



Compact 2D/3D Laser scanners with integrated controller reinvigorate profile measurements

Laser profile scanners — commonly comprised of a sensor, cable and controller — have reached a new technology milestone: a compact scanning device with an integrated controller for profile measurements with high precision. The integration of the controller part inside the sensor housing simplifies cabling arrangements and mechanical operations. More importantly, the integration of all of the electronics inside a compact sensor body makes the installation of 2D and 3D laser scanners much easier, a critical advantage in factory automation, medical production and machine building applications that provide a tiny installation space.

Laser scanners — also known as profile sensors — detect, measure and evaluate profiles on various object surfaces with high precision. Their versatile tasks include measurement and evaluation of angles, steps, distances, extreme values and more.

Compact and lightweight sensors with built-in controllers can better serve manufacturing and robotic applications where absolute precision is imperative in the measurements of tiny structures and small gaps.



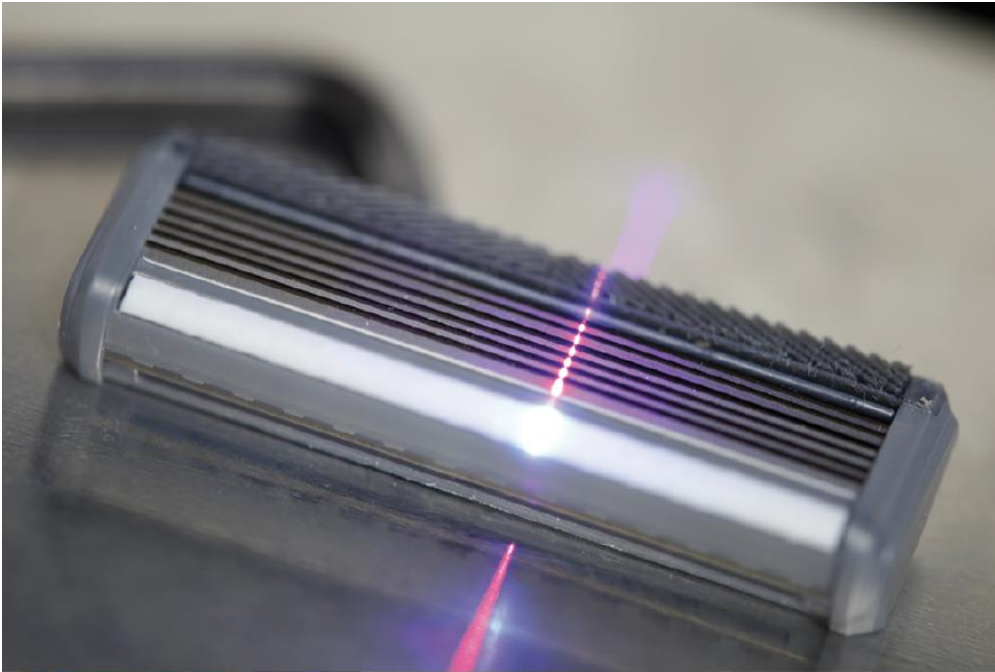
This compact laser profile scanner with integrated controller offers a reference resolution of 1.5 μm .

Why size matters in laser scanners

Traditional laser scanners that use external controllers carry both space and time overhead, a serious shortcoming when they operate on tight measuring locations. On the other hand, a compact sensor featuring integrated evaluations without an external controller or PC can be directly integrated to a PLC.

The new scanCONTROL 30xx laser scanners from Micro-Epsilon offer the highest performance and are used for high speed and precise 2D/3D measurement tasks. Equipped with an internal controller the scanners can be easily integrated in various environments.

Take the example of multi-blade razor production in which all blades must be properly aligned, without protruding blades. Here, measurement objects, in this case, blade points, offer a very small reference surface for angle measurements. So, the scanCONTROL profile sensor with a built-in controller can accurately measure the small reference surface of blade points during production control.



Quality inspection of razor blades with high precision.

Likewise, the medical use cases, such as for insulin pens and pacemakers, demand 100% reliable control, but their smaller housings make precision and detection extremely challenging for conventional measuring systems. Then there is the production of needles where the exact tip angle is critical.

Therefore, when laser profile scanners are tasked with measuring extremely small target objects, a high measurement resolution becomes crucial. When the measurement objects are ultra-small, such as multi-blade razors, laser sensors with integrated signal-processing capabilities bolster both accuracy and profile resolution of the measurement tasks.

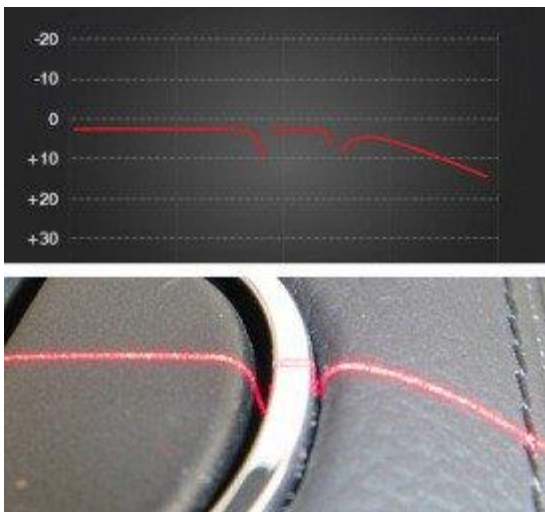
Three operating modes

The plug-and-play solution without an external controller or PC can efficiently handle both simple and complex measurement tasks. Micro-Epsilon's compact scanners allow engineers to choose from three predefined operating modes for their specific measurement task: high-resolution mode for maximum precision; high-speed mode for ultra-fast measurements; and high dynamic range (HDR) mode for optimal profile detection on difficult surfaces.

Start with the high-resolution sensor matrix with 2,048 points that can achieve a point distance of 12 μm . This sets a new standard in terms of profile resolution and paves the way for more reliable

detection of even the finest of details. The industries that demand the highest precision and resolution include electronics, medicine and precision mechanics. In high-speed mode, compact laser scanners can provide calibrated 2D profile data with up to 5.5 million points per second. Their profile frequency of a maximum of 10 kHz enables precise profile measurements in highly dynamic processes.

In industrial automation and robotics, for instance, the highly automated processes demand laser scanners to capture measuring points quicker than traditional scanning applications. Automated systems can employ the measurement data in a digital format made available by the compact scanners and perform the automated correction, control and quality assurance in live processes.



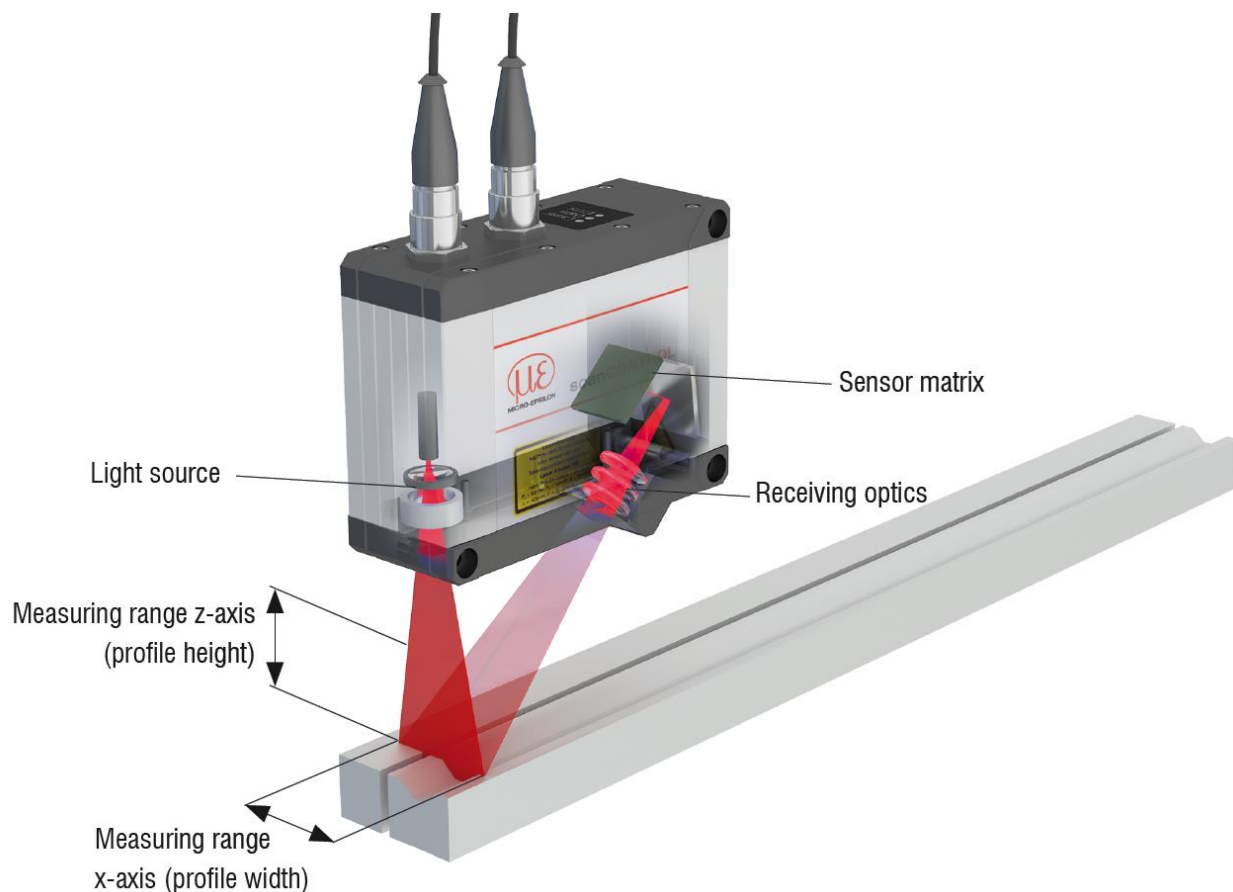
The dynamic range mode allows laser scanners to facilitate accurate measurements, even on inhomogeneous surfaces.

Next, for inhomogeneous or dark surfaces, the sensors employ HDR data acquisition and an improved form of auto exposure to optimize the measurement results. In HDR mode, the rows of the sensor matrix are exposed simultaneously without time offset, which facilitates highly reliable detection of rapidly moving objects.

Real-time surface compensation is another important feature; it allows laser sensors to measure reliably under rapidly changing conditions. The sensor rapidly adapts to the exposure time and threshold of reflection detection in real-time to ensure stable measurement results. Also, the auto exposure feature enables engineers to individually select the areas to be exposed.

How laser scanners work

The [scanCONTROL 30xx](#) laser scanners from Micro-Epsilon embody the resolution, speed and dynamic range characteristics outlined in the above section. A compact size combined with higher resolution allows the scanCONTROL 30xx family of sensors to reach new dimensions in quality control.



The scanCONTROL 30xx profile sensors with integrated signal processors and optical components project an enlarged laser beam onto the target surface.

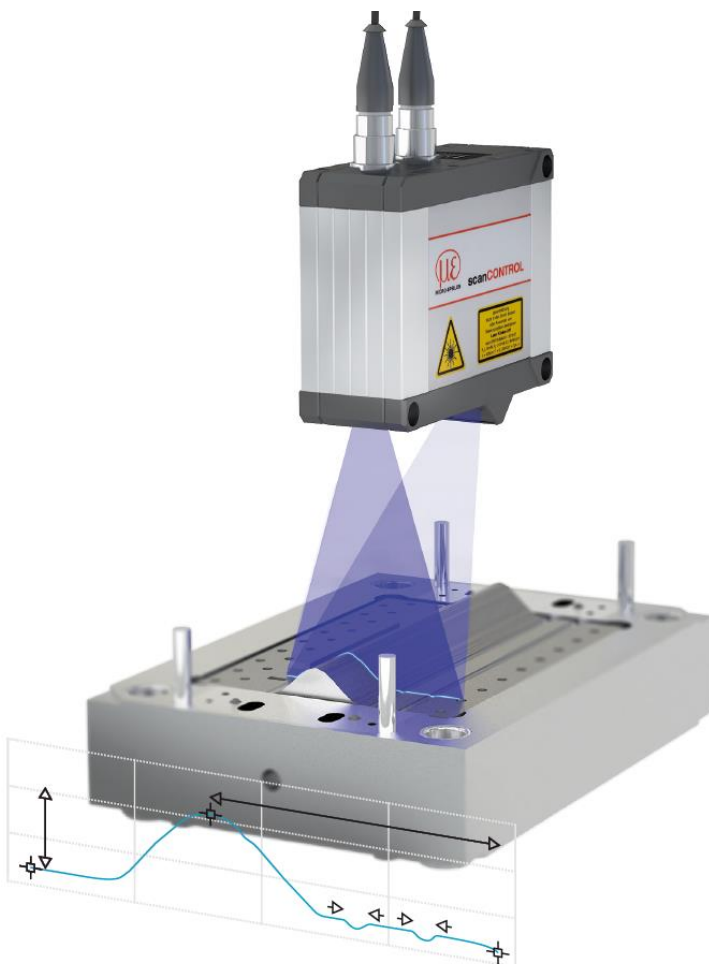
Its high measurement precision also allows the profile sensor to measure extremely small target objects such as adhesive beading in smartphone housing. A pacemaker the size of two-euro coins is another use case that requires geometrical inspection of any leakage and can benefit from a compact sensing device performing highly accurate dimensional measurements.

The scanCONTROL 30xx sensors measuring 96 mm x 112 mm x 40 mm can be easily integrated into various environments. These compact and lightweight sensors allow several interfaces to output the measured data directly, e.g. Ethernet, PROFINET, Ethernet/IP and EtherCAT links. Here, the [scanCONTROL Configuration Tools](#) software enables engineers to deliver direct measurement results without using an additional computer or controller.

The scanCONTROL 30xx sensors operate according to the international GigE Vision standard, which allows them to be integrated into industrial image processing systems. Additionally, the sensor can autonomously execute several measuring programs in parallel while delivering different measurement results per profile.

The available interfaces further enhance the integration of laser scanners in industrial and manufacturing environments. Moreover, for multi-scanner applications comprising an array of sensors, interface modules are available.

In addition to the red standard laser, the scanCONTROL 3000 is available with Blue Laser Technology for measurements on demanding surfaces, like red-glowing steel or transparent plastics.



Blue Laser Technology: Micro-Epsilon holds a patent for measurements with blue lasers on red-hot glowing objects exceeding 700 °C and (semi-)transparent objects such as plastics, glass, adhesives, silicones, paints and seals.

Micro-Epsilon

The scanCONTROL 30xx laser scanners are based on the proprietary technology of Micro-Epsilon.

Micro-Epsilon plays a leading role in measurement technology. For more than 50 years, the company has offered reliable, high performance, unique solutions whenever high precision measurement or inspection is required. Its product range covers sensors to measure distance and displacement, sensors for IR temperature measurement and color detection, as well as systems for dimensional measurement and defect detection.

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