

**elementsix**™

DE BEERS GROUP

# Micron+™ finishing

Unrivalled product offerings



**e6.com**

With more than sixty years' experience in optimising and producing precision-grade Micron™ powders, Element Six (E6) has developed proprietary manufacturing methods and uncompromising quality control procedures, ensuring that all E6 micron products, including customised offerings, exceed industry standards.

The main applications for E6 Micron™ products include finish grinding, lapping and precision polishing operations across the optics, electronics and automotive industries.

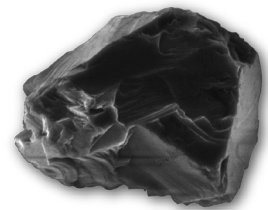
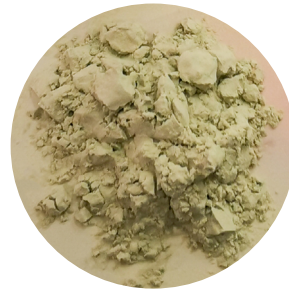
## Micron+™ product portfolio

At E6, we provide a complete range of micron powders in synthetic diamond and cubic boron nitride (cBN).

Our Micron+™ products are stringently processed to ever tighter sizing, shape and purity specifications, to consistently meet the most exacting quality demands facing our customers today.

### MICRON+™ MDA

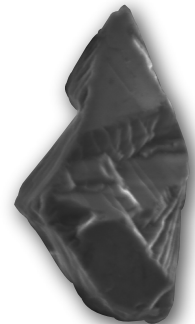
Micron+™ MDA is produced from selected metal bond synthesised material, using dedicated manufacturing processes, to ensure consistent size and shape characteristics. The shape distribution consists of both blocky and irregular shapes to ensure excellent abrasive action and enhanced performance.



### MICRON+™ CDA™

Micron+ CDA™ is produced from resinoid diamond grit, consisting of friable particles with irregular shapes.

With bonded abrasives, superior performance may be obtained from metal clad grit (see page 4). Featuring inclusions, to deliver consistent breakdown.



### MICRON+™ ABNC

Micron+™ ABNC is the cubic boron nitride solution in the micron+ range. It consists of uniformly shaped particles, carefully graded into discrete size ranges.

Ideally suited for grinding, lapping and fine-finishing of hard ferrous materials.



## Coatings and claddings

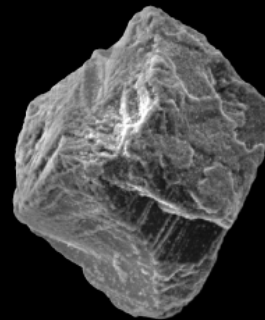
Coatings are a technology developed by E6 to enhance diamond retention in the bonding matrix and to protect the surfaces of the diamond particles during the sintering process.

Claddings are primarily provided with diamond and cBN abrasives for the resin-bond tooling market. A copper or nickel cladding aids the dissipation of heat from active particles, which prevents damage to the supporting matrix and the premature loss of abrasives. Claddings also aid retention of abrasive particles in the bond by providing a rougher interface of greater area.

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### TF coating

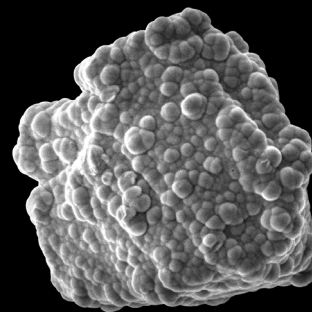
Using an active coating technology, this titanium carbide coating is chemically bonded to the abrasive particle, offering protection from degradation during toolmakers' sintering processes and providing enhanced particle retention in the metal bond matrix. Improved particle retention enables particle protrusion, allowing for more efficient grindings, whilst maintaining and increasing tool life.



### N cladding

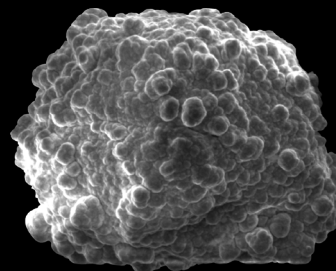
Electroless nickel cladding is deposited chemically. The chemical composition of the cladding is designed to prevent embrittlement caused by thermal cycling encountered during machining.

Available for items in both the MDA and CDA™ range with a 30% and 55% by weight cladding and a 60% by weight cladding in the ABN™ range.



### C50 cladding

Copper cladding in a resin bond has been found to be particularly effective in the dry grinding of cemented carbides. The electroless copper cladding, C50 (50% by weight metal), has a higher thermal conductivity than nickel, improving the transfer of heat from the grinding zone when acting in conjunction with bonds that have enhanced thermal properties.

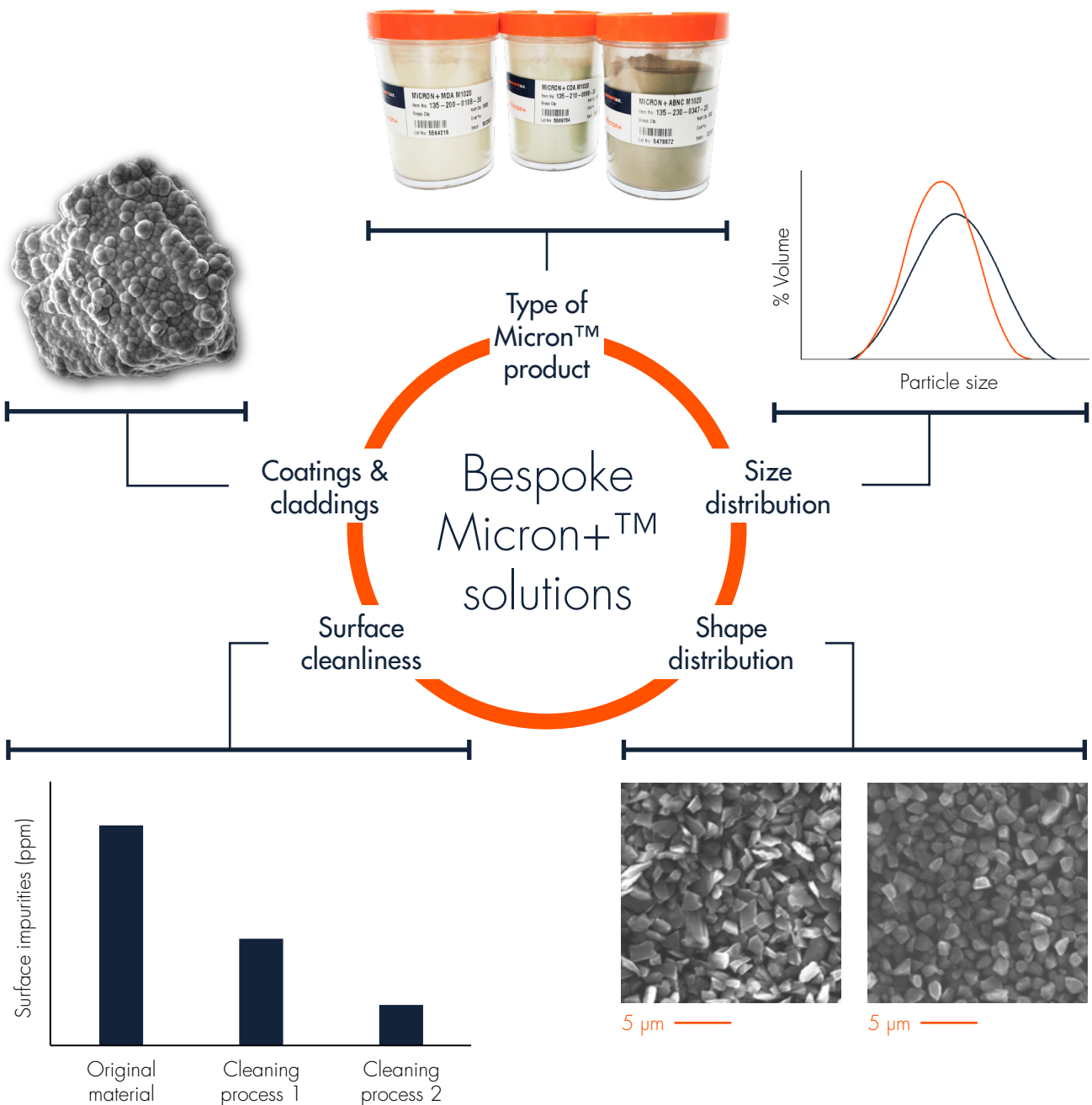


# Customised solutions

We help our customers to determine the product characteristics required for specific applications and deliver suitably tailored solutions.

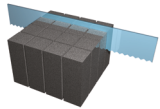
E6 has significantly invested in both its Micron™ processing and metrology capabilities. Examples include controlling and specifying shape parameters such as aspect ratio, improving tightly defined sizing distributions.

We can also offer bespoke coating and cladding solutions to meet your needs.



## Solar cell precision manufacturing processes

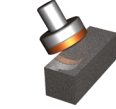
Our grit and Micron+™ products are used across multiple fabrication processes during the manufacture of solar cells, delivering reduced operational costs and increased productivity.



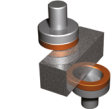
**Sizing & bricking**



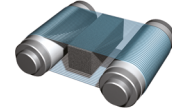
**Cropping silicon blocks**



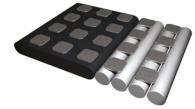
**Corner chamfering**



**Peripheral grinding**



**Wafer slicing**  
Precision wire sawing & diamond saw wire (Micron+™)

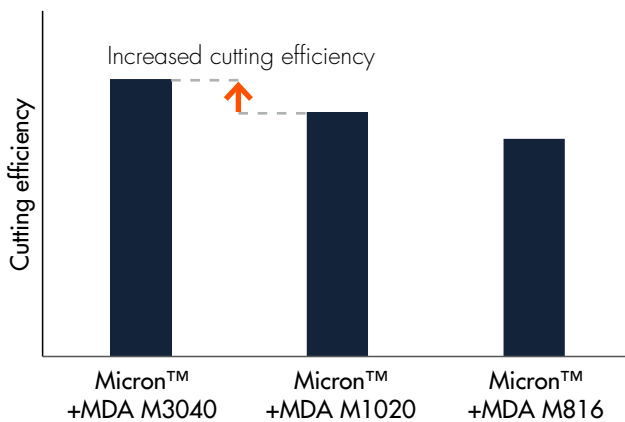


**Dicing & levelling**  
Cutting, lapping & polishing (Micron+™)

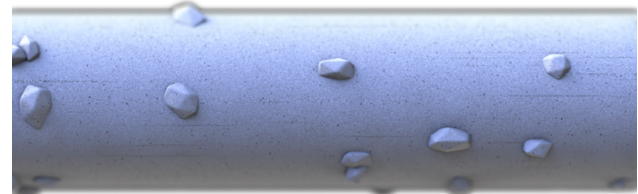
Find out more about the mesh-sized grit, relevant for these applications, in the [Precision Grinding brochure](#)

## Wafer slicing case study

Wafers (silicon, alumina) are produced using diamond wire saw. This technique achieves high form accuracy and good surface quality. Additionally it is cost effective and has a high throughput. The trends in this area have been towards using smaller diameter wires as well as smaller micron diamond to reduce material waste and to increase yield.



**Wire saw before use**



**Wire saw after use**

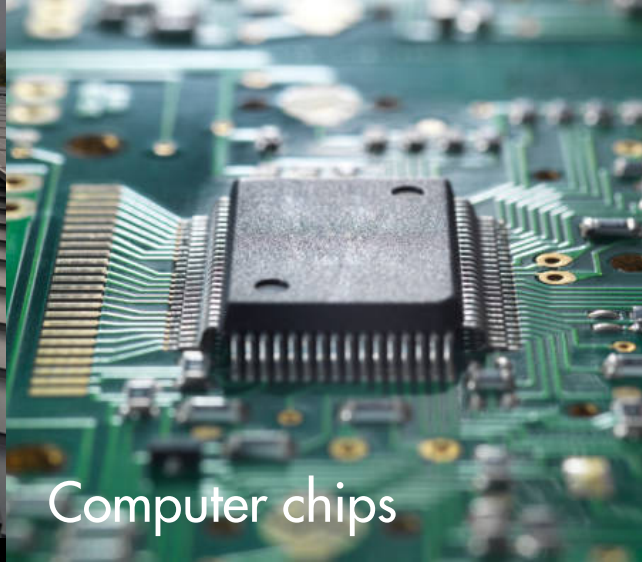


**Sliced wafers**





Solar panels



Computer chips



LCD screens



Lenses



LEDs



Cylinder liners



Crankshafts



Stone polishing

# Product offering: available sizes, coatings and claddings

Size ( $\mu\text{m}$ )*	MDA				CDA™				ABNC	
	Unclad	N55	N30	TF	Unclad	N55	N30	C50	Unclad	N60
0-0.25	✓								✓	
0-0.5	✓								✓	
0-1	✓				✓				✓	
0.5-1	✓				✓				✓	
0.75-1.5	✓				✓				✓	
1-2	✓				✓				✓	
1-3	✓				✓				✓	
2-4	✓				✓				✓	
3-6	✓				✓				✓	
4-8	✓				✓				✓	
6-12	✓	✓	✓		✓	✓	✓	✓	✓	✓
8-16	✓	✓	✓		✓	✓	✓	✓	✓	✓
10-20	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
15-25	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
20-30	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
20-40	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
25-35	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
30-40	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
40-60	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
40-80	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

\* The values stated are nominal and do not portray the absolute size distribution. Contact us for customised product solutions, including: non-standard sizing, coatings, claddings and surface treatments.



Element Six, part of the De Beers Group, designs, develops and produces synthetic diamond solutions and other supermaterials, and operates worldwide with manufacturing facilities in Germany, Ireland, South Africa, the UK and US.

Element Six solutions are used in applications such as cutting, grinding, drilling, shearing and polishing, while the extreme properties of synthetic diamond beyond hardness are opening up new applications in a wide array of industries such as optics, power transmission, water treatment, semiconductors and sensors.

## Contact us

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