3D SMART SENSORS FOR INLINE ELECTRONICS INSPECTION

The consumer electronics (CE) industry is testing the limits of what 3D laser triangulation sensors can deliver in terms of 100 per cent quality control. This article offers an in-depth look at the specific trends and demands of achieving high product quality in the CE market, and how high-speed, high-resolution 3D smart sensor solutions are leading the way with complete 3D inline inspection of micro-features on small electronics parts and assemblies

The Gocator 2420 laser line profile sensor is designed to scan small electronics parts, such as PCBs, in a fast-moving inline process

Fierce competition in consumer electronics is driving product inspection requirements down to the micron-level of repeatability and accuracy, testing the limits of what 3D laser triangulation can deliver, including scanning challenging surfaces like polished metal and glass.

The increasing demand for high-resolution is a direct result of the fast-paced cycle of innovation in the consumer electronics industry, where new designs in cellphones, tablets, laptops, and wearables compete each year to deliver "the next big thing" crafted with the highest quality fit and finish.

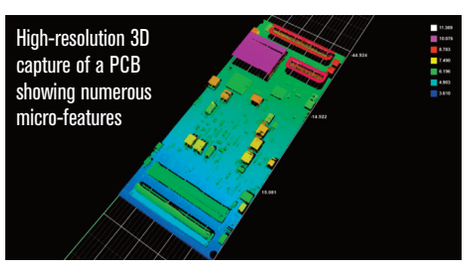
For example, a typical challenge facing manufacturers today is the need to inspect surface gap mating on parts like cellphone enclosures, down to 1-2 microns in repeatability and at production speed. This relentless demand for improved quality at higher speeds means suppliers of machine vision technologies must adapt quickly to offer solutions that keep pace with the multitude of new micro-features essential in small part assembly.

DESIGNED FOR ULTRA HIGH-RESOLUTION

To meet the demand for the consumer electronics market, LMI Technologies developed the Gocator 2400 Series of 3D smart sensors, uniquely designed for high-performance electronics and small parts quality inspection.

Traditional 3D sensing solutions in the CE market today are limited to resolutions around 10µm, whereas new product designs are introducing assembly features well below this limit. At 6µm, the Gocator 2410 model offers ultra-high X resolution, which enables the inspection of features to ensure successful mating and assembly of parts.

Leveraging two-megapixel cameras and an embedded processor, Gocator 2400 sensors produce higher data density while achieving large fields of view. Field of view is a major factor in effective electronics inspection. The Gocator 2420's wider field of view means a single sensor can inspect more of a small part in one scan, which results in fewer sensors required to perform the same operation and therefore a significant reduction in system cost and complexity.



High-resolution 3D capture of a PCB showing numerous micro-features

BLUE-LASER PRODUCES CLEANER PROFILES

Due to its shorter wavelength, a blue laser performs better than red lasers on highly polished or gloss surfaces typical of electronic and small parts. On these types of surfaces, red lasers exhibit greater speckle, producing increased signal noise on the detector and resulting in decreased measurement accuracy.

The shorter wavelength of a blue laser results in much lower noise levels and cleaner profiles, typically by a factor of two to three compared to red wavelengths. Both the 2410 and 2420 models are blue laser profilers.

CUSTOMISATION OF SENSOR FIRMWARE

Traditional 3D sensors deliver fixed functionality in scanning and measurement. What you purchase is what you get, and nothing more. Gocator changes this traditional landscape by allowing developers to customize measurement running in the embedded firmware.

With the Gocator Development Kit (GDK), users can embed their own custom measurement tools into the Gocator Firmware itself, with the same functionality as native built-in tools, while benefiting from the ease of use of a web-based user setup that leverages built-in 3D visualisation and drag and drop workflow.

A 'VIRTUAL SENSOR' TESTING GROUND

Testing custom algorithms is a critical step in being able to generate accurate and reliable measurements. For this purpose, Gocator Emulator is available to users. Emulator is a 'virtual' sensor that can be used as a safe, offline testing environment to ensure algorithms are reliable and ready for inline production environments.

As a result, Emulator gives programmers the ability to determine issues with current sensor configurations, then design and test improvements in a safe offline environment prior to deploying their custom solution onto an actual sensor.

Emulator allows you to perform 3D measurements on pre-recorded data taken from actual scanned objects (in this case, a small electronic part)

DATA PROCESSING ACCELERATION

For applications like electronics inspection where a standard one second cycle time is required, data processing acceleration may be necessary for end users to meet stringent QC and throughput specifications.

LMI offers a solution to this challenge in the form of Gocator Accelerator (GoX). GoX is a Windows PC application that allows the user to add the data processing power of a PC to their inspection solution. GoX significantly increases processing speed and reduces cycle times, removes memory limitations, and allows the user to handle large 3D point clouds for measurement and inspection in the required cycle time.

Learn more about the Gocator 2400 Series at www.lmi3d.com/gocator