

Integrating AI and connectivity: The Leica TS20's role in evolving monitoring workflows

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SUMMARY

Semi-automated monitoring has become the standard for managing periodic monitoring projects, combining manual expertise with automation in key stages to improve accuracy, save time, and optimise resources. However, in workflows that integrate robotic total stations with in-field monitoring software, challenges such as adverse environmental conditions and limited connectivity have hindered the progression towards greater automation. The Leica TS20 total station, launched in 2025, directly addresses these constraints by introducing edge-AI automation, mobile connectivity, and robust performance under challenging conditions, making a significant advancement in semi-automated monitoring.

This paper explores the Leica TS20's technological innovations and their implications for Leica Geosystems monitoring solutions, with a primary focus on semi-automated monitoring. While the TS20 lacks the dedicated monitoring features of specialised instruments like the Leica TM60, it sets a new benchmark for semi-automated monitoring by integrating edge AI, mobile connectivity, and robust hardware durability. The TS20 is the first total station equipped with a neural processing unit (NPU), enabling edge-AI capabilities such as autonomous workflow optimisation, proactive error detection, and reliable measurements in challenging conditions – key factors for improving monitoring efficiency and accuracy.

Two primary AI features distinguish the TS20 in monitoring applications:

- Automatic identification of prism types prevents configuration errors and ensures consistent data quality.
- Autonomous search, aim, and measuring to targets even in dynamic and adverse environments,

such as dusty or rainy conditions, ensuring reliable and uninterrupted operation.

These capabilities, combined with embedded monitoring-specific software applications, IP66-rated durability, and integrated mobile connectivity via eSIM, enable dual monitoring workflows. The first is an enhanced geodetic semi-automated workflow that collects data efficiently and accurately and integrates seamlessly into an online monitoring platform for improved data visualisation, analysis, and stakeholder accessibility. The second is the novel possibility to augment fully automated monitoring projects by incorporating periodic measurements via cloud-based data transfer, thereby increasing data coverage and redundancy.

By extending the automation in semi-automated workflows and making it possible to blend periodic measurements into fully automated schemes, the Leica TS20 represents a transformative advancement in monitoring applications. Its innovative features and adaptability to challenging environments position it as a pivotal instrument driving progress in geodetic monitoring practices.