SOLEX Metrology - case study n°3

Vision-automated industrial inspection solutions

Introduction

Automated machines are the natural extension of the Solex inspection systems. Combining a set of imaging systems, with robot handling devices and image processing software allows for the provision of a rapid inspection system that fulfils the needs of mass production. Vision monitoring is particularly pertinent for complex parts following fabrication and assembly. Our solutions are designed on a case-by-case basis working from the specifications set by our clients.

Problem areas

A specialist in fabricating technical parts in plastic, sub-contractor to the automobile industry, wanted to optimize the inspection of their Starter Alternator Reversible Systems (StARS) and make it more reliable.

In addition to a dielectric test, it was necessary to check for the presence of particular components and overmoulding quality - in terms of appearance and possible distortion - at several points of a complex piece (see Figure 1). A further difficulty concerned the need to use the same inspection station for pieces of different designs, destined for several different car builders.

Key elements

Our skills in automation, in imaging, in image analysis, along with the organization of our R&D service being designed to manage specific projects had allows us for achieving this development.

A combination of fixed monochrome CMOS cameras using coaxial lighting systems and specifically programmed image analysis software has enabled us to respond to this client need.

Technical achievements

The lighting and camera set takes three images of each part, from above, from below and from the side. The fixed monitoring areas (known as regions of interest or ROI) are defined for each of these captured images. They are, for example, symbolized on Figure 1 by rectangles or circles.

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These ROI relate to the following particular regions:

- Strip sets, where the need is to check for the presence of holes and any plastic material surplus at the edges (see Figure 2)
- A bakelite component where it is necessary to check for its presence and dimensions
- Power inserts or terminals that need to be free of material surplus on their lower and upper parts (see Figure 3).

Once the inspection sequence is finalised, the software will automatically indicate the compliance or otherwise of each of the regions concerned using a red or green colour code (see Figure 1).

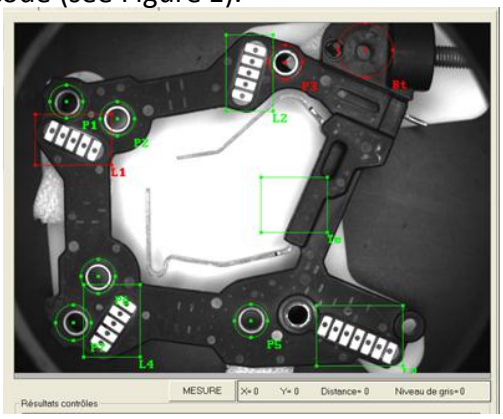

Figure 1 – upper view of the part to be checked with the various ROI represented by geometric forms

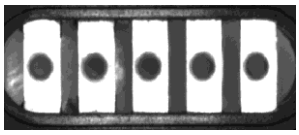

Figure 2 – enlargement of the image of a strip set

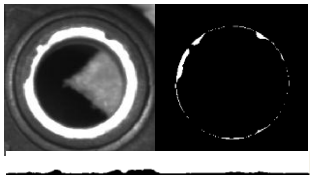

Figure 3 – Insert (on left), representation of the difference in relation to a model (on right), linearisation of this difference (at bottom)

Impact

The effectiveness of this inspection station has allowed the manufacturer to detect any unacceptable non-compliance in the units before they are despatched, thus avoiding costly on-site repairs or unit exchanges. The flexibility of the solution allows work on parts of various designs destined for different constructors, and also to detect any foreign intrusions in a series of parts.

Other possibilities

Automated pneumatic dimensional measuring methods whether without contact - or combined with and without contact - can also be implemented.

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