

## Case study

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# Automatic detection of shorts and flash on moulded parts

Industrial Vision Systems Ltd provide 100% inspection solution to a major magnesium casting company.

A leading magnesium casting company required a machine capable of inspecting the die cast fascias for the latest generation automotive vehicles. They sought to verify the casting process had been completed adequately so that no shorts or flash could be found on the over 200 different features cast, and that the part had been correctly populated with manually fitted components. The new vehicle will be available in both Left Hand Drive (LHD) and Right Hand Drive (RHD) and has two different models of fascia for each. Consequently the inspection machine would be required to handle all four different parts with a minimal amount of human configuration.

On completion of the inspection process it is essential that the cast be marked for traceability purposes, to show when the part had been inspected, if it passed or failed, as well as the date it was manufactured.

To fully inspect each cast a total of 15 cameras were required all controlled and processed by IVS®. This ensures that every feature is captured at the best possible resolution to accurately verify it's presence and quality. Two LED linear lighting strips provide a controlled even illumination over the

whole of the part ensuing stability and consistency in the captured images

The inspection process starts with a prompt on screen to tell the operator to load a part. When a part has been placed correctly on the locating dowels the operator energises one of the two "Go" buttons at the front of the machine. The part is traversed away from the operator on the two linear slides to the inspection position. When all image processing has been completed a pass or fail condition is sent to the PLC via the digital I/O interface. If the part passed, the system will print and apply a label to the side of the part. The label provides information on the type of cast inspected (LHD or RHD), the time and date of inspection and other information predetermined by the manufacturer.

Before the part is traversed back to the operator ready for unloading, the printed label is first checked by a camera, to verify the print quality of the LHD/RHD text. Only if this is deemed correct will the part move. If at any point a failure condition occurs in the image processing, the operator is required to reset the system in order to retrieve the faulty part from the machine.

### Software Solution

The machine uses 15 digital IVS cameras in all, to complete one full inspection of a cast and the label. The IVS machine vision processing is split into two check routines for each cast type; one for inspection of the cast and one for the inspection of the label.

The first part of the cast inspection check routine is to transfer all of the images from 15 of the cameras to the "image tray". From here each image can be accessed when required by any individual check.

The image processing is typically a look-up table to increase contrast, followed by template matching the key features to ascertain their class; generally "Good" or "Bad", "Present" or "Not Present". If any of the "features" fail the whole cast will fail the inspection process.

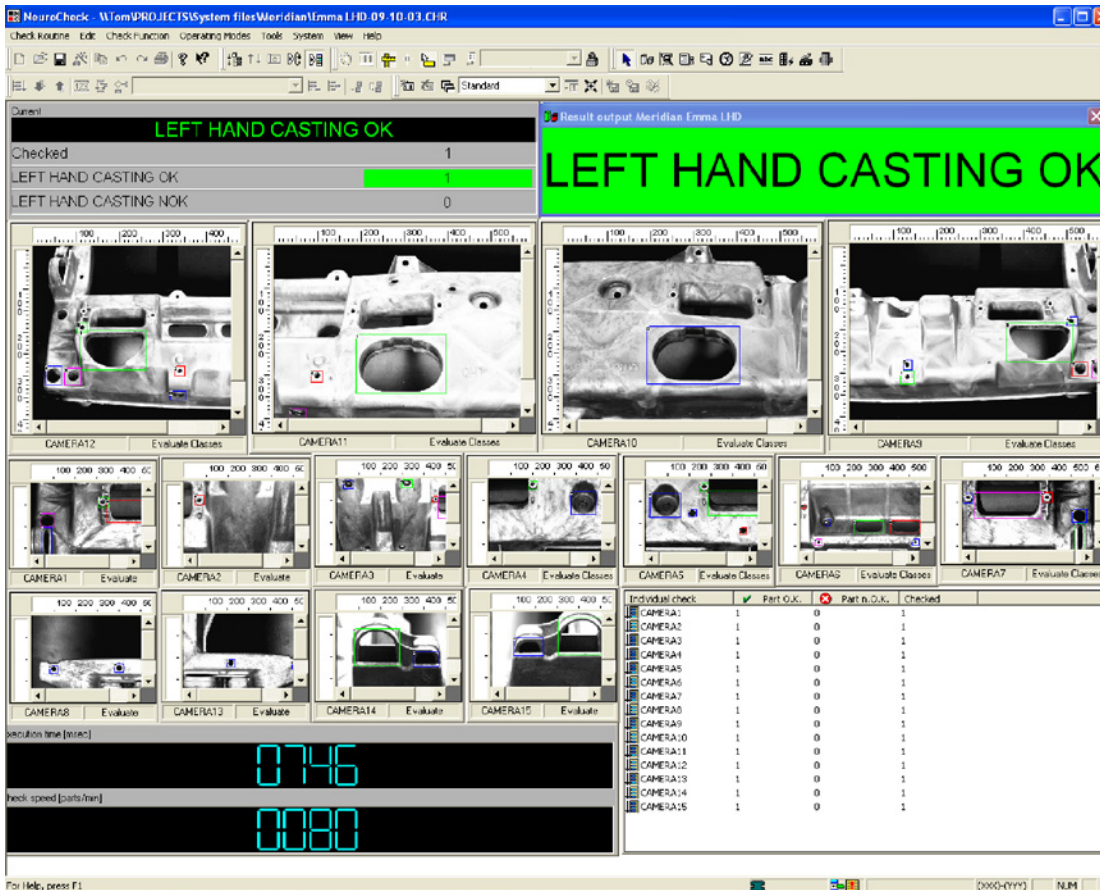


FIGURE:  
Automatic mode screen  
showing captured  
image and template  
match for each  
camera.

The final machine was approximately 3310 x1875x1775mm in size. The base of the system is made from powder coated welded steel section with powder coated steel infill panels and holds the 19" Industrial PC computer, electrical control cabinet and air supply. The top plate is made from black anodised aluminium and has two apertures allowing for movement of two linear slides. On top of the plate is an Aluminium extrusion framework enclosed with smoked perspex panels. The framework supports all 15 cameras, 2 high-frequency tool LED linear light arrays, the HMI monitor, control panel and light curtains.

The control panel enables the operator to select which type of cast is to be inspected. It also gives the ability to reset the machine and provides visual feedback if any of the emergency stop controls have been set.

The part is loaded by the operator through an aperture in the front of the machine, protected by the light curtains, onto the fixture. This is the "Load/Unload" position. When the light curtain is "safe" the operator can press the "Go" button to activate the system. The part then moves to the "Inspection" position.

## Conclusion

IVS has been used in a multi-camera set-up giving 100% confidence that the quality of parts produced matches the stringent quality checks the major automotive manufacturer ask for. The overall solution allows for rapid quality control across a large part confirming no flash or shorts exist, and giving final traceability that the quality check has been performed via the automatic print and apply system. This same approach can be applied for any virtually any moulded parts for the reliable detection of shorts and flash.