

CASE STUDY



Assembly check of air-conditioning unit For manufacturers producing physically large products multiple camera solutions offer 100% verification of quality

When dealing with physically large products there are a number of options for automated inspection; on the simplest and most cost effective is to use multiple cameras connected to one machine vision PC controller. This application was designed for one of the leading air conditioning manufacturers as a custom solutions for automated visual inspection.



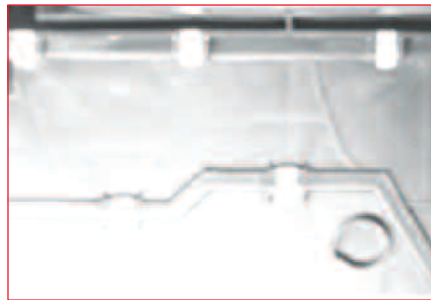
The image shows a car air-conditioning unit. There are a lot of small parts, like tubes, screws and clips, attached to this unit. To check the presence of these parts is not very difficult conceptually, but it poses some interesting problems.

The first problem is the size of the unit. It measures almost 1 metre in length, whereas some of the parts to be detected are smaller than a 10mm. It is immediately clear that such a check cannot be done using a single camera. The final setup consisted of fourteen Firewire cameras connected to the image processing controller through external hubs. The multiplexers are switched from within NeuroCheck using digital I/O. Images from all cameras are captured at the beginning of the check and stored on NeuroCheck's image tray so that the test piece can be removed from the inspection station even before processing is complete.

The second problem is lighting. It proved impossible to design an overall optimal illumination setup for the complete unit. Therefore a specifically designed illumination was assigned to each camera. The lighting is automatically switched together with the camera inputs by digital I/O.

The following images show the flat left and the curved right area of the unit. Under an unfavourable angle of incidence the dark plastic reflects the light so strongly that the metal clips blend together with the background. It is obvious that the different geometrical properties do not allow for simultaneously optimal illumination of both areas.

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Another important aspect of this application is positioning. Due to the size of the unit and the elasticity of the plastic position variations in the range of a few millimetres are inevitable. To overcome this problem, larger parts, which are easily detected, are used as position reference.

Not only is the optical inspection much more flexible than the conventional combination of mechanical components with inductive calipers, it has also proven to be more reliable, as it has detected several units with missing parts which tested OK with the mechanical/electrical inspection systems.

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