SmartRay

APPLICATION NOTE

A SINGLE-SCAN SOLUTION FOR ACCURATE KEYBOARD INSPECTION

APPLICATION BACKGROUND

The keyboard is an essential external electronic input device for desktop, notebook and tablet computers. The components of a typical keyboard include the upper and lower covers, keycaps, trigger switches, circuit boards, wires and other materials. The inspection of each component during the production process is very important in order to ensure rapid and efficient assembly.

To ensure the high quality of products demanded by customers, the inspection requirements of products are constantly increasing. It is difficult for traditional 2D vision inspection methods to meet the necessary measurements of depth, thickness, flatness, etc. In addition, it is challenging for a single 3D vision sensor to meet requirements for accuracy.

ECCO

3D INSPECTION SENSOR

CHALLENGES

When performing the application of keyboard size inspection, a single sensor cannot fully cover the inspection of the entire keyboard while meeting the required accuracy specifications of ±0.02 mm. Additionally, because of the shadow effect on a 3D sensor, it cannot detect the inner and outer of the long edge, and width of the side wall of the upper cover, at the same time.

SOLUTION

To meet the varying requirements of customers for different inspection projects, including scan rate and accurate quality inspection, SmartRay offers a solution using multiple 3D sensors of different models to complete the inspection by scanning images once.

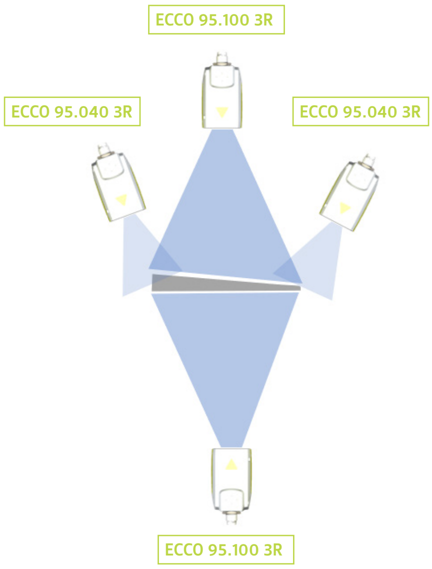
A combination of the ECCO 95.040 and ECCO 95.100 3D sensors, using multi-sensor registration remove, can complete the entire inspection in a single scan.

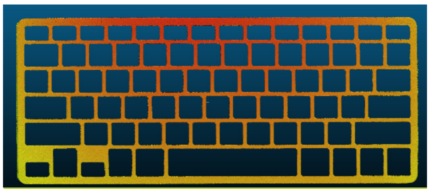
Delivering a high accuracy between 0.0014 and 0.0018 mm vertically, and from 0.018 to 0.020 mm horizontally, the ECCO 95.040 can be used to measure the outer length and width of the upper cover, and the height and deviation of the edge buckle.

The ECCO 95.100 can measure the middle position of the upper cover – for example, the height difference of the keycap hole site. With a horizontal resolution of 0.05 mm, the ECCO 95.100 may not meet the accuracy of ± 0.02 mm required for inspection of the direction of keyboard hole length and width, and the inside and outside edge dimensions. However, it has a vertical resolution of 0.0085 mm, which enables it to be used to measure the height deviation and thickness of the keyboard hole site.

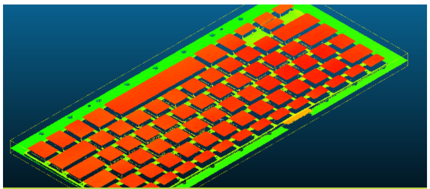
For other keyboard-related applications, the ECCO 95.100 or ECCO 95.040 can be used alone to measure the thickness of the upper and lower covers of the keyboard, the inner and outer walls of these covers, and to verify the optical character recognition (OCR) key position.

Multiple ECCO sensors can be combined to complete the inspection in a single scan

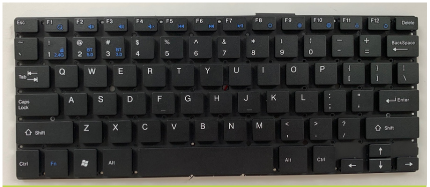




Upper covers inspection result in 3D image



Lower covers inspection result in 3D image



OCR key position's character presence/ mismatch verification

SUMMARY

This ECCO 3D vision sensor solution can complete all the required size measurements for the application in a single scan. This greatly reduces the inspection time, while providing superior imaging effects and more intuitive stitched images.

By delivering a complete keyboard data map with one scan, including various data measurements, the inspection system improves production efficiency, saves manufacturing costs and improves the production process.

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