

Case study

Optimising process and experience with the Leica Absolute Tracker AT960

BMW Group Plant, Regensburg, Germany



Laser tracker measurement system helps the BMW Group balance costs while maintaining complete confidence in process reliability and product quality. Working at high speed while balancing costs and maintaining complete confidence in process reliability and product quality is critical for a company like the BMW Group. The Leica Absolute Tracker AT960 delivered just that in an environment where anything short of excellence is unacceptable.

The complex and multifaceted nature of automotive manufacturing at the highest level means even the tiniest details are of critical importance. When the BMW Group decided to work with Hexagon Manufacturing Intelligence, the priority lay in finding a new and thoroughly portable measuring system that would improve efficiency, productivity and ease of use.



A key goal for any new system was reducing operation time without sacrificing the precision and accuracy needed to properly identify production defects. Deviations can occur during the assembly of a car body, which is why the whole body must be measured after assembly. Any problem detected can then be passed to the production team so the cause can be addressed and the deviation immediately rectified through future production.

During the course of the plant's daily routine such measurements must be performed across many locations. These include various production areas, where it's vital the alignment of robots, tools and jigs is precise so the fabrication of parts is correct. That means portability that doesn't compromise precision and accuracy is another major concern.

What the metrology experts of the BMW Group plant Regensburg needed was a system that was faster and more portable than what they had in place, but that would still be capable of delivering the precision and accuracy their production line demanded. Their overall user experience and measurement results were in need of a new injection of technological innovation.

The focus of the business' prior research into available metrology solutions was on comparing the functionality of these systems relative to their use on a range of individual automotive components, particularly on the most critical points of the build process. The capacity to deliver accurate measurement was central to this analysis.

It was this focus that informed the decision to opt for a Leica Absolute Tracker AT960 paired with a Leica T-Scan 5 and a Leica T-Probe as the comprehensive solution that best met their needs. With production tolerances of 0.1 mm, a system based around the AT960 stood out for its capacity to deliver on the BMW Group's stringent accuracy requirements.

While the accuracy of the AT960 was a key factor in this decision, also important were the efficiency savings presented by using it together with the Leica T-Scan 5 and Leica T-Probe.

The AT960 and Leica T-Scan 5 work quickly in unison, with the scanner's lightweight, handheld and easilymanoeuvrable design allowing users to save time without losing precision. Simple to install and use, the Leica T-Scan 5 has a number of features designed to improve its operation and results. The user feedback feature with improved dual-colour pilot beam and acoustic feedback combines the most reliable data acquisition with superb user experience.

So efficient is the Leica T-Scan 5, it need only be passed over an area once to obtain the required data. When it comes to scanning a whole car body, these are some of the features that have transformed a once tedious and arduous process into one that is smooth, efficient, stressfree and still remarkably precise.

The many LEDs positioned around the casing of both the Leica T-Scan 5 and Leica T-Probe allow the AT960 to track their movements as easily as a reflector, achieving six instead of just three degrees of freedom. In addition, PowerLock – Hexagon's patented active vision technology – provides intelligent targeting to automatically reestablish an interrupted beam if the connection with the tracker should be momentarily lost due to repositioning, delivering considerable operational time savings. Customisability was another important feature of the setup Hexagon has delivered for the BMW Group. The company decided to employ a setup using red-ring reflectors – cornercube reflectors with a removable ring, hardened steel surface and an optical centring accuracy of +/- $3 \mu m$ (0.00012"). These reflectors can be positioned to conduct static measurements of features that are difficult to manually reach, such as those on the underside of a car body. This sort of functionality has been another excellent driver of increased efficiency as well as practicality for the fixed installations on the platforms in the BMW Group measurement rooms.

The fast relay of data from the Leica T-Scan 5 to the Leica Absolute Tracker AT960 and then from the tracker to the software is a further benefit for the BMW Group's use case. This speed and flexibility means the scanner can be operated at a speed dictated by the user.

Another benefit of the AT960 is that it comes as a completely sealed unit certified to IP54 standard and with integrated environmental monitoring, solving one of the key challenges of maintaining accuracy. Temperature is an important factor in the measuring process for the BMW Group in Regensburg; when the temperature of a car body is too hot, the body expands, and when it's too cold, it contracts, and such changes can affect the accuracy of the readings. The embedded MeteoStation in the AT960 helps control the temperature of the measurement environment as it can be easily programmed to alert users if there's a change in temperature within the measuring room.

When it comes to portability, the AT960 also delivers. Featuring optional battery operation and Wi-Fi as standard, and with a system weight of less than 14 kg, the AT960 can be taken almost anywhere. A further flexible functionality feature of the AT960 is that it can be detached at the base and positioned vertically, horizontally and even hung upside-down as the user requires.

As the AT960 is the most portable system on the market, when paired with the Leica T-Scan 5, the Leica T-Probe and the red-ring reflectors, it delivered exactly what the BMW Group needed to ensure the portable, accurate and fast measurement of gaps, surfaces, drill holes, as well as the alignment of car bodies, components and other large production tools.

After a year of successful operation in Regensburg, the comprehensive metrology system Hexagon delivered has become a major part of everyday life for BMW Group's measurement and inspection team.







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Our technologies are shaping urban and production ecosystems to become increasingly connected and autonomous – ensuring a scalable, sustainable future.

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