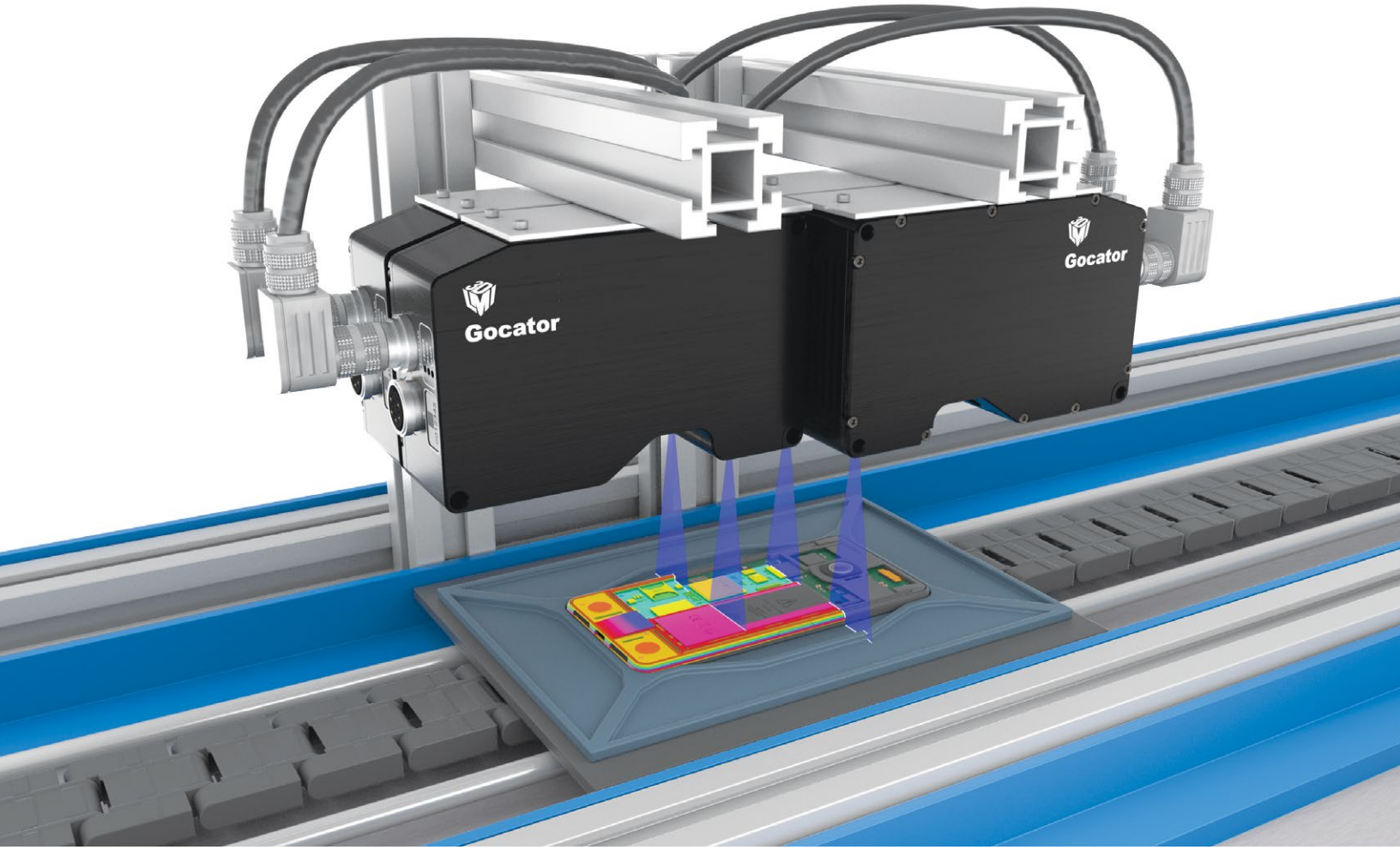
LMI TECHNOLOGIES

FactorySmart® Inspection




# A PROVEN LEADER IN 3D SCANNING AND INSPECTION

## FOR THE CONSUMER ELECTRONICS INDUSTRY

Gocator®

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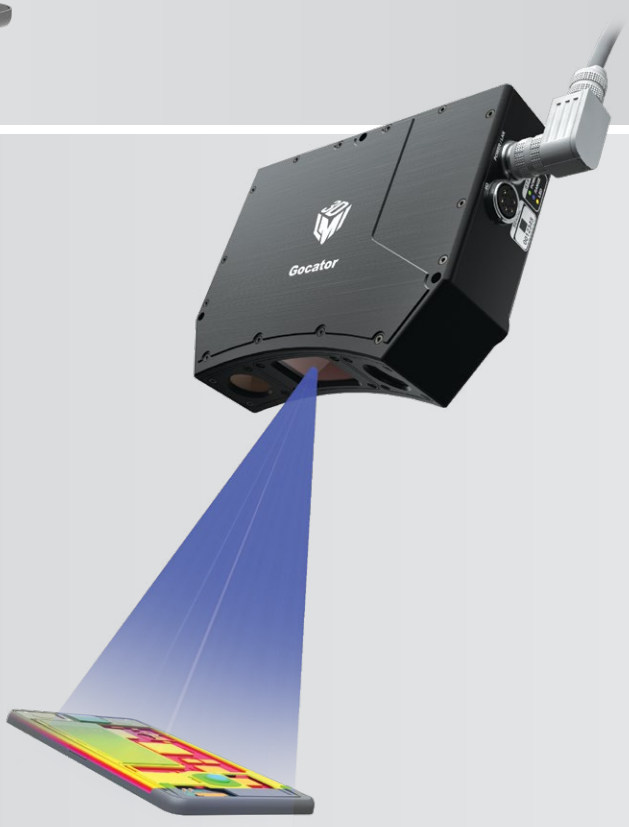
# TWO TRUSTED 3D TECHNOLOGIES FOR INLINE ELECTRONICS INSPECTION


LASER PROFILERS

SNAPSHOT SENSORS



# THE CHALLENGES IN CONSUMER ELECTRONICS (CE) INSPECTION

Inline systems present a number of challenges for quality control in the consumer electronics (CE) industry. The factory processes in these systems require an advanced 3D machine vision solution to maximize efficiency, lower cost, and increase yield.


- Fast production rates demand high-speed quality control
- Subtle variations in light uniformity affect results
- Challenging surfaces (shiny, reflective) require high-sensitivity measurement systems
- Presence of products with complex shapes requires maximum scan coverage

# ACHIEVE YOUR MANUFACTURING GOALS

Gocator® makes your electronics manufacturing smart.

## Smart manufacturing means to:

» Speed up cycle times

» Operate more efficiently

» Get products to market faster and more profitably

» Reduce waste/rework of parts

» Minimize product recalls

» Increase manufacturing flexibility

# GOCATOR® FOR SMART CE INSPECTION

Gocator 3D smart sensors provide a complete solution for 3D scanning, measurement, and control in consumer electronics manufacturing applications.

### From Physical to Digital

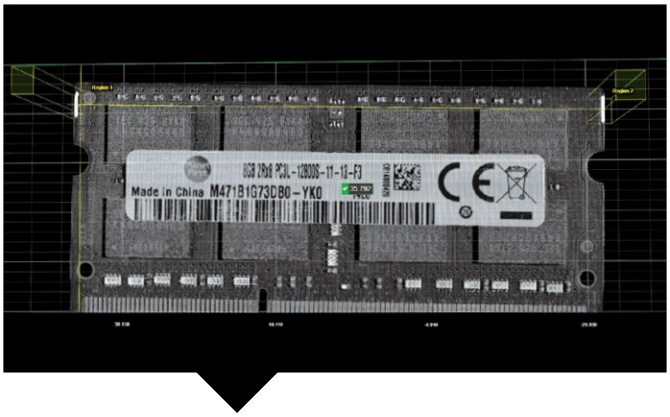
Gocator scans physical targets and digitizes them into 3D. This allows manufacturers to make measurements in the digital realm, execute control decisions, and achieve high quality outcomes in the factory.

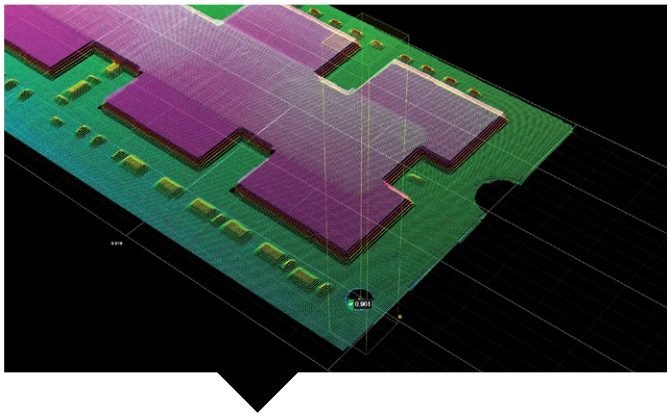
### Quality Control Decision-Making

Gocator makes critical pass/fail decisions and communicates this directly to factory networks and equipment—all within a single package, and all at production speed.

## Critical Gocator Features for CE Inspection

- High speed
- High X resolution
- Small form factor
- Integrated data processing
- Onboard software and built-in measurement tools



# REALIZE THE BENEFITS OF SMART 3D

Gocator makes manufacturing FactorySmart®.

## Complete 3D Inspection. Built-In.

Inspection is a multi-step process. First, the target is digitized in 3D. Then it's measured to verify critical tolerances are met. Finally a control decision is communicated—either to a robot, PLC, or factory process control monitoring systems. Gocator is smart because all of these capabilities are onboard, which minimizes system cost and complexity and helps manufacturers achieve their goals.

## Web-Based User Interface

Gocator offers an easy-to-use web-based user interface that requires no special training. Simply open your favorite web browser to access and control the Gocator, and communicate directly to factory equipment. Leverage a point-and-click design with effective 3D visualization using responsive pan, zoom, and rotate navigation.

## Network Connected

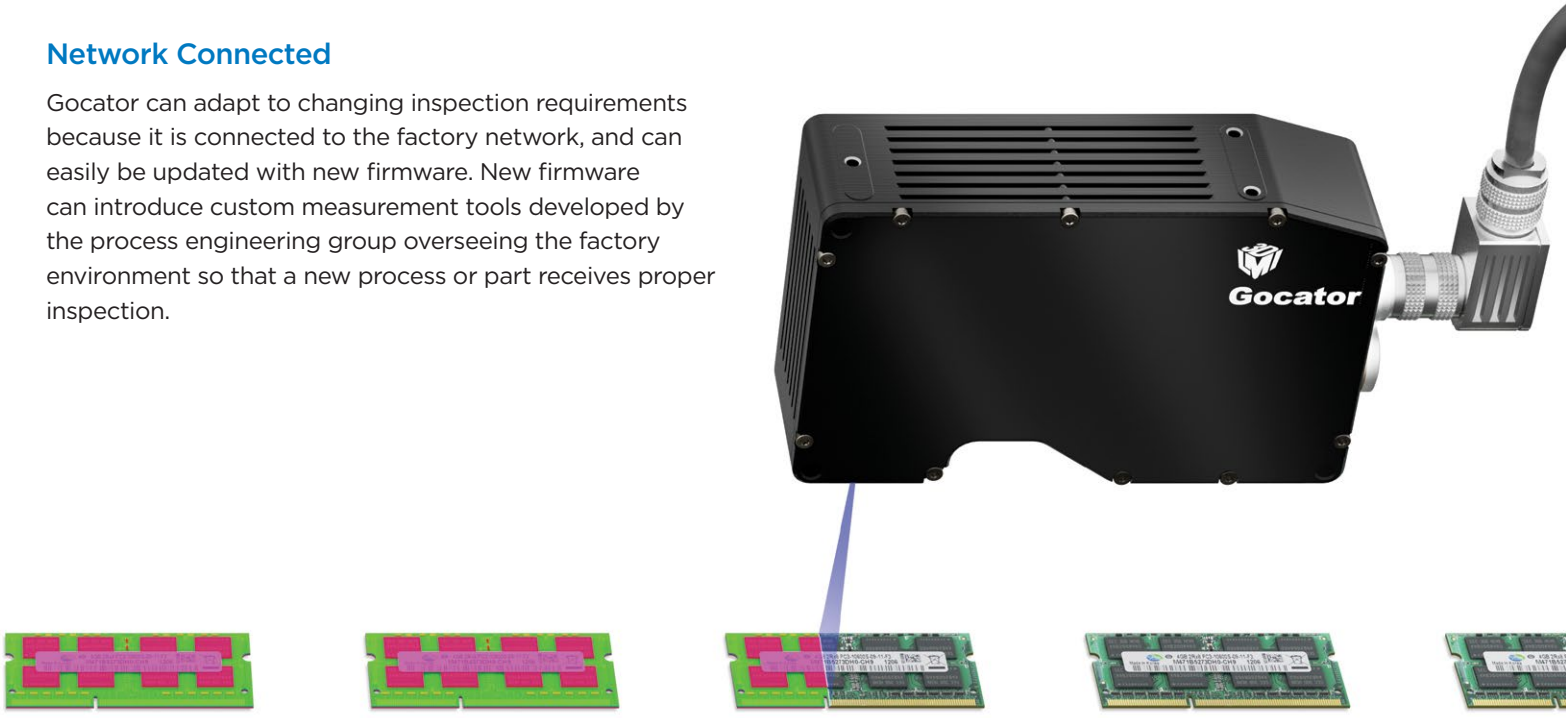
Gocator can adapt to changing inspection requirements because it is connected to the factory network, and can easily be updated with new firmware. New firmware can introduce custom measurement tools developed by the process engineering group overseeing the factory environment so that a new process or part receives proper inspection.

## Robot-Friendly

Gocator offers built-in support to work with robots directly and enable a fully functional multi-model production line to work at a much faster, more efficient pace than traditional single-model assembly lines.

## Flexible Design for Multi-Model Production

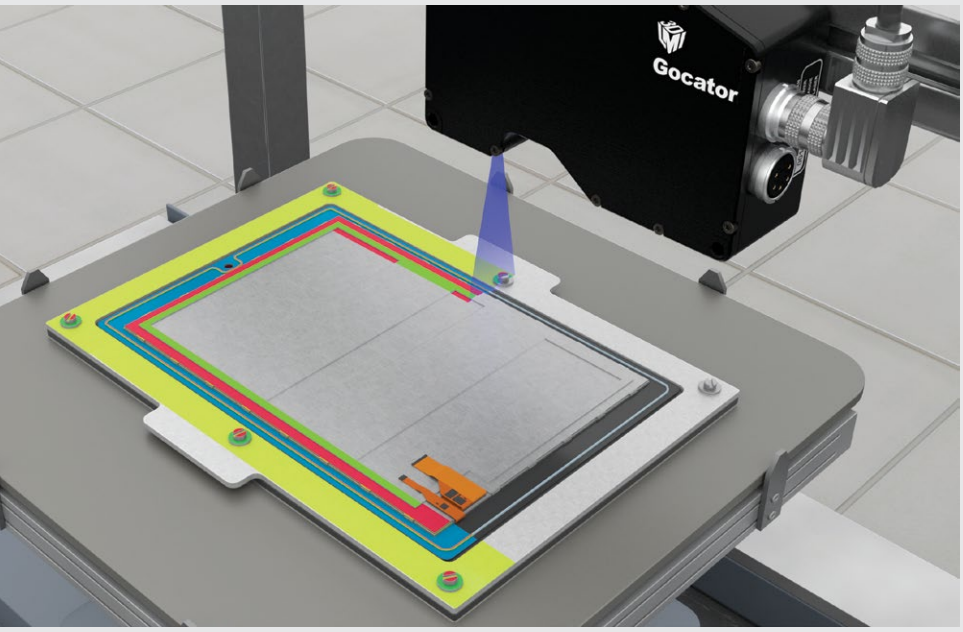
Gocator 3D smart sensors can be "reprogrammed" on-the-fly by loading different "job" files that correspond to each model in a multi-model production line. A job file contains the specific settings for measurements, exposures, and pass/fail criteria.

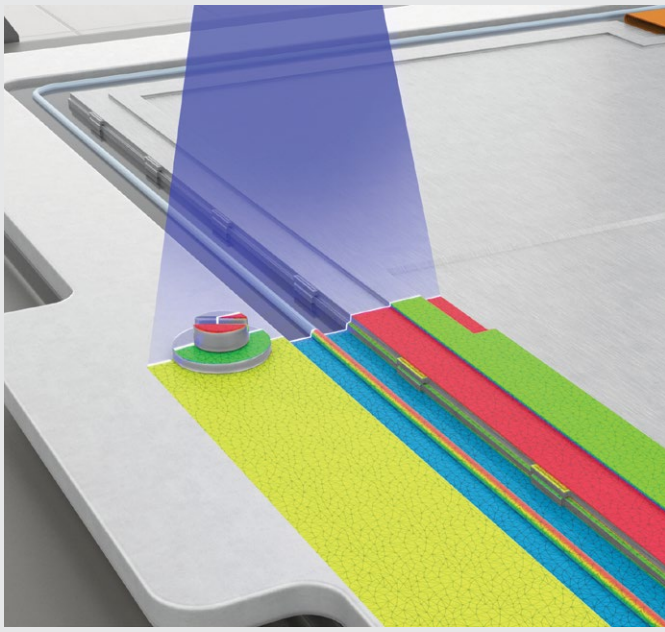


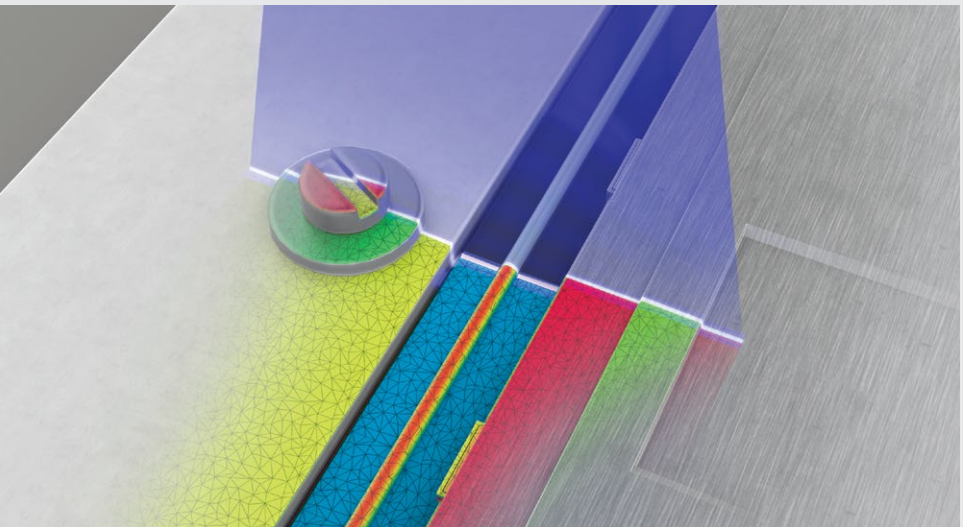
# PRE-ASSEMBLY INSPECTION

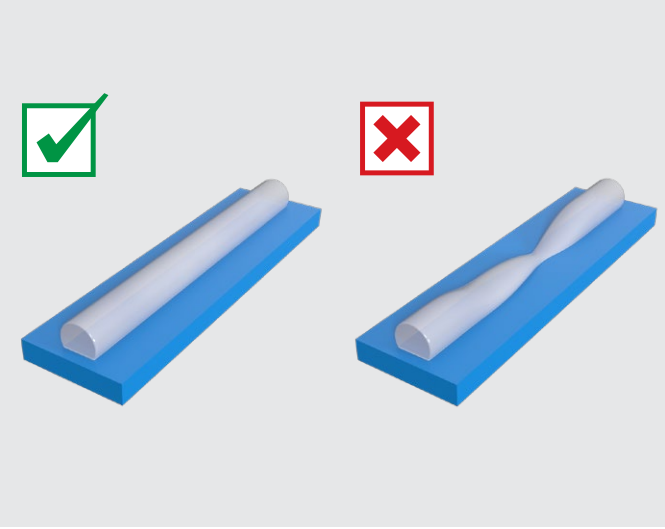
Gocator

## **Glue Bead Volume and Uniformity** Inspection







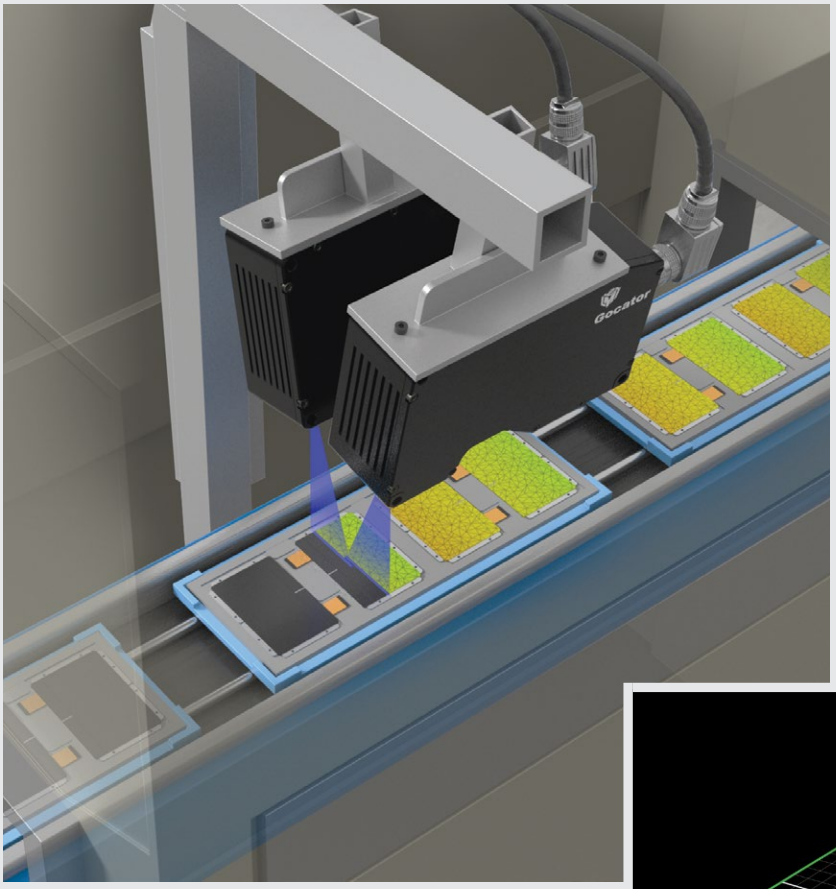
### Effectively scan different surface material finishes with ease.

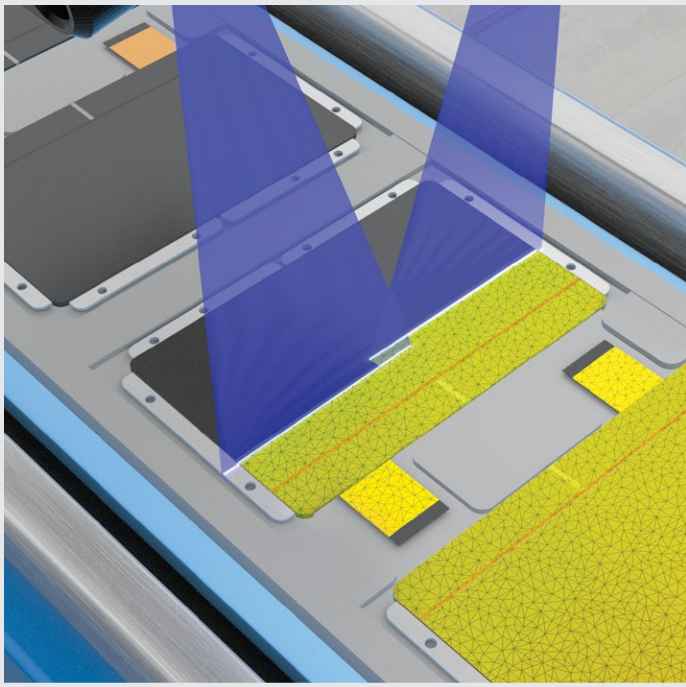
A Gocator 2420 sensor is used to scan the glue bead along the surface of a tablet touch panel. Correct bead volume and uniformity is critical for ensuring an IP67-rating and a secure bond between components.

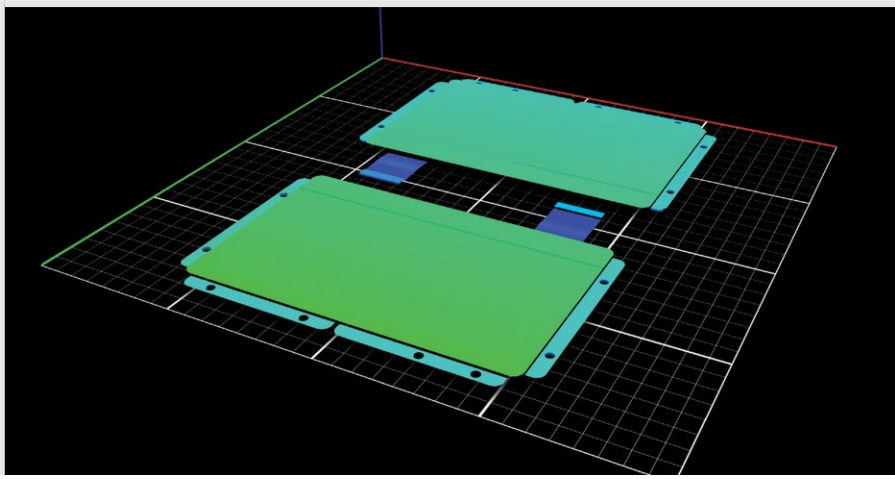
# PRE-ASSEMBLY INSPECTION

Gocator

## **Trackpad Flatness** Inspection





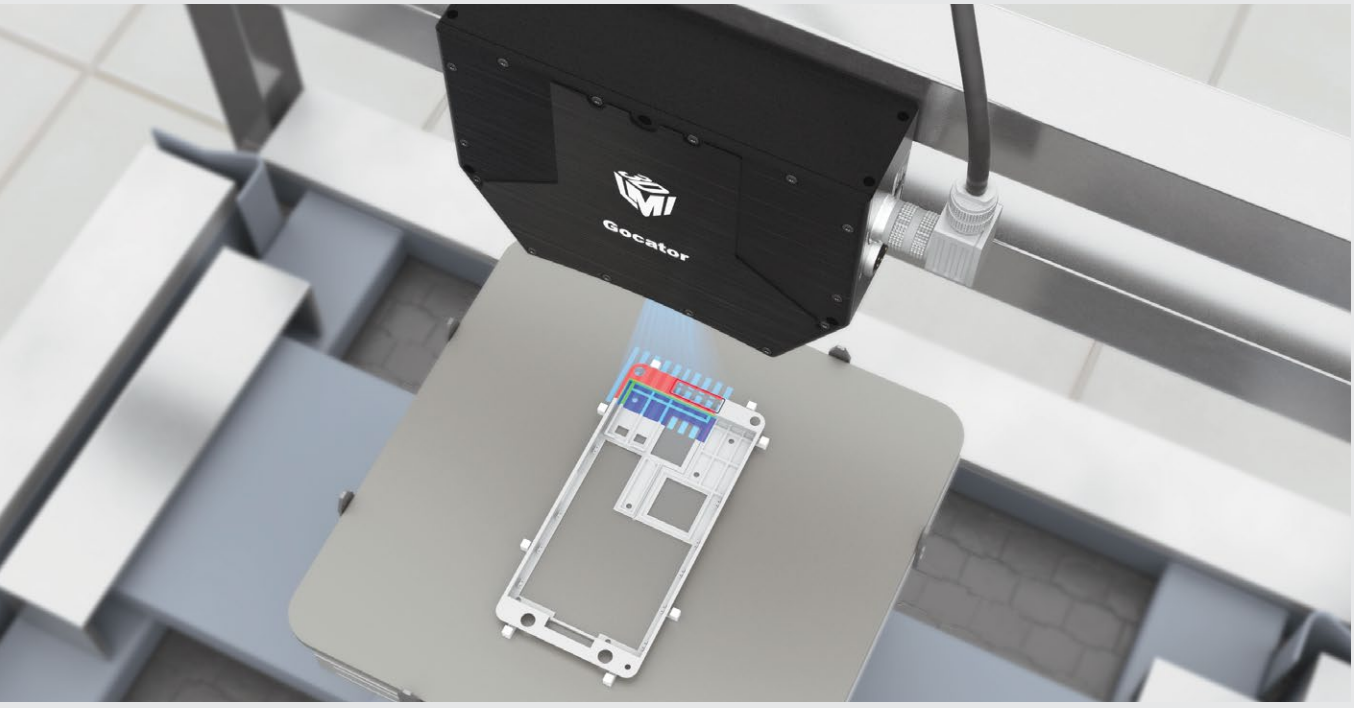
**Simple and intuitive multi-sensor setups minimize occlusion, with automatic alignment that stitches data from multiple sensors into a single 3D scan.**

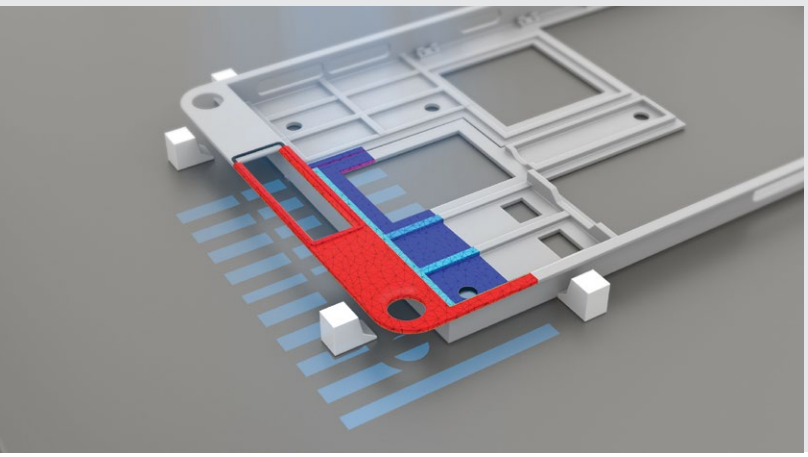
Two Gocator 2420 sensors scan a trackpad to ensure the surface is flush (both pre- and post-assembly).

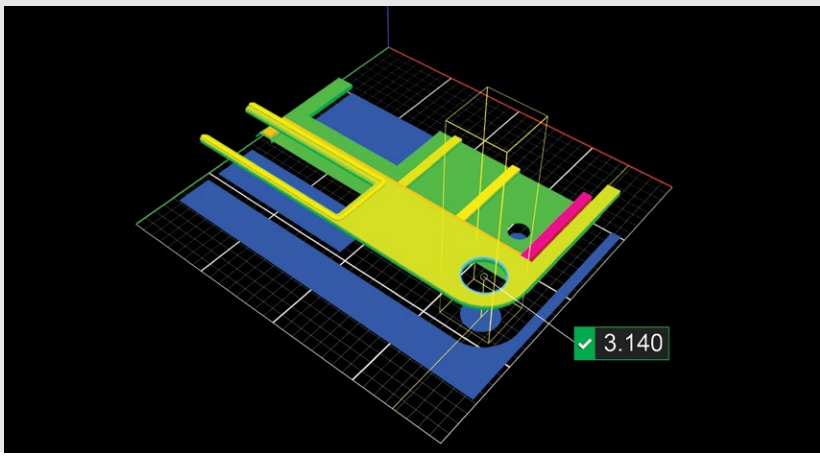
# PRE-ASSEMBLY INSPECTION

Gocator

## **Cell Phone Housing Hole** Inspection





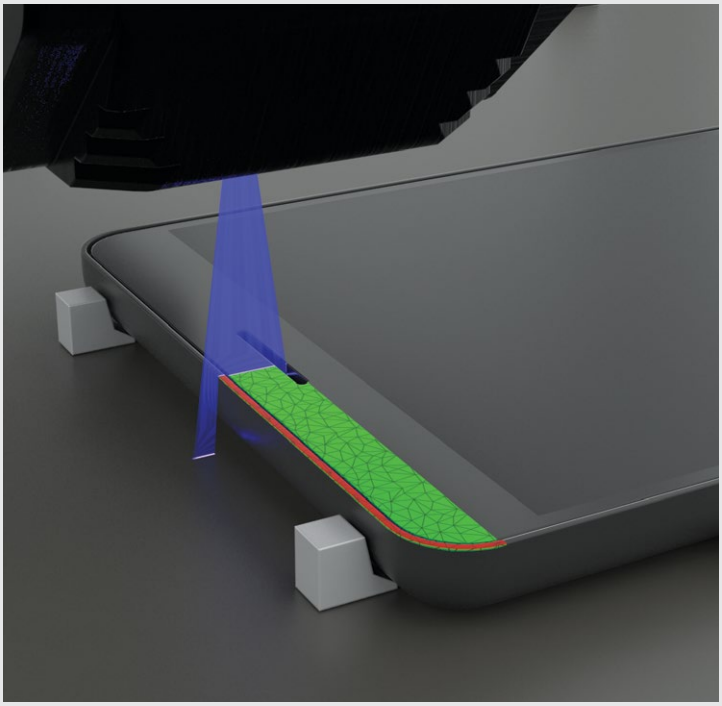

### Scan multiple features in a single snapshot and apply built-in 3D measurement tools for easy inspection.

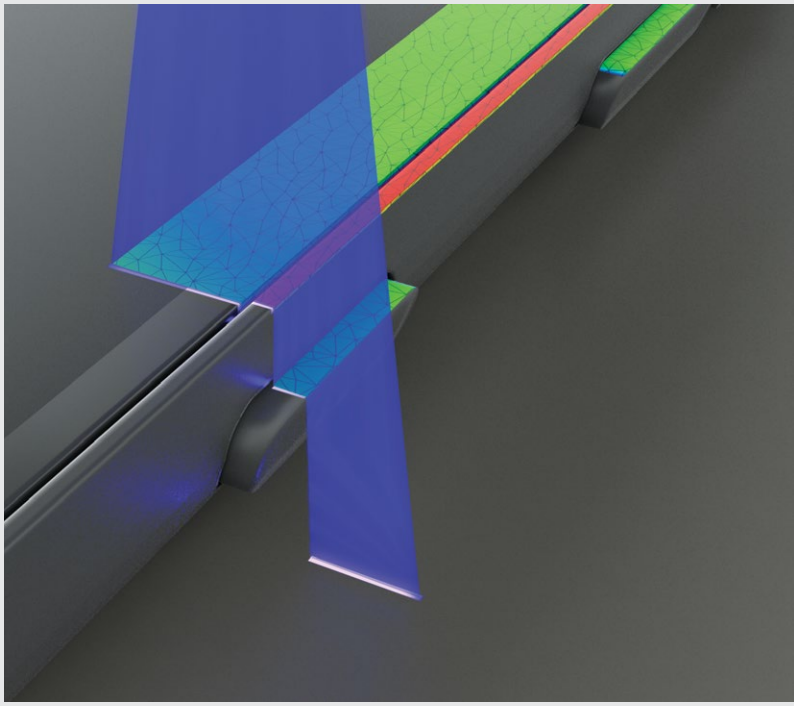
Gocator inspects the size of the holes in a plastic electronics part on a cellphone midplate. A single midplate travels on a motion slider that transports the part under the sensor FOV to take multiple exposures.

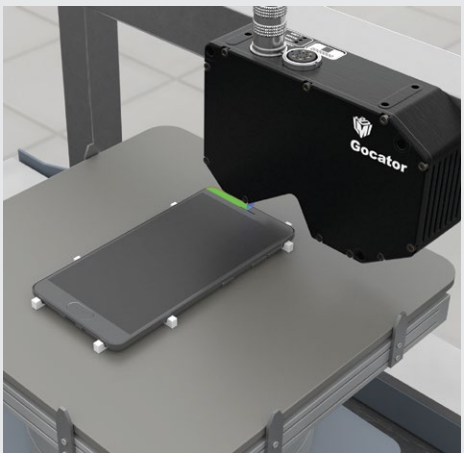
# COMPONENT ASSEMBLY INSPECTION

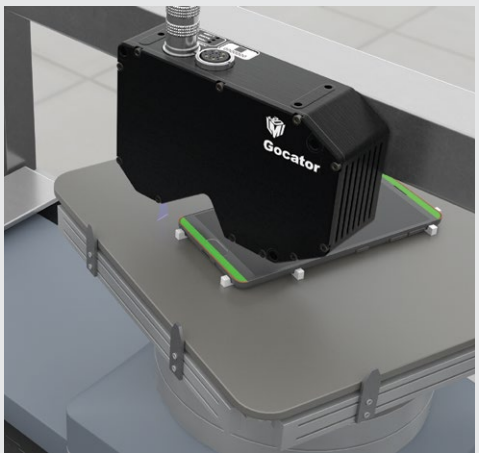
Gocator

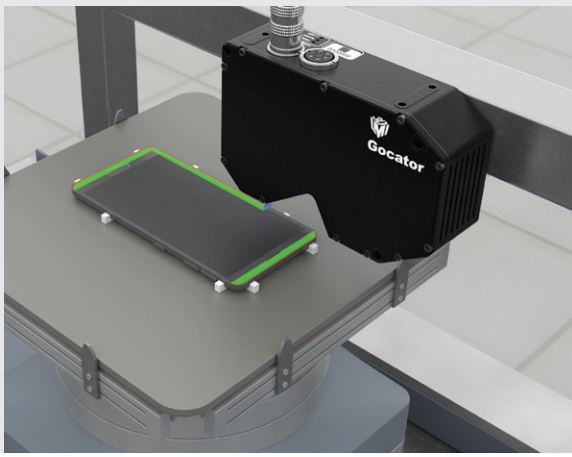
## **Cell Phone Glass/Bezel Gap & Flush** Inspection







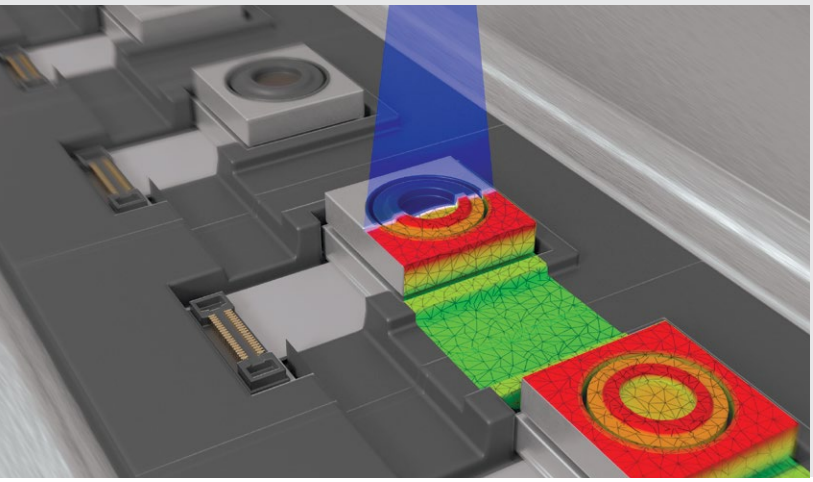

### Scan shiny/reflective surfaces, with high repeatability to within 0.2 µm.

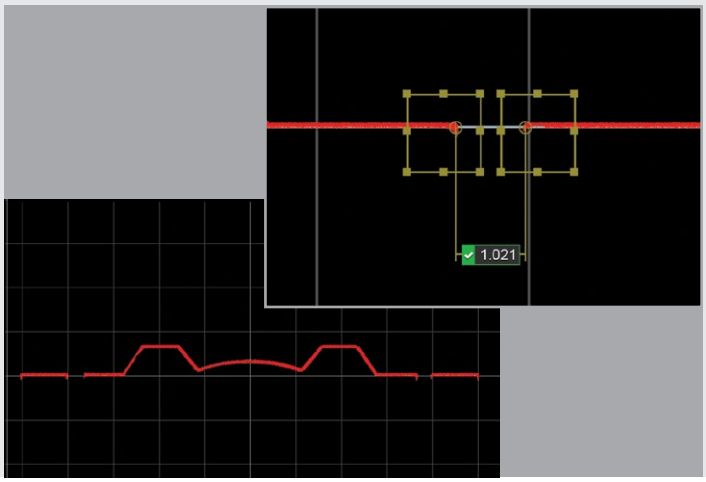
A Gocator 2410 scans and measures the edges between the glass and the screen of the cell phone assembly. A slider rotates the phone, and the sensor inspects all four edges.

# COMPONENT ASSEMBLY INSPECTION

Gocator

## **Cell Phone Camera** Inspection



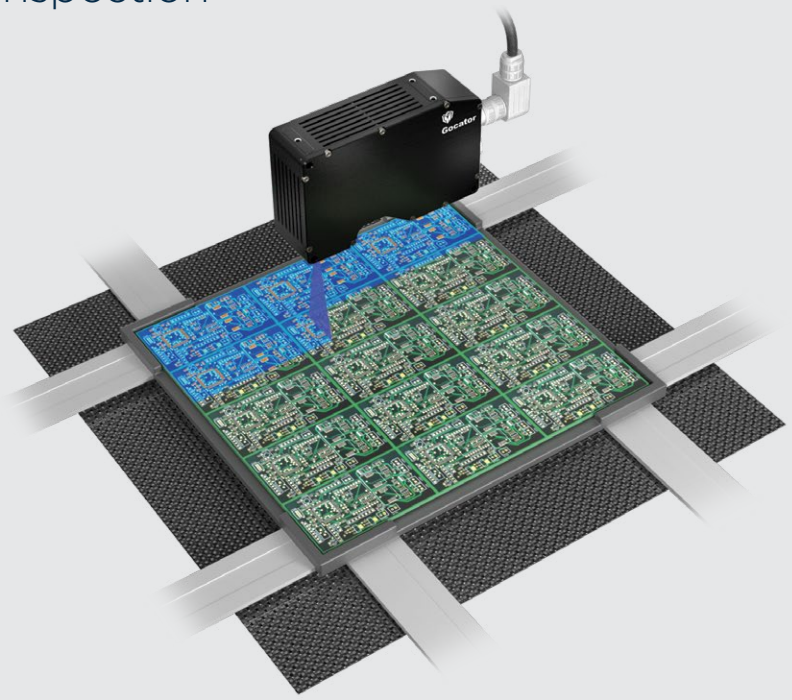

**Best-in-class 6 µm X resolution with 0.2 µm Z repeatability for inspecting the smallest features.**

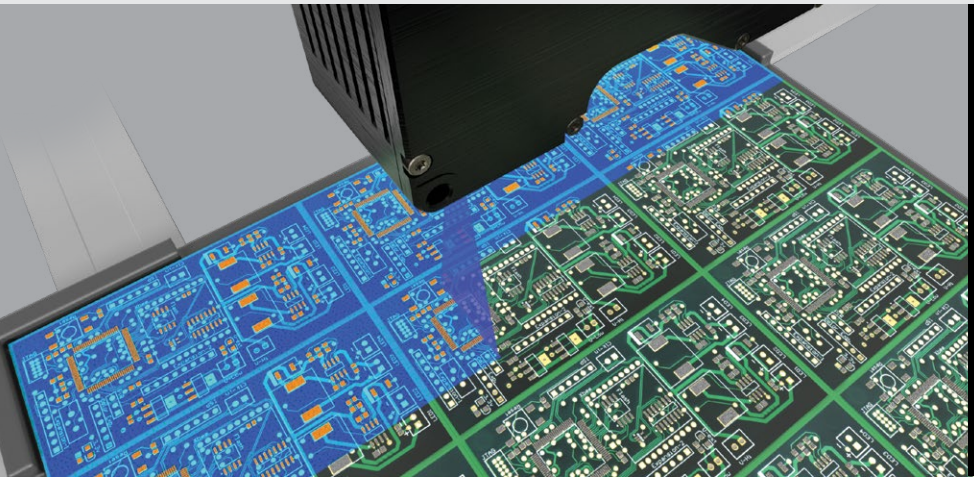
Gocator 2410 scans assembled cell phone camera modules to determine whether the lens assembly has been correctly centered in all axes.

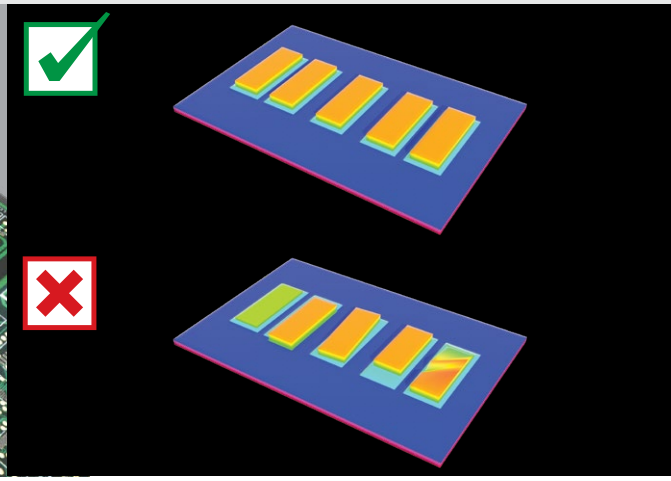
# COMPONENT ASSEMBLY INSPECTION

Gocator

## **Solder Paste** Inspection



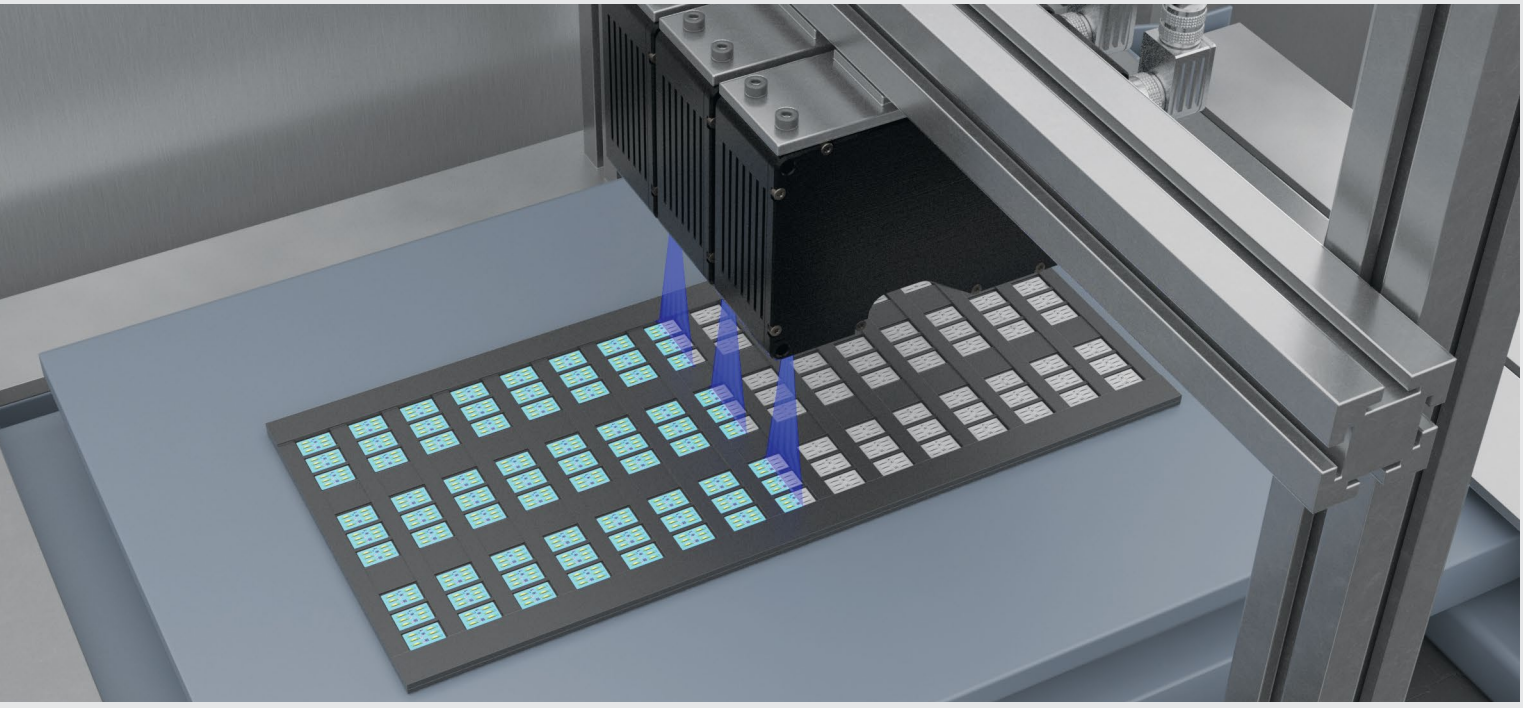


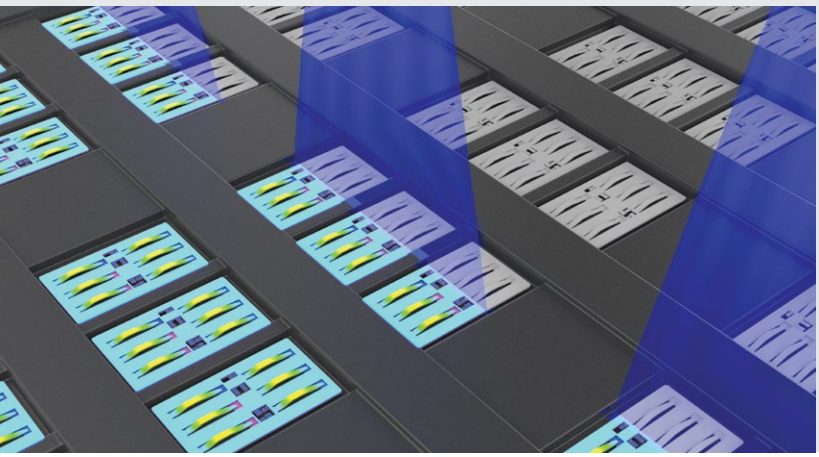


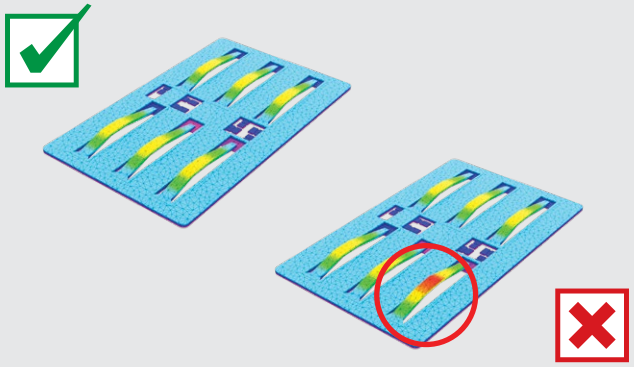
### Real-time, low-latency onboard processing for faster inspection cycle times.

Gocator 2410 scans the surface of PCBs to measure the correct height and positioning of the applied solder paste. The sensor also verifies that there are no breaks in the paste, and that it fully covers the contact surface.

## **Nano-SIM Connector Pin** Inspection







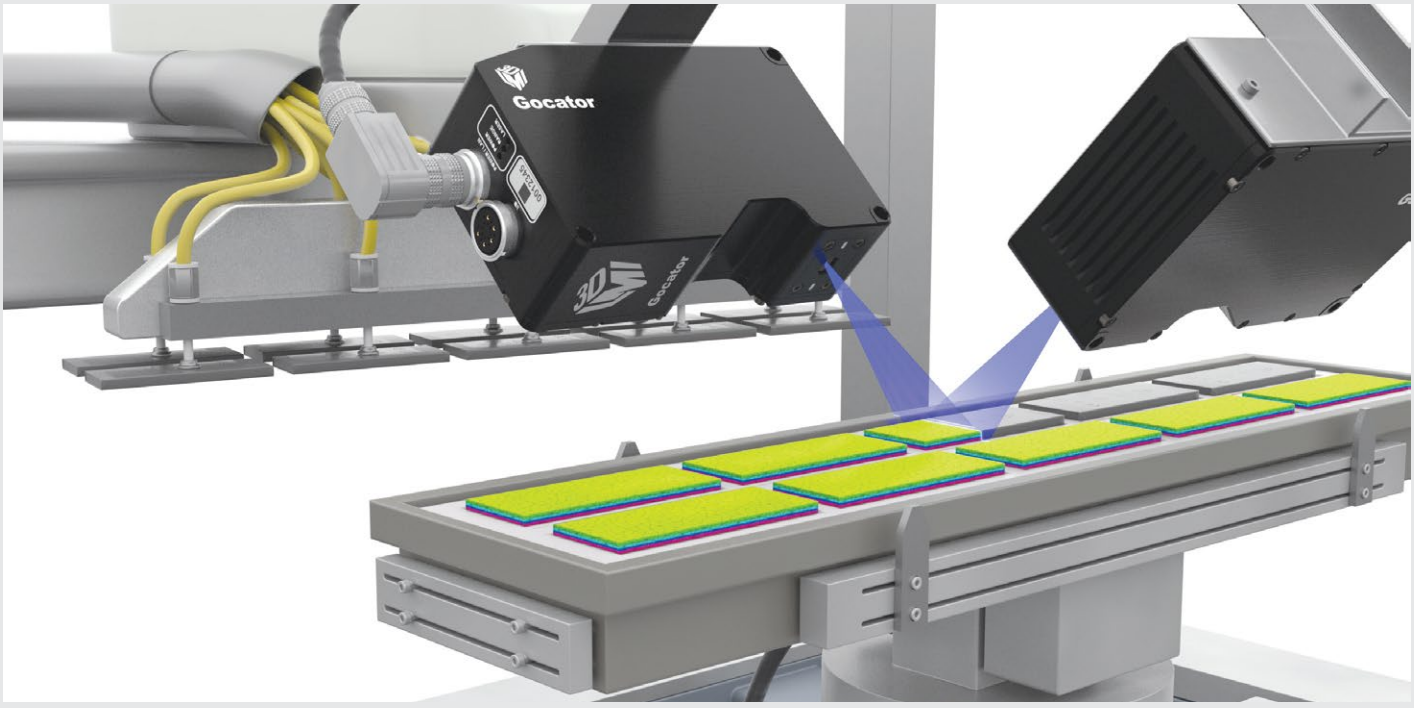
### Use multiple sensors to scan many parts simultaneously.

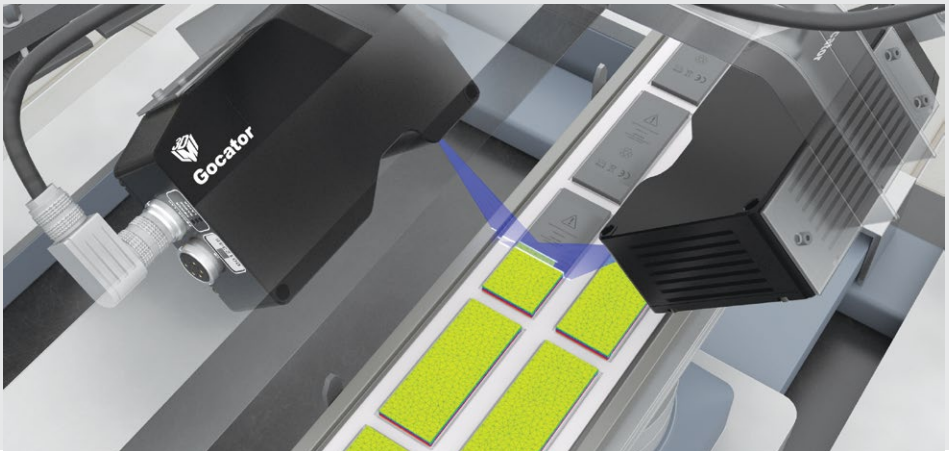
A Gocator 2420 scans to create a 3D surface from which SIM connector pin heights are measured.

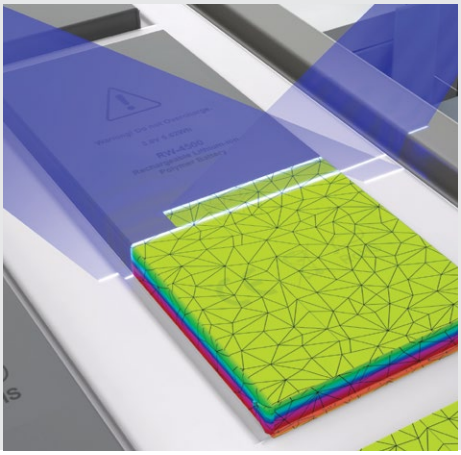
# FINAL INSPECTION

Gocator

## **Cell Phone Battery** Inspection



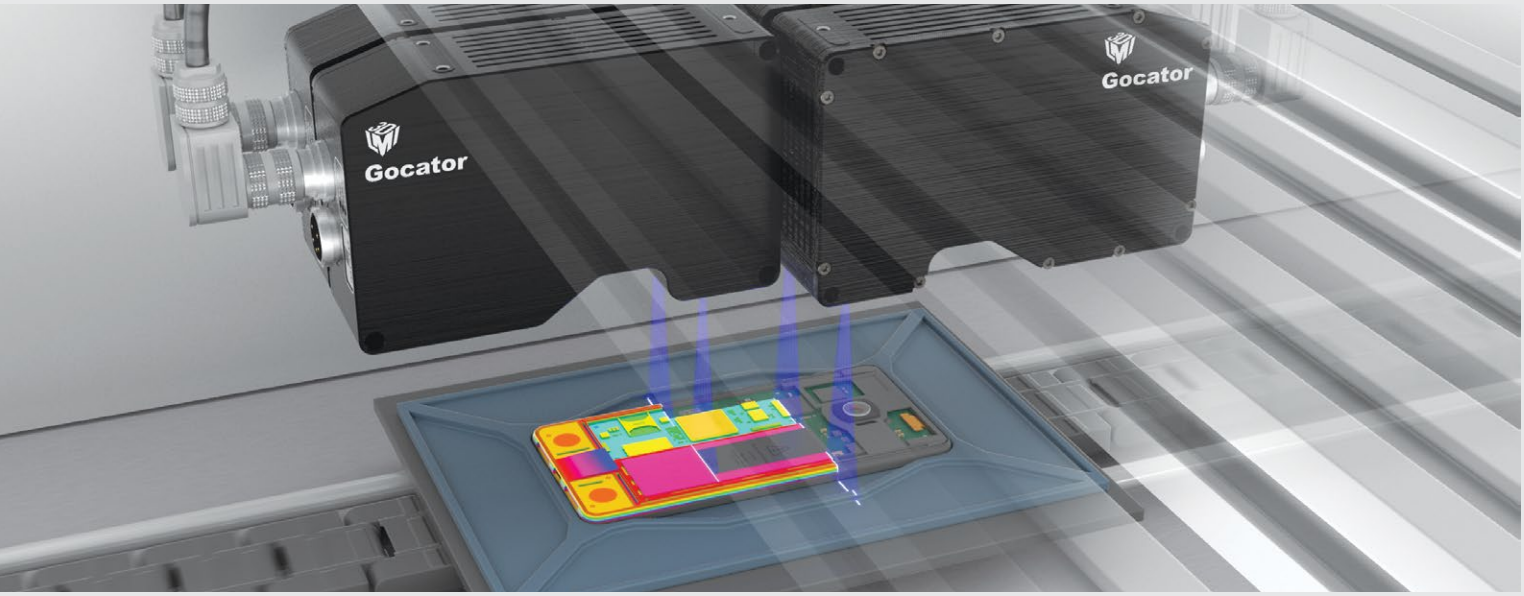
### Eliminate occlusions and avoid dropouts by angling two sensors for complete object inspection.

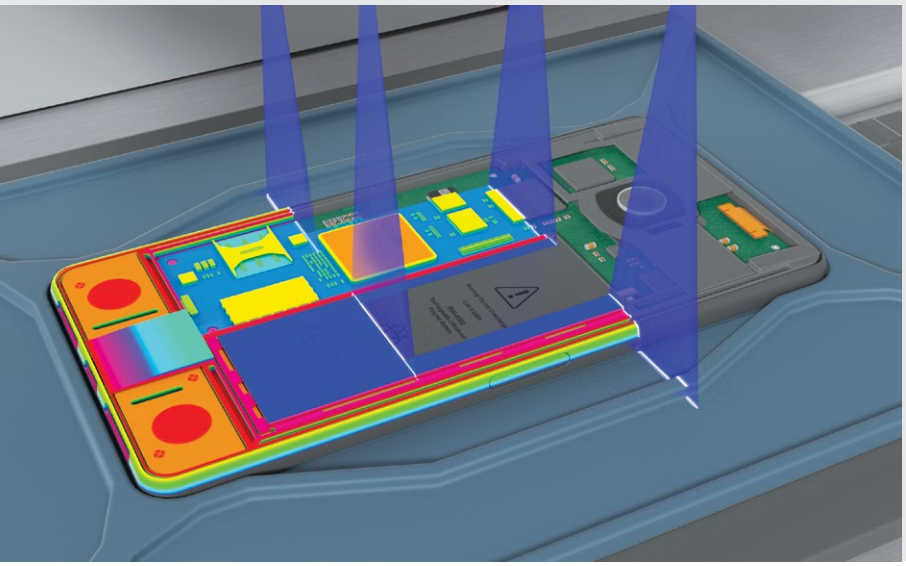
Two opposing Gocator 2430 sensors scan a cellphone battery, inspecting surface flatness and looking for potential dents in the corners. The sensors also verify that the flaps are correctly folded over.

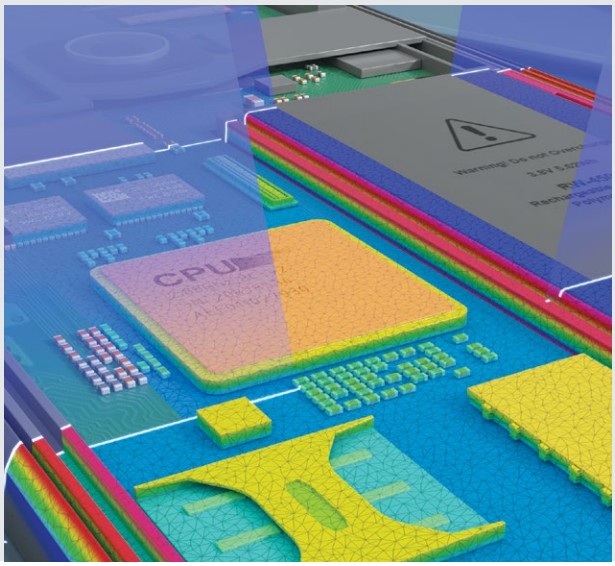
# FINAL INSPECTION

Gocator

## **Cell Phone PCB and Part** Inspection





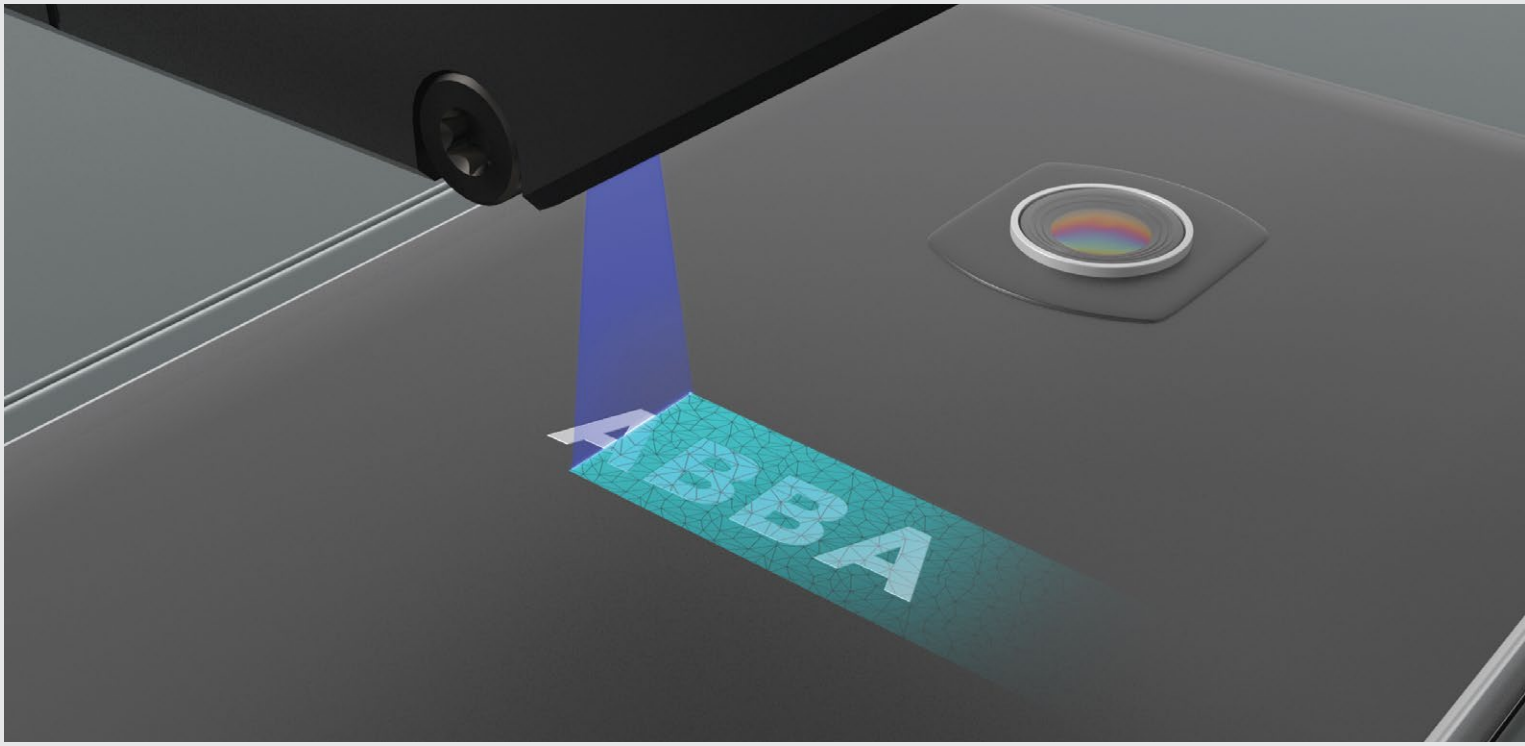

**Large field of view and measurement range allows users to accomplish more with fewer sensors, while still capturing the finest surface and edge details.**

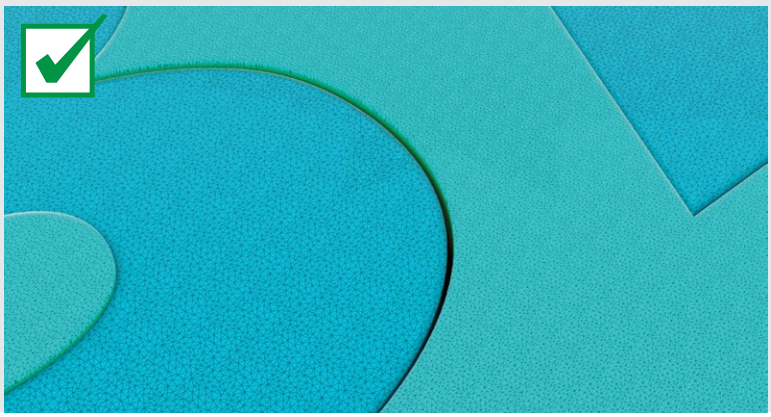
A cell phone with the back panel removed is scanned with four Gocator 2420 sensors for final verification of measurements. Final height of PCB, battery, and camera are the key measurements taken.

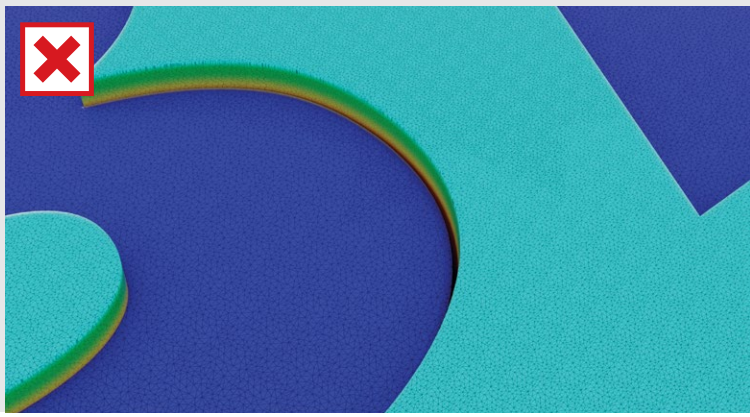
# FINAL INSPECTION

Gocator

## **Logo** Inspection



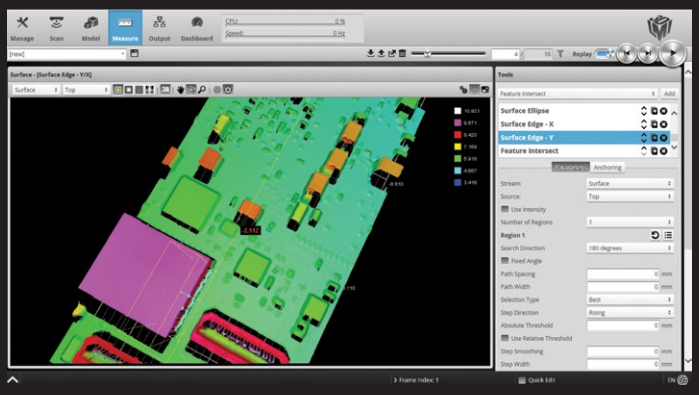



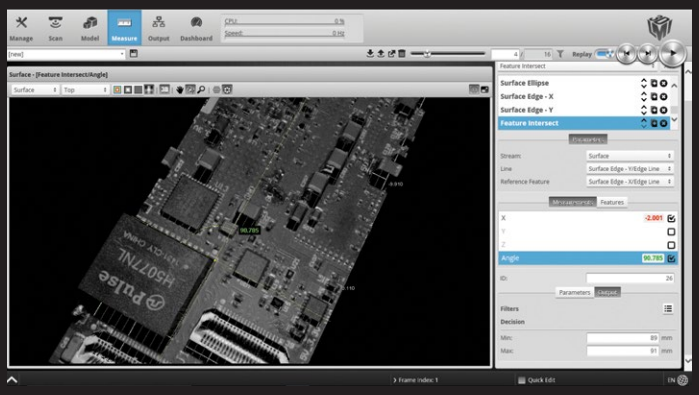


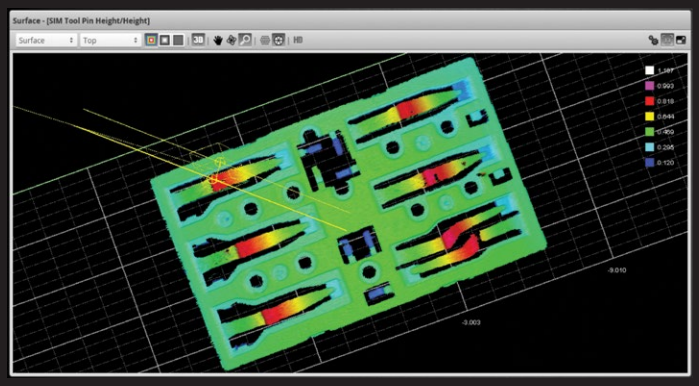
### Detect the slightest variation in shape with Z resolution down to 1.1 µm.

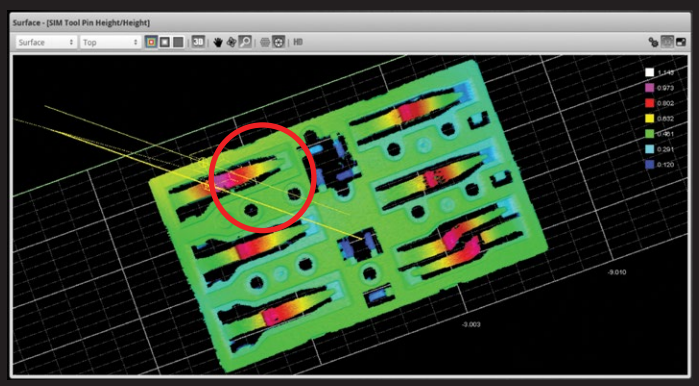
Gocator scans the back of a cell phone to verify correct shape/height and positioning of embossed characters.

# GOCATOR USER INTERFACE
## SMART 3D VISUALIZED









- Web-browser based
- O/S independent (PC, Mac, Linux)
- Point-and-click functionality
- Firmware included, no separate software required
- Built-in measurement tools
- Process 2D intensity and 3D height data for high repeatability

# SENSOR NETWORKING FOR INCREASED SCAN COVERAGE

Gocator laser profilers support seamless multi-sensor networking for scanning larger components and assemblies or complex parts (i.e., with irregular surface geometry and multiple occlusions). These sensor networks are connected by LMI Master controllers.

## MASTER 810 & 2410

Master 810 and 2410 network controllers make it easy to distribute power, achieve microsecond data synchronization, and provide laser safety for up to 24 sensors per Master. Designed to scale, Masters provide uplink/download ports for daisy chaining, and support differential or single-ended encoder and digital I/O.

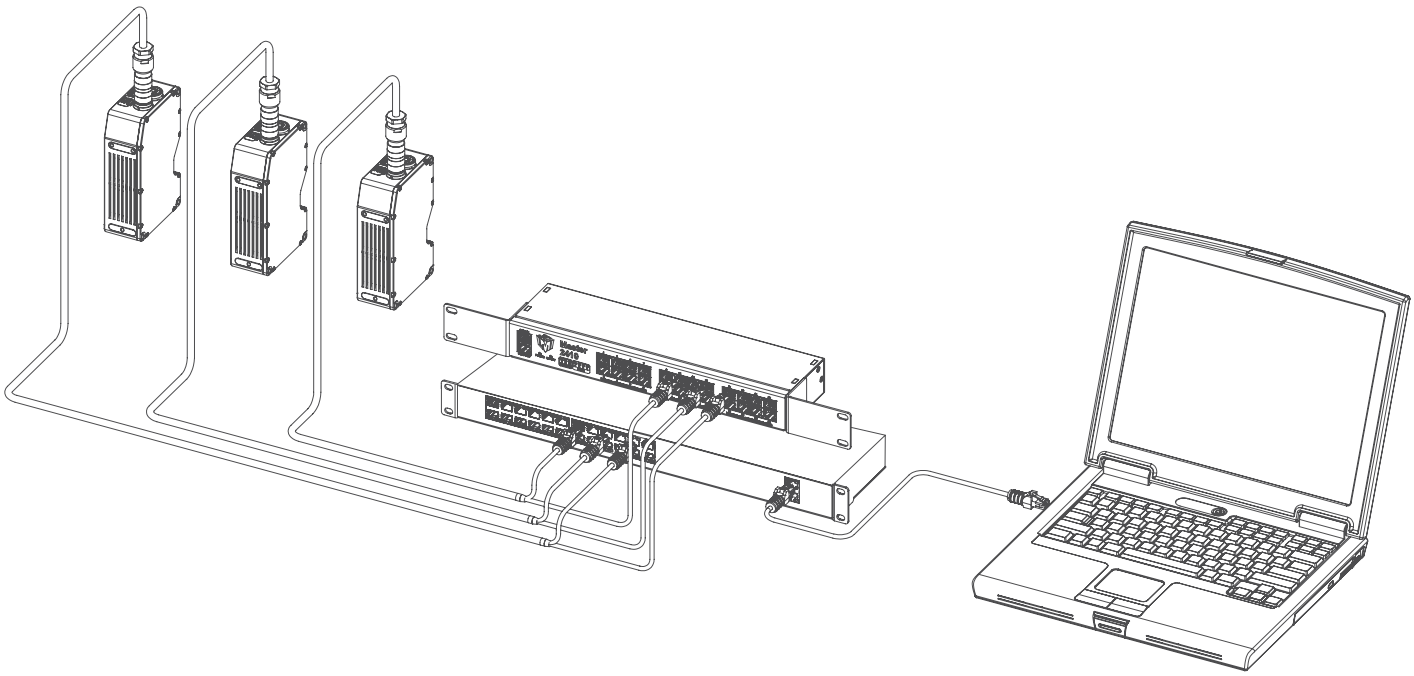
- SYNCHRONIZED WITHIN 1 µs ACCURACY
- ALL-IN-ONE CABLING
- BUILT-IN LASER SAFETY CONTROL


Master 810. Supports up to 8 sensors.


Master 2410. Supports up to 24 sensors.

## BENEFITS OF MULTI-SENSOR SUPPORT

- IDEAL FOR SCANNING LARGE OR COMPLEX TARGETS
- SIMPLE POINT-AND-CLICK NETWORK SETUP
- BUILT-IN LAYOUT ALIGNMENT AND STITCHING FOR MAXIMUM EASE OF USE
- MAINTAINS HIGH RESOLUTION ACROSS WIDE FOV



# It’s Better to Be Smart.

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