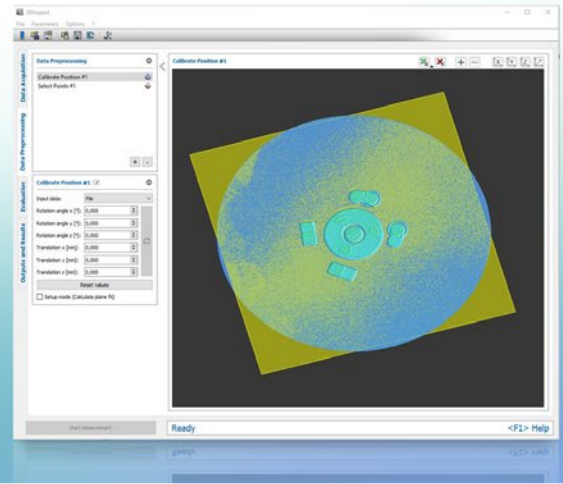




3D inspection of unpopulated printed circuit boards

Printed circuit boards are integrated in electrical devices such as sensors, smartphones or computers. Unpopulated printed circuit board substrates serve as basic elements for this. Due to the high quality requirements that apply to substrate production, 100% control by high-precision measuring sensors is necessary. If, for example, the evenness of the substrate does not meet the specifications, assemblies cannot be placed exactly during assembly. For high-end ceramic substrates, the highest measurement accuracy requirements of up to $2\text{ }\mu\text{m}$ apply.

Conventional inspection systems such as measuring microscopes are not suitable as an automated inline solution because the inspection process takes a long time and these microscopes are very expensive. Therefore, 3D sensors from Micro-Epsilon are used to enable fully automated inline inspection of the substrates.

The high-precision 3D snapshot sensor surfaceCONTROL 3D 3510 measures directly in the production line on the matt surface of the substrates. The working distance is 120 to 140 mm. The recorded measurement values are calculated in the sensor and output to an external PC via the integrated Gigabit Ethernet interface. Further processing, evaluation and logging of the 3D data is possible with the powerful 3DInspect software.

The evaluated data is transferred via Modbus to the 2D/3D gateway from Micro-Epsilon, which receives the signal and forwards it via EtherCAT to the control unit of the conveyor belt. If defects are detected on the substrates, the control unit automatically sorts out the bad parts.

With the surfaceCONTROL 3D 3510 3D snapshot sensor for geometry, shape and surface measurements, fully automated inspection is possible without manual insertion of the parts by a production worker.

The sensor achieves best measurement results on matt objects with a repeatability of up to $0.4\text{ }\mu\text{m}$. A measurement with subsequent calculation and evaluation takes only 1.5 seconds. The housing is IP67 certified for industrial applications.

Requirements for the measurement system

- Component size: 40 mm diameter
- Measurement accuracy: flatness from $2\text{ }\mu\text{m}$
- Measuring time incl. evaluation: < 2 s

Ambient conditions

- Temperature range: $-2\text{ }^{\circ}\text{C}$... $+22\text{ }^{\circ}\text{C}$
- Air-conditioned room

System design

- surfaceCONTROL 3D 3510-80 sensor
- 2D/3D Gateway
- 3DInspect software

Advantages

- Fast and accurate flatness measurement in 2 seconds cycle
- Highest repeatability in the submicrometer range
- 100% inline inspection
- Intuitive 3DInspect software with "Contourfit" measuring program
- Fully integrated industry sensor (IP67)