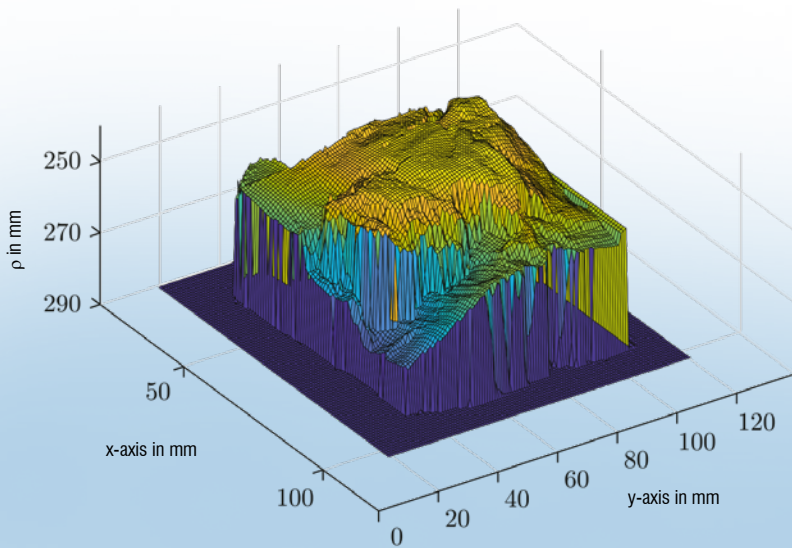




High resolution depth mapping of organic material

Laser profile scanners from Micro-Epsilon perform true 3D measurements based on calibrated data. They are therefore versatile in numerous applications.

The future in 3D

TU-Darmstadt is already taking advantage of these diverse opportunities. The powerful 3D sensors of the scanCONTROL 2900 series perform high-resolution measurements of muscle mass or bones in combination with camera systems. This is a completely new approach in the field of microsurgery. With the additional data obtained from the laser profile scanner, statements about the topology of the organic material are derived. This additional knowledge will enable computer-based assistance systems to provide better support during operations in the future.

For optimal measurement of organic material, Micro-Epsilon offers the patented Blue Laser technology. With blue laser, significantly more precise measurement values can be generated on organic materials than would be possible with red laser. In addition, since the measurements are non-contact, no influence is exerted on the measured object. Per profile, the fully integrated sensor delivers a resolution of 1,280 points in the x-axis direction. An additional linear guide moves the sensor in the y-axis direction so that the generated profiles can be lined up and a 3D point cloud is created. This guide is integrated into the customer software via freely available integration packages (LLT.DLL) and evaluated there.

Requirements for the measurement system

- Large measuring range: 100 mm
- High z-axis resolution: 12 μm
- 1,280 measuring points/profile
- Profile frequency of up to 300 Hz
- Organic material: muscle tissue, bones

Ambient conditions

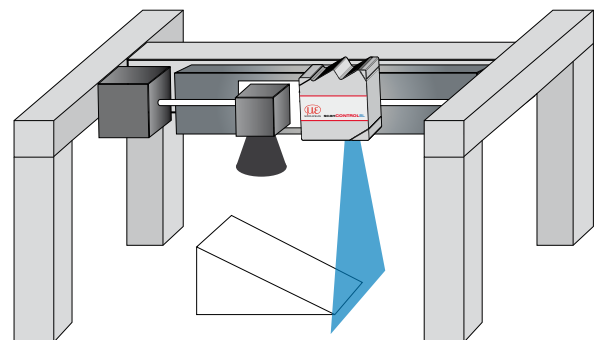
- Clean environment (surgical area)

System design

- scanCONTROL 2900-100/BL
- Customer side: camera and linear axis

Advantages

- Profile data increase informative value of a conventional 2D camera image
- High-resolution height information enables visualization of the actual surface structure
- Blue laser optimizes measurement result and protects the organic target



Sources: S. Babilon, P. Myland, L. Schlestein, J. Klabes, T. Q. Khanh. High-resolution depth measurements in digital microscopic surgery. Engineering Reports 3(4), e12311, 2020, <https://doi.org/10.1002/eng2.12311>.