

SURFACE ENGINEERING



World Leader in Superabrasive Finishing Systems



Advantages of Applied Diamond Expertise

Diamond Characterization Drives Innovation

Diamond-based surface engineering systems from Engis are helping global technology and manufacturing firms expand the frontiers of innovation. How? By applying our diamond expertise to each application through our Diamond Characterization lab.

At the heart of this process is classifying and characterizing diamond particles especially suited to each material and application. Consistent results require a precise understanding of diamond's intrinsic and extrinsic attributes – such as particle size, shape, cleanliness, friability and thermal properties. Each variable affects performance, so each system must be engineered to generate specific surface features, geometries and finishes.

Engis is renowned for the superior reliability, quality and consistency of our diamond grit. This is made possible by our ISO9001 quality certified facilities where we micronize our own diamond.

Most important, Engis understands how to repeatedly create new breakthroughs for our customers. We have worked with the world's leading data storage companies for decades, engineering surface finishing processes that enable continuous improvements in the speed, accuracy and integrity of disc drives.



Engis has developed many innovations, including this patented apparatus for close monitoring of the crushing strength and fracture characteristics of finished diamond powder.

Engis also revolutionized the honing process – across all applications and materials. Our precision single-pass bore finishing technology arose out of our experts' intrinsic understanding of diamond superabrasives and how to apply them in customer applications.

The 5 Keys to Diamond Characterization

- Five areas of focus, all inter-related
- Close monitoring of incoming raw diamond
- Enhanced PSD grading to create standard and custom grades
- Shape of the diamond is closely monitored
- Dynamic analysis of mechanical strength

LOT	GRADE	EXTRINSIC (ppm)										INTRINSIC (ppm)									
		B	Co	Cr	Fe	Mn	Na	Ni	Si	Zr	B	Co	Cr	Fe	Mn	Na	Ni	Si	Zr		
S436	15-25	4	<1	1	22	1	34	142	118	<1	1	1	1	45	22	<1	55	11	<1		
S429	15-25	1	<1	1	48	2	26	28	89	<1	1	1	<1	1	1	1	1	1	1	<1	
S429	12-22	2	<1	<1	54	2	30	25	70	<1	1	2	<1	44	22	5	56	12	<1		
11011	20.055	<1	<1	<1	11	<1	1	31	4	<1	<1	<1	<1	12	<1	<1	6	<1	<1		
11010	17	<1	<1	<1	8	<1	1	20	8	<1	<1	<1	<1	48	1	<1	14	2	<1		
11008	15-25	<1	<1	<1	2	<1	<1	1	8	<1	<1	<1	<1	49	4	<1	19	5	<1		
11019	8-12	<1	<1	<1	1	<1	<1	1	1	<1	<1	<1	<1	3	<1	<1	2	<1	<1		
10997	0-1	8	<1	<1	102	1	5	6	1	<1	<1	<1	<1	2	<1	2	10	4	<1		
10996	3-5	0	<1	<1	106	<1	7	7	10	<1	<1	<1	<1	1	<1	<1	3	<1	<1		
10998	0-2	6	<1	<1	46	<1	3	2	4	<1	<1	<1	<1	3	<1	2	7	5	<1		
10996	0-1	12	<1	<1	60	<1	36	5	2	4	1	<1	<1	6	2	38	22	22	<1		
10978	5-1.0	12	<1	<1	19	<1	26	6	10	2	<1	<1	<1	3	2	17	14	13	<1		
10935	5-1.0	18	<1	16	18	<1	38	1	<1	<1	1	<1	2	8	2	26	20	9	<1		

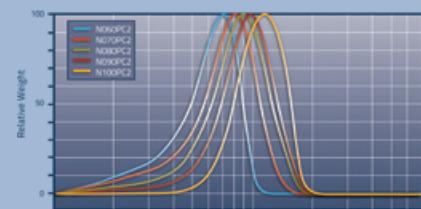
Consistency of Diamond Materials

Assess size, shape, purity, residual crystal growth defects



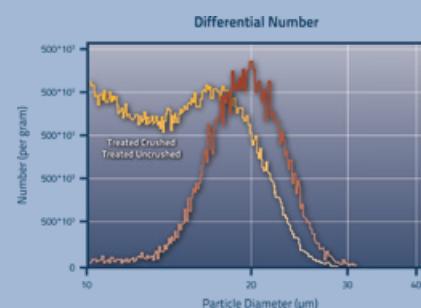
Shape

Dynamic analysis of particle shape characteristics



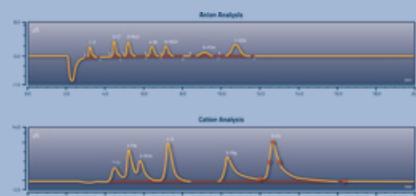
Particle Size Distribution

Ensure consistent PSD from 25 nm to 60 microns



Mechanical Strength

Monitor crushing strength, fracture characteristics



Surface Cleanliness

Remove surface contaminants via proprietary process

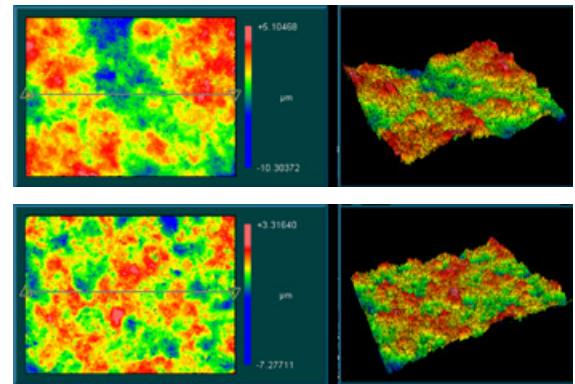
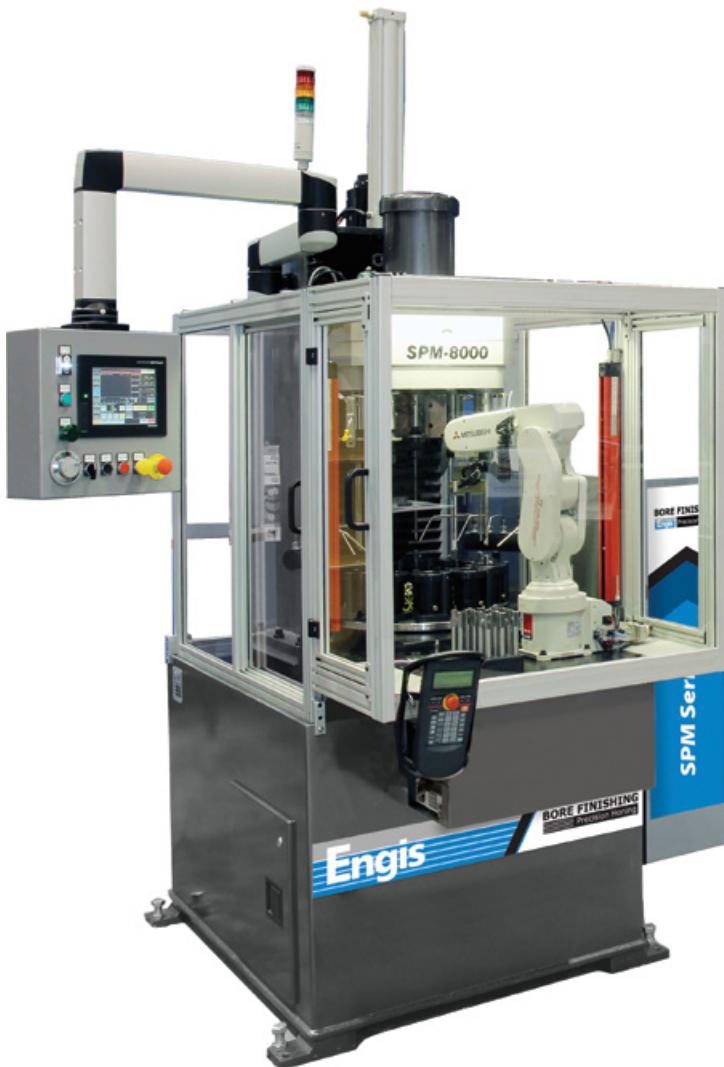
Surface Engineering Matters

In high-stakes manufacturing, both product performance and business profitability depend on the precision and integrity that is engineered into the finished surface.

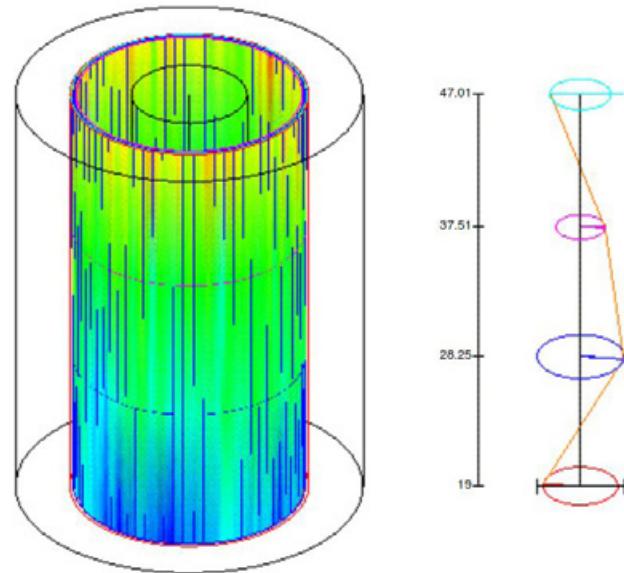
Every attribute is vital: the condition and finish of the lapped surface; its dimensional tolerances and topography; or whether it be the precision and geometries of the holes and bores of the workpiece. Engis® helps manufacturers develop processes for optimizing each of these factors, so every part shipped makes a high-value contribution to the bottom line.

Surface Engineering through Diamond Expertise™

That's what we do at Engis. Since 1938, we've used our extensive knowledge of natural and synthetic diamond – as well as CBN and other superabrasives – to help customers unlock the potential of the properly engineered surface.



Engis deploys the latest surface measurement technology to continually improve its surface engineering solutions. Sophisticated metrology displays "before" and "after" Images of data measuring surface flatness.



Our Mitutoyo RA-2200 Roundness/Cylindricity Machine provides precise measurement of customer components.

Complete, Integrated Surface Finishing Systems

Designed to maximize the advantages of diamond superabrasives.

Engis designs and manufactures complete, end-to-end solutions for creating precise finished surfaces that your application requires. We're more than just a supplier of products and machines. Through our process development laboratories, we can offer you efficient turnkey systems that are custom-tailored to achieve your manufacturing objectives.

Each system consists of the following:

- Diamond and CBN superabrasives characterized and micronized by Engis
- Machines, tooling, part holders, automation and accessories
- Process development and application consultation to maximize productivity, consistency and versatility

Surface Engineering Solutions for Single-Pass Honing

Boost throughput and generate precise geometries, while consistently creating optimal surface conditions – all with a single pass through the part.

Engis designs, manufactures and integrates all key components:

- Single & multi-spindle machines – standard & custom-build
- Diamond and CBN plated tools
- Fixtures, workpiece holders, gauging systems
- Automation, robotics, material handling systems
- Process development with experienced bore finishing engineers



Surface Engineering Solutions for Lapping & Polishing and Wafer Grinding

Hyprez® systems from Engis come with decades of application experience, process development know-how and diamond expertise setting new standards for versatility, consistency and precision – without sacrificing speed and throughput.

- Bench-top and free-standing machines – standard & custom-build
- Standard and customized diamond slurries and compounds
- Lapping plates – vast range of materials, machined features and diameters
- Fixtures, workpiece holders, slurry dispensers and accessories
- Three specialized Process Development labs

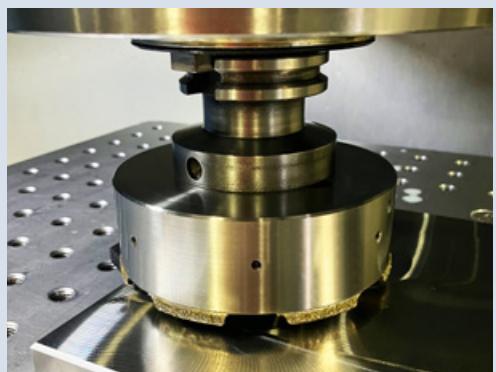
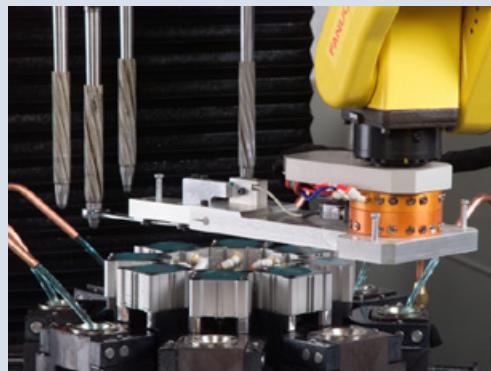
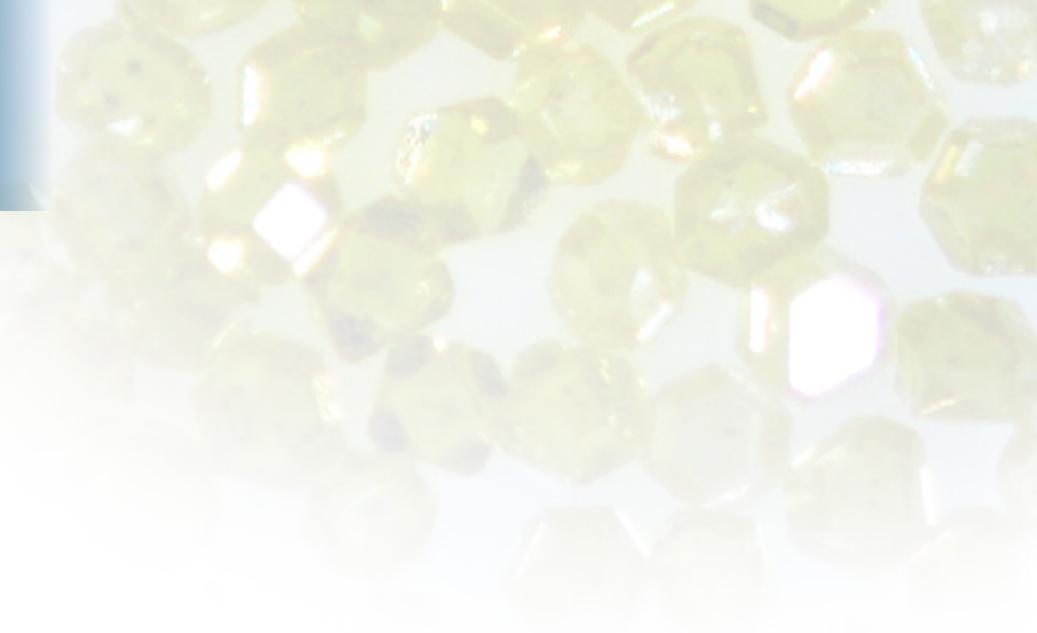


Surface Engineering Solutions for Grinding

Electrogrit® diamond and CBN plated grinding products earn respect through superior, consistent cutting precision and long wheel life

- Diamond and CBN plated form wheels
- Diamond dressing blocks and tools
- Diamond pins, mandrels
- Diamond saw blades, specialized tools
- Dia-ForZ® wheels for foundry applications
- Best application assistance in the industry





World Leader in Superabrasive Finishing Systems



Engis Asia Pacific Pte. Ltd.

SINGAPORE
Tel: 65-6745-1923
Fax: 65-6745-2907
Email: sales@engis.com.sg



Engis Corporation

Wheeling, IL U.S.A.
Tel: (847) 808-9400
Fax: (847) 808-9430
Email: info@engis.com



Engis-Japan Co., Ltd.

Yokohama, JAPAN
Tel: 81-45-474-0666
Fax: 81-45-474-0677
Email: email@engis.co.jp



Engis Korea Co., Ltd.

Gyeong Gi-Do., KOREA
Tel: 82-31-354-1426
Fax: 82-31-354-1430
Email: engis@engis.co.kr

THE ENGIS® GROUP OF COMPANIES



Engis of Canada Ltd.

Burlington, Ontario, CANADA
Tel: (905) 632-3016
Fax: (905) 632-4250
Email: engiscanada@engis.com



Helical Lap & Mfg. Company

Mt. Clemens, MI U.S.A.
Tel: (586) 307-8322
Fax: (586) 307-8325
Email: info@helicallap.com



Engis (UK) Ltd.

Oxfordshire, ENGLAND
Tel: 44-1491-411117
Fax: 44-1491-412252
Email: sales@engis.uk.com



Engis Lapping & Grinding Technology Co., Ltd.

Shanghai, CHINA
Tel: 86 021 58979832
Fax: 86 021 58979581
Email: sales@engis-china.com

Hyprez® Lapping/Polishing Systems
Beginning-to-end flat finishing systems – machines, plates, pads, diamond powders, slurries, lubricants and other accessories – plus customized equipment, specialized formulas, testing labs and technical support for process and technology development.

DiaMold® Toolroom Products

Comprehensive line of diamond polishing compounds, abrasive stones, sticks, bobs, brushes and files – plus powered hand finishing systems for every toolroom application.

Engis Single-Pass Bore Finishing Systems

Single-pass bore finishing systems – standard models and custom machines – plus diamond and CBN plated finishing tools, parts holders/fixtures and integrated automation system.

Electrogrip® Grinding Systems

Advanced superabrasive grinding, cutting and dressing systems utilizing diamond and CBN materials. Specializing in the aerospace, medical, ceramic, automotive and composite industries.



World Leader in Superabrasive Finishing Systems ENGIS CORPORATION

105 W. Hintz Road • Wheeling, IL 60090-6038
Phone: 847.808.9400 • Toll Free: 1.800.99.ENGIS
Fax: 847.808.9430 • E-mail: info@engis.com
Website: www.engis.com



Engis is a registered trademark of Engis Corporation U.S.A. and other countries.
All products designated with ® or TM are registered Trademarks or Trademarks of Engis Corporation.