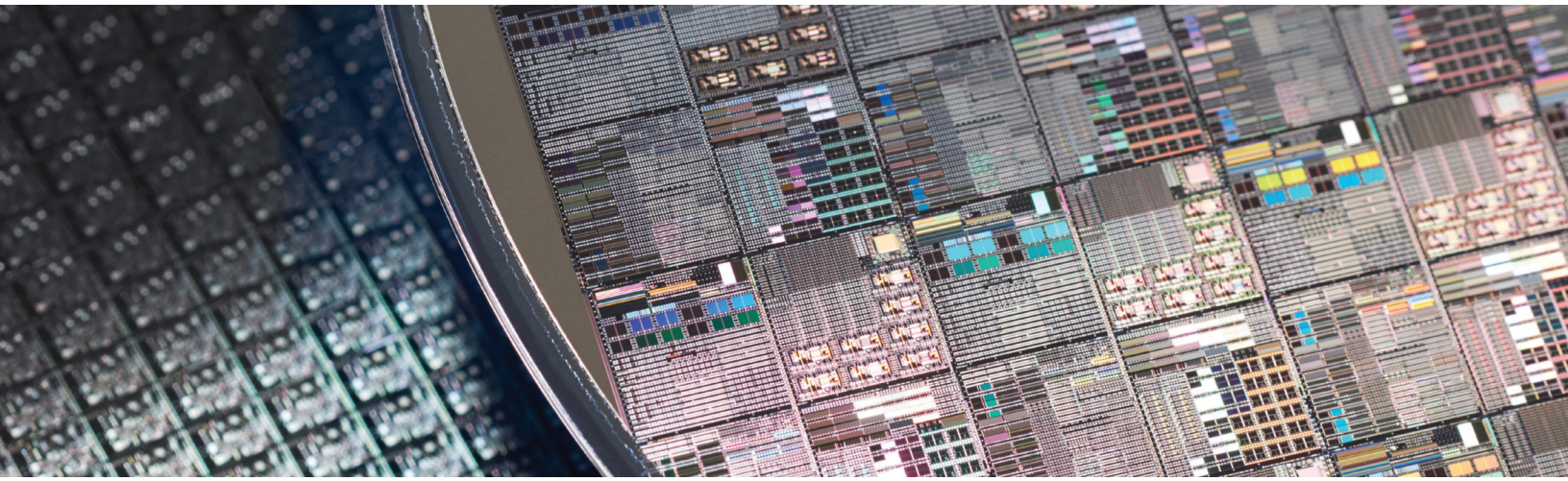
LION PRECISION

SEMICONDUCTOR CASE STUDY



THE BENEFITS

6 Seconds/Cycle Savings

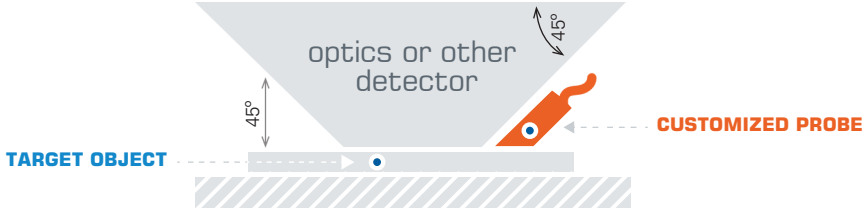
Improving Focus Speed

Z-HEIGHT MEASUREMENT FOR SCANNING ELECTRON MICROSCOPES

The Problem

A Semiconductor Inspection Tool manufacturer was using a scanning electron microscope to identify defects on silicon wafers during the production process. They needed a fast reliable way to position the microscope at the proper focal length above the wafer. The tool is in continuous operation so they need to do this as quickly as possible to increase throughput and maximize profit.

A Scanning Electron Microscope (SEM) is a type of microscope that produces images of a sample by scanning the surface with a focused beam of electrons. The electrons interact with atoms in the sample, producing a signal that contains various information about the sample's surface topography and composition. The electron beam is scanned in a raster scan pattern, and the beam's position is combined with the detected signal to produce an image. SEM can achieve resolution better than 1 nanometer. Specimens can be observed in high vacuum in conventional SEM, or in low vacuum or wet conditions in variable pressure or environmental SEM, and at a wide range of cryogenic or elevated temperatures with specialized instruments. The customer was looking for a faster way to complete the inspection process in their application.



THE SOLUTION

CPL290 Driver

C9.5-5.6S Probe

DOWNLOADS

Z-Height Detection for Backside Semiconductor Wafer Inspection

Semi Silicon Wafer Thickness

Z-Height White Paper

Capacitive Sensor Operation & Optimization

Why Lion Precision

For over 30 years Lion Precision has been supplying non-contact capacitive displacement measurement systems for precise measurements to the industry. Their high bandwidth, nanometer resolution and vacuum compatibility combined with very high reliability and custom design capability made the Lion Precision capacitive system the best choice for this measurement.

The Process

The customer specifically came to Lion Precision to provide them an integrated sensor solution that allowed the optical head of the electron microscope to be quickly moved into its focal range over the wafer. Lion Precision developed a custom capacitive probe with a 45° surface in order to fit the available space. The probe was encapsulated in PEEK (a plastic insulating material) to improve reliability and prevent charging issues in the vacuum chamber. The capacitive driver was optimized to allow on/off switching within 1 ms. The dual range option on the driver allowed for the microscope to be positioned at two different heights. The system was supplied for a HV (high vacuum 10-6 torr) environment with a vacuum feed-through and LEMO connectors. A capacitive probe was mounted on the side of the electron microscope optics. As the microscope head is moved down in the Z direction the cap sensor measurement is used to quickly move it into its focal range above the wafer. Then the final (fine) focus of the electron microscope is achieved.

The Solution

Lion Precision utilized a vacuum compatible capacitive probe customized to a 45 degree angle, and CPL290 driver. This product met both the space constraints of the space the probe needed to fit in as well as vacuum compatibility. The CPL290 was selected for its multi-range and high resolution capability.

The Benefit

The Customer saves about 6 seconds per cycle of operation when using a capacitive sensor to quickly focus the electron microscope onto a wafer. The electron microscope is used to locate and correct surface defects. Since these platforms are in operation 24/7, this results in a significant time savings. This in turn allows more wafer throughput and generates more revenue per hour.

Customization

Lion Precision understands that our customers have unique high precision applications with difficult to achieve performance specifications. As a result we work closely with each customer to ensure they get a solution to meet their application needs. It is why more than 60% of our products are customized. It is also why we have built our team around quickly responding and servicing these custom niche applications. Please give us a call let's discuss your specific needs.

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