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New Optical Flatness Measurement by Magnetic Deflection

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The magnetic flatness measurement system enables precise flatness assessment of strip steel, even under high tension, where traditional optical methods fail due to elastic elongation. Unlike conventional flatness measuring rollers, which are costly and offer limited resolution, this system applies a uniform electromagnetic force perpendicular to the strip, inducing a controlled deflection that correlates with local tension. The deflection is measured optically using a Camera Cluster System (CCS) based on laser triangulation.

A production-ready prototype, installed in 2024, successfully measured materials up to 1400 mm wide. The system demonstrated high accuracy in distinguishing different flatness profiles, including sharp edge elongations and uniformly flat materials. To verify its precision, the measurement results were visually confirmed on a flatness inspection table. The system could reliably predict the flatness of each sample, which is manually inspected after every produced strip, proving its effectiveness in real-world production environments.

A key advantage of the system is that it not only detects flatness defects but also confirms the presence of truly flat material—a critical factor for quality assurance and process optimization. Unlike traditional methods that focus solely on defect detection, this system provides a continuous full-strip assessment, ensuring a more comprehensive flatness evaluation.

Additionally, its non-contact operation reduces wear and maintenance compared to mechanical systems, making it a cost-effective and scalable solution. By integrating the system into production lines, manufacturers can achieve real-time flatness classification, optimize upstream processes, and improve overall product quality. This innovative approach enhances industrial flatness measurement, reduces material waste, and ensures higher precision in steel processing.

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