes.

Cone and Mounted Points:
Diamond and CBN Cone Mounted Points can be manufactured over the complete range of grit sizes, diameters, included angles and profiles to give superior material removal while maintaining desired surface smoothness on the workpiece. These mounted points are guaranteed to surpass the drilling / boring performance of conventional production processes.

Dressing Wheels / Blocks:
Straight and profiled dressing wheels and dressing blocks are manufactured with extremely tough diamond to sustain shapes / profiles over long periods of dressing operations to give long life and faithful profile reproduction on the grinding wheel. These are widely used in automotive components industry, ball bearing industry and thread and gear cutting industries.

Grinding Wheels:
Electroplated grinding wheels are suitable for both, non-metallic and metallic ferrous & non-ferrous materials, as these may be manufactured using Synthetic Diamond Powder and CBN. Our selection of the most tightly graded superabrasives ensure faithful reproduction to complicated profiles and the hardest metal bond diamond grits ensure that the same is retained over a large number of grinding operations.

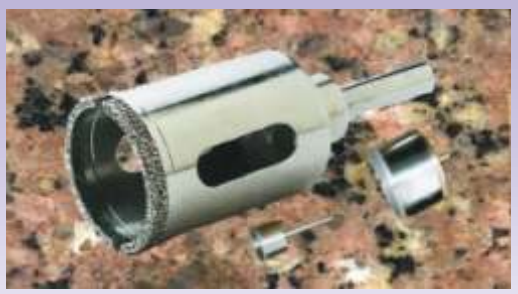
Internal Grinding Pins and Wheels:
Diamond and CBN internal grinding pins and wheels are available from 1 mm diameter to 24 inches in diameter depending upon specific requirements. These are widely used in automobile and precision machining industries to achieve desired surface smoothness while quickly attaining required material removal.

Twist Drills:
Diamond electroplated twist drills are manufactured using tough diamond and CBN for drilling holes in tough materials. High concentration of tough diamond on drill bits provides superior drilling action, making these tools the preferred alternative over cone and mounted points in certain applications. Manufactured in all available drill sizes, with standard fittings.

Lapping Plates and Discs:
For fast and effective stone polishing, Gem Lapping Discs are available from 30 mesh to 3000 mesh in diameters from 2” to 36”, with or without master laps, magnetic, adhesive and velcro backings. We have also designed and developed a number of profiled lapping discs, which are finding increasing use in the manufacture of beads of precious and semi-precious stones.

Continuous and Interrupted Slitting Saw Blades:
These are used for applications involving fast and aggressive cutting in materials such as fiber reinforced glass and plastic, ferrites, marble, limestone, sandstone, etc. Continuous and interrupted (narrow and wide slots) slitting saw blades are available in diameters ranging from 1 inch to 36 inches, in varying thickness, diamond types, and grit sizes depending upon individual requirements. Detenso discs are also developed for fast and silent material removal on demanding materials.

Wire Saw Beads:
Wire saw beads are used in applications requiring fast cutting with economy of operation. Manufactured using tough saw grade diamonds for aggressive cutting these are used for dimensioning stone blocks as well as asphalt, tarmac and reinforced concrete. Available in both, free bead as well as assembled on wire.



Core Drills:
Diamond Core Drills are used for drilling holes in blocks of stone, granite, concrete, ceramic epoxy resins, fiberglass and other composite materials. Selection of the toughest grade diamonds guarantees long life, with aggressive cutting and economy of operation compared to traditional methods of coring and drilling.

Routers:
Diamond routers are used extensively for imparting forms into very abrasive materials such as marble, glass, fiberglass, aerospace composites, and aluminum oxide. Available in a variety of standard fittings in a range of profiles.

Polishing Drums:
Graded polishing drums are used on stone blocks to initially achieve surface flatness and then to provide polishing action for superb luster and sparkling finish. Used for granite and stone, and usually available in sets of 7 grits, (30, 70, 100, 170, 270, 325 and 400 mesh).

Glass Machining:
Manufactured using tough, coarse diamond these tools are engineered to withstand the extreme abrasive action of silica that makes it difficult to machine glass using conventional tools. Diamond routers, bevel wheels and grinding wheels are used for decorating glass edges, grinding glass lenses and watch glass.

Stripping and Recoating:
Especially for tools with demanding tolerances and complicated profiles, we offer our services for stripping and recoating the worn out tools with a fresh layer of abrasive. A range of specialty chemicals have been developed to ensure that the worn-out tool can be carefully stripped for recoating. There is very little difference between a refurbished and a new tool. This not only reduces cost but also substantially reduces the turn-around time for a worn-out tool, and a refurbished tool can often be delivered within a matter of days

Diamond Lapping Compounds

Advances in engineering technologies, and increased demands for betters luster and surface finish have given rise to requirements for new products and technologies where high precision and excellent surface finish are called for. The answer to these evolving requirements of the engineering and lapidary industry is our range of precision graded synthetic diamond lapping compounds. These lapping compounds are manufactured using the toughest and most tightly graded diamond powders for aggressive cutting action and exceptional surface smoothness. These are available in Low, Standard, and High concentrations, in tightly graded sizes ranging from 0.25 microns to 80 microns.

To meet varied requirements regarding lubricity and work-piece contamination issues, lapping compounds are available with Oil Soluble, Water Soluble and Universally Soluble carrier jellies.

- ***Oil Soluble Compounds*** provide the greatest flexibility in carrier chemistry, recommended for applications such as controlled lapping of carbide drawing dies, cold heading dies and other standard polishing applications.
- ***Water Soluble Compounds*** are used where petroleum contamination is forbidden. These are carefully engineered to ensure the highest lubricity and thermal consistency.
- ***Universally Soluble Compounds*** have been developed to combine the advantages of both oil and water soluble compounds, increasing the versatility of use.

We also offer our services in altering the properties of our vehicles to match your requirements for consistency, lubricity, viscosity, stability, thermal properties, should your requirements fall outside of our standard range of products.

Gem Lapping Compounds are available in 5 g syringes for easy dispensing, as well as in 50 gram, 100 gram, 500 gram and

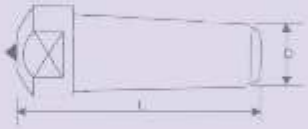
Size	Nominal Size	Color
0 - 1/4 µ	*0.125 µ*	
0-1/2 µ	*0.25µ*	
0-1 µ	*0.5 µ*	
0-2 µ	*1 µ*	
1-3 µ	*2 µ*	
2-4 µ	*3 µ*	
4-8 µ	*6 µ*	
8-12 µ	*10 µ*	
10-20 µ	*15 µ*	
15-25 µ	*20 µ*	
30-40 µ	*35 µ*	
40-60 µ	*50 µ*	
60-80 µ	*70 µ*	

Diamond Shaped / Dressing Tools

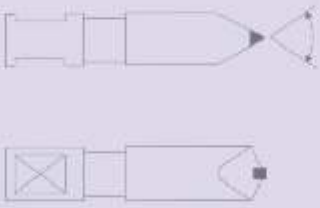
Our range of Dressers and Diamond Shaped Tools are available for a wide range of precision dressing applications. Standard products include single-point, multi-point, crown and blade dressers, and diamond chisels of various shapes and sizes. High precision is our motto and tolerances of 5 microns and 15' on angles are standard on all our supplies. Further precision products can also be supplied should your requirement fall outside our standard range of products.

Single Point Dressers

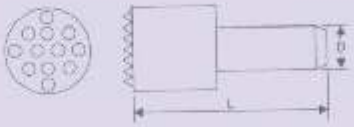
Single Point Dressers



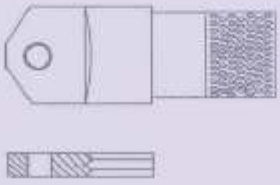
Shaped Tools / Chisels



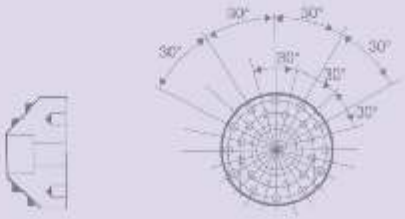
Cluster Type Dressers



Blade Type Dressers



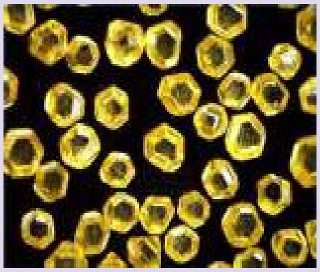
Crown Type Dressers



Synthetic Industrial Diamond Powder

We at Gem Diamond Products, are committed to providing the industry with the complete range of diamond and cBN powders including the tough Metal Bond Synthetic Diamond Powder for grinding and sawing applications, the friable Resin Bond Synthetic Diamond Powder for quick cutting on engineering materials, Graded Synthetic Diamond Micron Powder for exceptional surface finish and smoothness, and Cubic Boron Nitride for applications involving ferrous materials.

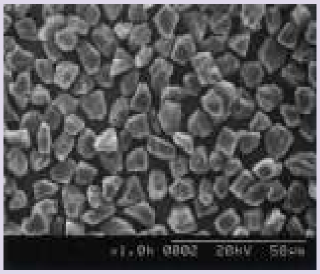
Our superabrasives powder division is dedicated to providing the best diamond powder available worldwide. Beginning with sourcing of the best grade diamonds available worldwide, the powders are subject to a thorough cleaning and purification process to remove even the last traces of impurities. The powders are then graded using state-of-the-art machinery and then subjected to rigorous quality control procedures using sophisticated equipment such as the Leeds and Northrup Microtrac Laser Particle Size Analyzer and computerized Image Analysis techniques to ensure they are of the highest standard.



Metal Bond Diamond Powder

Resin Bond Diamond Powder

CBN



Graded Micron Powder

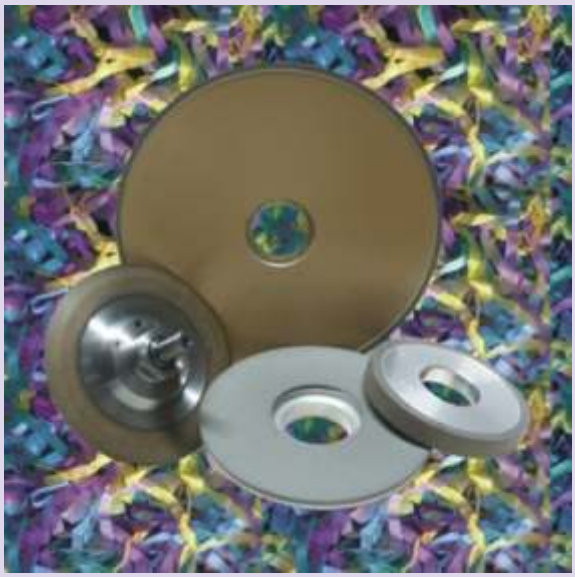
Standard* Available Grades of Graded Synthetic Diamond Micron Powder

0 - 0.25	P		5 - 10
0 - 0.5	O	L	8 - 12
0 - 1	L	A	10 - 15
0 - 2	I	P	10 - 20
0 - 3	S	P	15 - 25
1 - 2	H	I	20 - 30
1 - 3	I	N	25 - 35
2 - 4	N	G	30 - 40
4 - 8	G		40 - 50

Standard* Grit Size Chart Showing U.S. Mesh Sizes, FEPA Standard and Surface Finish

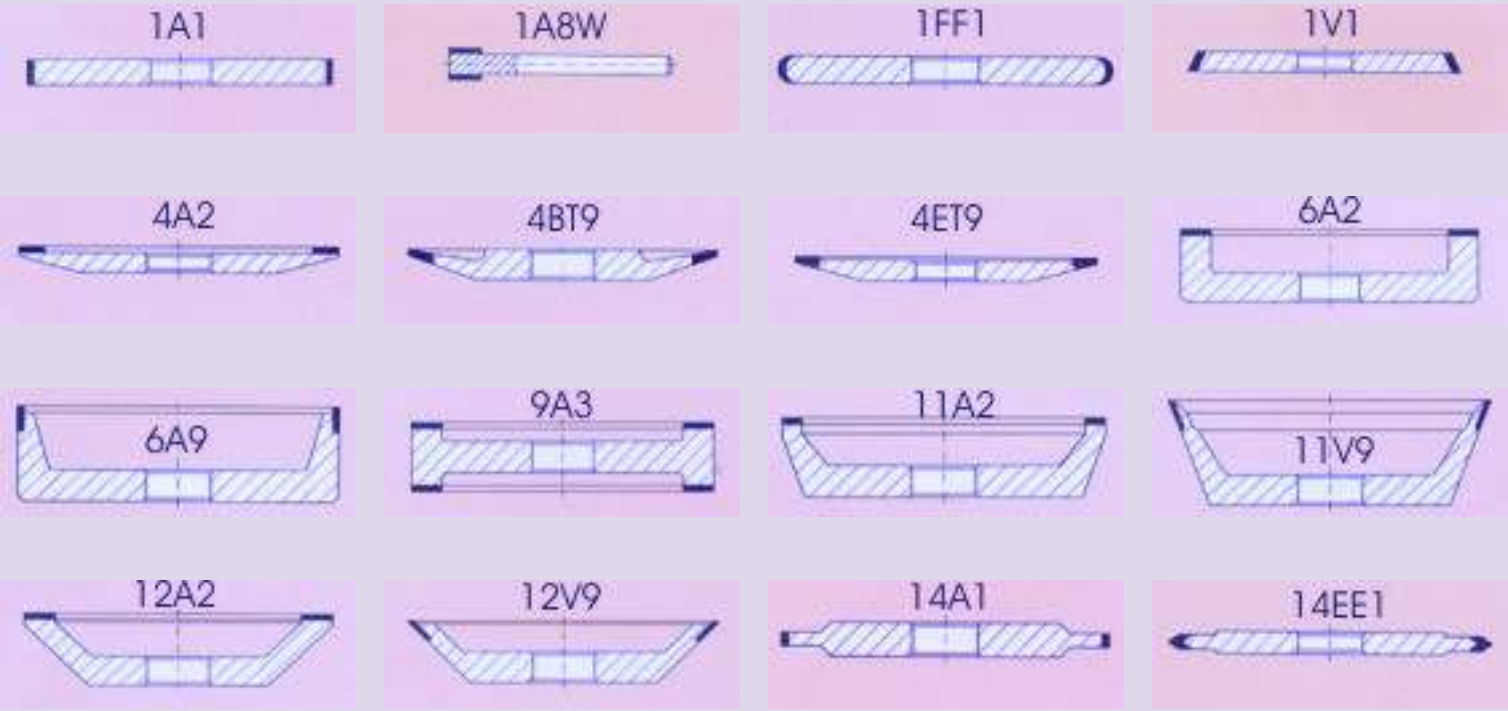
US Mesh Size	FEPA	Micron Range	Pieces Per Carat	Size in Inches
20/30	D851	600-800	97	**0.033**
30/40	D602	425-600	460	**0.025**
40/60	D427	250-425	1334	**0.018**
60/80	D251	181-250	10400	**0.011**
80/100	D181	151-181	17410	**0.008**
100/120	D151	127-151	20920	**0.007**
120/140	D128	107-127	49400	**0.006**
140/170	D107	90-107	83400	**0.005**
170/200	D91	75-90	140000	**0.004**
200/230	D76	63-75	25200	**0.0035**
230/270	D64	53-63	384000	**0.003**
270/325	D54	45-53	66000	**0.002**
325/400	D46	38-45	1130000	**0.0017**

Diamond / CBN Resin Bonded Tools



Resin Bonded Diamond & CBN tools are used for machining hard materials such as ceramics, steel, cast iron and hardened ferrous materials, tool and die steels, glass, tungsten carbide, and polycrystalline hard materials, ferrites, graphite, semi-Conductor materials, super alloys, exotic and space age materials, etc.

Making use of the best available highly friable resin bonded diamond powders, and bond mix formulations which have been carefully perfected over decades of research and trials, we offer you the complete range of Diamond and CBN resin bonded tools.



Gem Diamond Products

323 Adhyaru Industrial Estate, Sun Mill Compound, Lower Parel, Bombay 400013, India

Tel: +91-22-2492 7823 • Fax: +91-22-2495 2706

email: contact@gem-diamond.com • http://www.gem-diamond.com