# DISCOVER A NEW WORLD OF SUPERABRASIVES SCIENCE AND ENGINEERING









## LEADING THE WAY IN QUALITY CONTROL

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Through utilization of enhanced quality control instruments, The Worldwide Group can further its commitment to excellent testing standards. We are proud to be an innovator in implementing the strictest and most advanced quality control measures to reassure our customers of our integrity and to ensure superior testing every time.

## **QUALITY ASSURANCE PROGRAM**

WWSA is an ISO 9001:2008 certified firm.

WWSA's quality control team members have a combined 50+ years of experience in the superabrasives industry.

All WWSA quality control verification equipment is calibrated on a regular basis.

WWSA maintains retention samples of all manufactured lots since WWSA was founded in 2004 to ensure product traceability for every customer order and internal test.

All WWSA quality control testing conforms to ANSI and FEPA standards.

WWSA utilizes statistical process control to assess and maintain all testing results.

## WWSA PERFORMS THE FOLLOWING TESTS ON ALL PRODUCTS:



- Friability testing according to ANSI Standard B74.23.
- Size verification testing according to ANSI Standard B74.16.
- Micron size verification testing according to ANSI Standard B74.20.
- Shape consistency verification utilizing Microtrac S3500SI and Diashape shape analysis software.
- Product cleanliness verification using IC, ICP and AA.
- EDS Quantitative and qualitative elemental analysis.



#### Microtrac S3500 SI

- Uses three precisely placed red laser diodes to accurately characterize particles
- Reliable and repeatable particle size analysis for a diverse range of applications by utilizing the proven – theory of Mie compensation for spherical particles and the proprietary principle of Modified Mie calculations for non-spherical particles

Measures 0.02-2800 Microns

### MICROTRAC **S3500 SI** DYNAMIC IMAGE ANALYZER AND LASER DIFFRACTION

Knowledge and understanding of particle shape as well as size are essential to the development and control of WWSA's diamond and cBN products. The Microtrac S3500 SI particle characterization system provides high quality, statistically significant particle size and shape information.

This combination of hardware and software in a single integrated package provides a high level of automation and validation of results.

Particle size distribution (PSD) and shape characterization are critical product measurements for applications that demand specific surface finish and removal rate in which the Microtrac S3500SI delivers reliable, repeatable and validated results in minutes.







#### **Microtrac SI Benefits:**

- By utilizing dynamic imaging, size, and shape analysis, users can quickly characterize complicated wet samples in shorter amounts of time versus other methods of measurement
- 15 images per second allow users to capture a complete picture of the sample being measured.
- Full frame camera ensures clear images and both high and low concentrations
- Utilizing stroboscopic LED lights provides superior image clarity



### JEOL SEM with EDS

The JEOL low vacuum Scanning Electron Microscope with integrated Energy Dispersive X-Ray Spectroscopy is ideal for performing advanced analytical analysis. Utilizing the latest Silicon Drift Detector (SDD) technology, the JEOL SEM allows engineers, scientists, and technicians to carefully assess and analyze the morphology and elemental chemistry of super abrasive grains and their coatings.

The JEOL SEM has been carefully designed for ease of use, and the versatile InTouchScope has functions that users and customers of all abilities will be happy with. Key features include:

- Automatic SEM condition setup based on sample type
- Simultaneous multiple live image and movie capture
- Easy sample navigation at 5x 300,000x magnifications
- Quantitative and qualitative elemental analysis
- Low and high vacuum operation
- Wireless capability
- Portable, compact, small footprint SEM

The InTouchScope features all the capabilities of a full size tungsten SEM with integrated EDS analysis in a small, ergonomic and intuitive design. An onboard turbo pump makes this a truly self-contained, portable SEM that is easy to set up anywhere in the lab.







### SONOSCAN **D9600** ACOUSTIC EMISSION MICROSCOPE

At the very forefront of C-SAM acoustic micro imaging systems, the Sonoscan D9600 is the perfect general purpose tool for failure analysis, process development, material characterization and low volume product inspection.

Using high-frequency, non-destructive sound waves, we can utilize the Sonoscan D9600 to produce an accurate image of solid and porous samples. The performance levels of the D9600 are truly unrivaled on the market.

With incredible accuracy and an extremely robust design, the Sonoscan D9600 includes enhanced electronics and software technology that puts it at the top of the performance level list for laboratory acoustic microscopes. Its innovative capabilities are the reason it has earned a place in our high-tech Materials Characterization Laboratory.

#### **EXAMPLES OF REJECTED DISKS** FOR VOIDS AND DELAMINATION



#### Each disk received is inspected for the following:

- Carbide grind uniformity
- Layer thickness
- Edge chips
- Sonoscan for surface flatness, internal voids, delamination, uneven layers, pooling, pitting and bond interface uniformity.

#### LAYER THICKNESS



#### **BOND INTERFACE SCAN**



#### DISK SURFACE FLATNESS





### KEYENCE **3D IMAGING** VHX 2000 Digital 3D microscope

This extremely versatile and exceptionally handy all-in-one microscope system cleverly combines the capabilities of a conventional stereomicroscope, compound microscope, and metallurgical microscope.

Taking digital microscopy to new heights, the result of this innovative design is a single system that can observe, measure, and record. To further its performance, we have carefully developed a customized mounting system to allow us to take images of the wheel on the spindle.

This added feature lets us characterize the wear progression of abrasive grains. We can measure grit exposure / pull out, wear flats and bond erosion, which are all critical to comprehensive performance evaluation.

Key features of the Keyence VHX 2000 Digital Microscope include:

- 0.1x 5,000x magnification range
- Incredibly large depth-of-field (inspect from any angle and perform 2D/3D observation and measurement)
- Can identify optimal bond / crystal combinations by generating in-process color images of the tool's bond / crystal wear characteristics down to 1 micron











Worldwide Superabrasives and SPOC have continued their commitment and passion for quality control, utilizing state of the art residual stress measurement capabilities with the acquisition of a leading residual stress mapping machine - the Proto LXRD.

### PROTO LXRD

#### **Benefits of Measuring Residual Stress**

Measuring residual stress after grinding tests allows accurate assessment of wheel and process performance – a key factor in manufacturing superior parts. Visual assessment of a part cannot determine whether a part has sustained induced stress or burn, both of which can affect part performance. Knowing the type of residual stress that remains on a part is highly important in the manufacture of high quality automotive, aerospace and power generating equipment. By utilizing the Proto LXRD we can maintain the highest standards of quality control by closely analyzing samples that we grind for residual stress.

#### **Key Features of the Proto LXRD**

Manufactured by the leading name in residual stress mapping, the Proto LXRD uses sophisticated x-ray technology and enhanced detection software to accurately create a detailed map of residual stress. We can measure residual stress on sample parts that we grind to reveal any subsurface damage or burn. The Proto LXRD leads the way in residual stress measurements with:

- Robust, heavy-duty design Primed for industrial use
- Fast, durable X-ray detectors that do not deteriorate over time
- Unique modular goniometer system (patent pending)
- Advanced onboard chiller / heater to maintain optimum performance of X-ray tubes
- Wide range of X-ray apertures to enable measurement of odd-shaped parts
- The latest XRDWin 2.0 software for unparalleled data collection and accurate residual stress analysis









### ANCA TX7+

#### ANCA's premium machine

The result of 20 years of ongoing R&D and the implementation of customer feedback. The basis of the powerful TX7+ is ANCA's expertise in CNC technology, mechanical and electrical design and software engineering. It is a machine that is an industry benchmark in its class. Flexible software and tooling, combined with a large working envelope mean the TX7+ is capable of manufacturing complex tools and components for the medical, aerospace and automotive industries.

- 5 Axis CNC
- Max Wheel Diameter 300 mm (12")
- Max Wheel Speed 10,000 RPM
- 37 kW (49 Hp) peak
- Max Work Diameter 200 mm (8")
- Max Work Speed 3,000 RPM
- 2 EBBCO Coolant Delivery Systems
  - o Mineral Oil
  - o Water Based Synthetic
- High Pressure (100 bar) Wheel Cleaning Nozzle









### MODAL ANALYSIS

Utilizing specialized hardware and software, SPOC is able to measure and analyze the static and dynamic response of a machine tool. The use of Modal Analysis allows SPOC engineers to identify the capabilities and limitations of a grinding machine which is paramount in determining stable and optimal grinding conditions.

- Static Stiffness
- Dynamic Stiffness
- Damping
- Modal Analysis
- Foundation/Isolation
- Thermal Deflections
- Grinding Stability (Chatter/Lobing)
- Advanced Troubleshooting
- Generate Machine Purchase Specs











Nearest point to

Furthest profile point from datum

#### Surtronic R-100 Series

- Precision (+/- 25 nm spindle accuracy)
- Patented Gauge Orientation
  - o Roundness
  - o Flatness
  - o External
  - o Internal
- Talymin Gage Technology (6 nm resolution)
- Speed (3 parts/minute including setup)

### SURTRONIC

#### **Harmonic Analysis**

Higher order harmonics can come from machine tool chatter, an out of balance spindle, or an eccentric grinding wheel. All of these phenomena can be detected by a simple roundness measurement; the results of these measurements can be reduced to their harmonic content utilizing a Fast Fourier Transform and then viewed for the harmonic phase, number and amplitude.







### TALYSURF

#### Surface and Contour in One

The Form Talysurf i-Series is a high accuracy instrument capable of simultaneous surface finish and contour measurement. The system's low noise and high resolution gauge ensures measurement integrity with choice of gauge ranges providing versatility for a variety of applications.

#### Gauge

- o Range up to 5mm
- o Resolution down to 0.4 nm
- Roughness
  - o Noise less than 6 nm Rq
- Contour
  - o LS arc measurement less than 3.3 μm
  - o Pt less than 0.25 nm



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