

Industrial vision makes all the difference

Picture Courtesy of RNA Automation Ltd

John Haddon

UK INDUSTRIAL VISION ASSOCIATION



VISION SYSTEMS can offer fast, accurate and reproducible inspection capabilities at a highly competitive cost. They can introduce automation into the production process at a number of different levels, from simply speeding up the inspection process to levels not possible using human inspectors through to being an integral part of a statistical process control system that can identify when a manufacturing process is moving out of specification. While using vision as a final inspection process on finished product can ensure no defect product reaches the end-user, using it earlier in the process can bring real added value by bringing improved quality throughout the process, major savings in waste, improved process efficiency through energy saving and possibly all three!



Plastic component camera inspection system

Vision systems overview

Vision systems typically consist of an illumination system and video camera or set of cameras linked to computers. The computer provides the platform for the image processing and decision making. These PC-based systems can be used for simple single camera applications or the most sophisticated multi-computer, multi-camera configurations. For many applications, a smart camera offers a cost effective solution. This is a self-contained, standalone vision system with image processing capabilities built into the housing of the camera, removing the need for a local PC. These systems are ideal where only one inspection view is required. A third variant is the compact vision system, where all processing capabilities are housed in an industrial controller which can be connected to multiple cameras. The choice of which system will be the most suitable will be determined by the requirements of the application. A good way of understanding just how vision can make a difference is to take a look at examples from three very different industries.



Automotive engine assembly

In this highly demanding industry, an automotive engine manufacturer was faced with the problem that they were getting too many engines failing their final performance tests due to

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operator errors during assembly. A detailed examination of the problems showed that the part complexity, combined with the extensive teardown and rework required if an error is made, justified the use of vision-based inspection. The solution to the problem was to install three smart camera-based vision inspection stations to carry out a range of tasks from absence/presence to gauging/measurement. The first station featured a single smart camera to verify that the crank gear and water pump gear are aligned properly. The second station features 4 smart cameras. Cameras 1 and 2 both verify the presence and location of eight water seals. Camera 3 determines the presence and location of a drainback seal, another gasket, and eight water seals. Camera 4 verifies that only a single head gasket is installed. The final station features a single smart camera to verify that the timing mark (painted line) on the idler gear is between two painted teeth on the crank gear. The implementation of the vision systems has led to a reduction in engine failures and subsequent rework in a way that wasn't possible with the existing human inspection and plans are in place for further vision systems to monitor many more assembly processes.

Plastic moulded components in food and beverage industry

A global leader in the food and beverage industry had a requirement for a fully automated quality control and inspection system to handle and inspect two plastic moulded components that differ in size and shape. In addition to meeting food and GMP standards, the system needed to be able to accommodate either component with a minimum tooling changeover as well as meeting a number of stringent requirements. The inspection solution had to:

- not cause any damage to the components
- inspect from all three planes-
 - Top for damage and optical character recognition
 - Bottom for diameter and damage
 - Side for damage, height and profile.



Automotive engine showing eight water seals

Courtesy of ThyssenKrupp System Engineering, Inc

- be capable of operating at up to a rate of 1200 parts/minute
- be able to handle components either cold from storage (minimum 10°C) or directly from a moulding machine (maximum 40°C)
- detect and reject 100% of components that are outside the specified limits and generate the minimum amount of waste due to either damage caused to the components by the vision system or rejections that are not outside the limits of the specification (false rejects).

The resulting vision system can achieve repeatability of measured values to 20 microns accuracy over 10,000 measured parts, with a one micron resolution. This system has given the customer a huge benefit in terms of reduced percentage of false rejects, and reduced damage incurred during manufacture, helping them maintain their lead in a hugely competitive market place.

Medical Dressing Materials

A manufacturer of medical devices was experiencing difficulties with the thin film that is used as part of the process, due to biological, dirt and debris contaminants. Unfortunately the supplier could not guarantee the quality of the material and hundreds of thousands of metres were awaiting processing into a high value product and multiple production lines were stalled as no material was available. Manual inspection of the film is impossible and the only other solution would be 100% inspection of the finished product with costly waste if a contaminated product is manufactured. An inspection system capable of detecting minute defects running at 100m per minute was engineered with a short lead time by a vision systems integrator and smoothly integrated into the batching line. When a defect was detected, the line could be stopped, the contaminated section cut out and the good sections spliced together with information on the defects found fed back to the film manufacturer. The vision system allowed the device manufacturer to continue production knowing that quality was built into the process with minimal cost, orders were met on time and high quality product was being delivered.

A Helping Hand

There are many manufacturers and suppliers of vision components and systems and the UK Industrial Vision Association, a Special Interest Group of the Processing & Packaging Manufacturers Association has many members who can offer good advice.

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