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Fast and Precise Large Area Topology Measurements Using Laser Distance Sensors

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Novel developments in particle detector technology require fast and precise methods to measure large area topologies in the order of a few square meters.

A standard method is a tactile coordinate measurement system. With such a system resolutions of better 10 μm are achievable but with relatively long duration of several hours for one cycle. Sensitive structures may be damaged.

We present a method using a non tactile laser distance sensor. Such a device is able to scan surfaces very fast without touching the surface. The presented device has a special measurement mode, enabling it to measure semitransparent surfaces.

The vertical translator to mount the sensor is able to move in sub mm steps. Using this we are able to measure the position and height of copper on FR4 with an accuracy below 10 μm .

This technology can be used in nearly every field where a fast topology scan of large areas is required.

We report on the performance of the sensor scanning non transparent as well as semitransparent surfaces. This includes studies to minimise the measurement duration without a loss in the resolution. Our method to calibrate our measurement system will also be shown. This calibration is needed to reach a resolution below 10 μm .

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