

ADVANCING SHOT PEENING QUALITY CONTROL WITH THE SHOTMETER: A MODERN APPROACH TO INTENSITY MEASUREMENT

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Shot peening is a critical surface treatment process that enhances material properties by inducing compressive residual stress, improving fatigue life, and resistance to stress corrosion. Traditionally, the intensity of the process has been measured using Almen strips, which rely on saturation curves to determine arc heights after peening. While effective, this trial-and-error method is time-intensive, requiring multiple iterations to optimize process parameters. The Shotmeter, a product by Tecnar Automation in collaboration with Progressive Surface, offers a reliable and versatile solution for measuring and controlling shot peening intensity, addressing longstanding challenges in process efficiency and consistency across diverse applications, including aerospace, medical, and automotive industries.

The Shotmeter–G3 system employs a dual fiber-optic device that detects particle flow at two precisely spaced measuring points along the spray stream. Brightness signals detected by a sensor are analyzed through cross-correlation to calculate the time delay between the two points. Since the gap is constant and precisely known, velocity is determined with accuracy within 2%.

This innovative approach complements the use of Almen strips for process control. Velocity measurements can be integrated with multiple systems, enabling seamless process monitoring, parameter adjustment, and data archiving. The Shotmeter provides actionable insights into particle velocity, media flow rates, and their direct correlation to intensity. Through empirical models and machine-specific velocity fingerprints, operators can predict intensity profiles without relying on time-consuming saturation curve development.

In addition to accelerating development, the Shotmeter serves as a robust troubleshooting tool. It facilitates periodic machine health checks by detecting anomalies in velocity profiles, enabling operators to diagnose issues such as nozzle wear or media inconsistencies. In one instance, an aerospace manufacturer resolved production disruptions by identifying faulty Almen strips, leveraging Shotmeter data to isolate the root cause within days rather than weeks.

The Shotmeter supports consistent process quality by providing velocity measurements at specified intervals to ensure compliance with established process limits and prevents defective parts from advancing through production. The system's capability to halt operations and trigger maintenance or quality alerts in case of deviations highlights its role as a critical safeguard in modern manufacturing environments, enabling quality-driven manufacturing practices.

The Shotmeter represents a groundbreaking tool that redefines shot peening by offering precise intensity measurement, rapid process optimization, and reliable performance monitoring. It represents a significant step forward in achieving greater efficiency, accuracy, and quality in surface treatment processes. This advancement not only addresses longstanding challenges but also sets a new standard for the shot peening industry.

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