

APPLICATION NOTES



Applying UCI Mobile Hardness Testing on Ceramics with SONODUR 3

Ceramics are essential in industries like medical, automotive and electronics due to their hardness, wear resistance, and thermal stability. Found in capacitors, bearings, and cutting tools, they offer strength but low fracture toughness, making hardness testing crucial to ensure reliability in demanding applications. To accurately assess the hardness of these materials without causing damage, innovative testing methods are required. One such technique is Ultrasonic Contact Impedance (UCI) mobile hardness testing, which provides a reliable, non-destructive way to evaluate ceramics directly on-site.

Application solution

SONODUR 3 uses advanced Ultrasonic Contact Impedance (UCI) technology. Unlike destructive methods, this approach measures hardness by analyzing high-frequency vibrations from an indenter in contact with the material surface. The system calculates precise hardness values (for example in HV, HRC or HB) within seconds while leaving no visible marks – a critical advantage for finished components.

Technical setup

For optimal ceramic hardness testing, the SONO-10H probe (10N force) is ideal for delicate ceramics, while the SONO-50H (50N force) provides better accuracy and repeatability for most technical ceramics.

Challenge

Traditional hardness testing methods, such as Vickers or Brinell, often require large, stationary equipment and can be destructive, making them impractical for finished parts or coatings. Additionally, sample preparation can be time-consuming and testing fragile ceramics risks cracking or surface damage. For on-site inspections, transporting samples to a lab adds cost and delays, making real-time quality control difficult. These limitations can lead to inefficiencies, increased production downtime, and potential failures in critical applications.



Comparable applications

- Industrial ceramics: Quality control for wear-resistant components.
- Medical ceramics: Hardness verification for implants or surgical tools.
- Aerospace: Testing ceramic coatings or heat-resistant parts.

Application tips

- Surface preparation: Ensure samples are clean and smooth for consistent contact.
- Multiple measurements: Test at least 10 points per side to capture hardness distribution.
- Data logging: Use SONODUR 3's storage to track results for quality documentation.
- Calibration: For absolute values, calibrate with a reference material (e.g., Vickers-standardized ceramic).

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