Robotic Vision

The phrase ‘robotic vision’ has been around for some time now, but to many it is seemingly more appropriate to a sci-fi movie than the factory floor! So, what does the phrase mean and how can the technology be applied to everyday manufacturing situations?
During the manufacture of assemblies it is frequently the case that parts must be transferred from one process to another, or parts be fed into a process for assembly with other parts. Often, these functions are carried out by operators, and due to human nature, mistakes inevitably creep in. In these cases manufacturers look to reduce costs and increase efficiency by automating these processes with robot technology. For the robot to pick up a part it must be presented in a known manner to enable a gripper to hold the part for transfer to the process. If only one part is to be picked by the robot or the range of parts conform to a simple shape then frequently mechanical tooling can be used to ensure the part is presented to the robot correctly. However, in many cases the process must be able to handle a wide range of different parts and require minimum changeover between parts. In these instances tooling can be prohibitively expensive and lead to long changeover times.

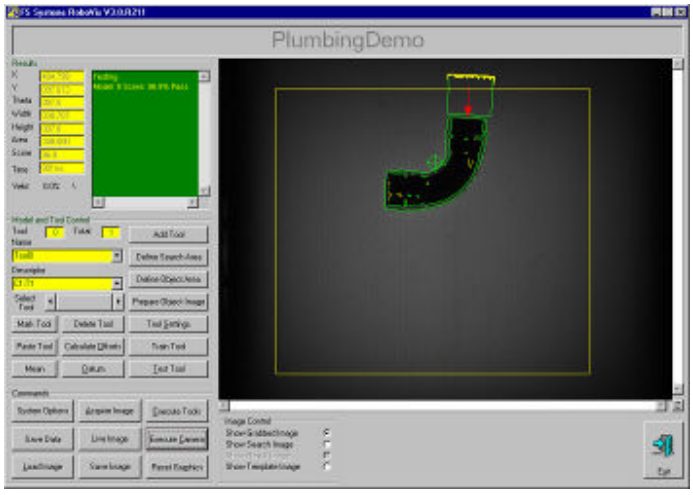
Simplifying Automation

An alternative is to use simple automation to present a part on a conveyor to a robot but use a vision system to both identify the part and calculate its position. If this information is sent to the robot then the robot can pick the part up using these co-ordinates as offsets to a nominal datum position set during set-up of the part. Product changeover time is reduced to a minimum and no expensive tooling is required.

Where does FS Systems fit in?

FS Systems have extensive knowledge in using robotic vision in these situations and have successfully installed a number of systems working with major brands of robots.
The vision system and robot communicate using either Ethernet or RS-232. The vision system uses no other I/O, inspection requests are sent from the robot and results in the form of pass/fail and X,Y,Theta co-ordinates are sent back in return. The vision system may also be used to select specific robot programs for different parts and if more than one part is being processed at a time, tell the robot which part it has located.

FS Systems **RoboVis** systems have been designed specifically for these tasks and include a wide range of features to simplify implementation of such systems in manufacturing applications.
FS Systems have a wide range of products applicable to robotic vision from simple smart cameras through to the RoboVis and GenVis PC based systems
One customer currently uses six of these systems to pick and place a wide range of plumbing fittings into an assembly process and benefits heavily from the automation of the operation in terms of cycle time, efficiency and changeover times.



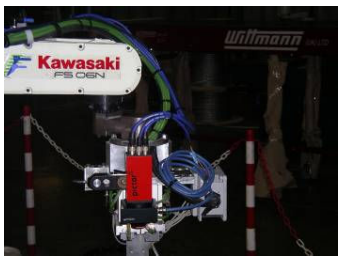
FS Systems

Technical Updates – Robotic Vision

Wide range of parts – no tooling changes

Each system handles a wide range of parts, and **RoboVis** instructs the robot which program to run and then, on an inspection request, grabs an image, locates the part and returns the correct pick co-ordinates. In some cases parts are handed and in this instance the system also tells the robot which way up the part is. As the parts can arrive at the pick position in multiples then the system checks that no part would cause a collision during pick before passing the part and instructing the robot with a pick position. Should a potential collision arise then the robot is alerted to the fact and the part is rejected, the conveyor then advances until the next part is found, any failed parts are re-cycled back into the bowl feeder via a secondary conveyor.

These systems make use of infrared lighting technology to eliminate the effects of factory lighting, and to exclude sunlight from the cell (which includes infrared) special coatings are included on the poly-carbonate guarding around the cell. Visible light can be used within the cell so it can be observed without effecting the vision operation.



Each system can store set-ups for thousands of parts, for these applications each assembly line processes 15 unique parts.

The parts are conveyor fed from a bowl feeder. Because the vision system doesn't require the part to be presented in any particular manner then the bowl feeder tooling can be kept very simple and will cover the range of parts for each line without tooling changes. This presents a very flexible solution to the customer and because no expensive tooling is including new parts can be taught and processed in the cell within minutes.

Adaptive Tooling

In some cases parts need to be correctly or partially orientated whilst within the feed system to enable the use of simpler pick and place or assembly systems. In these instances smart cameras can be used, checking parts within the feed system for orientation, correct part and critical features. Any failing parts can be rejected during the feed process and remove the need for complex tooling that is frequently unique to one part. These cameras can select a wide range of different inspections via digital I/O from a PLC or robot. In some cases a one button 'teach' method can be employed to create new inspections 'on the fly'. It is also possible to make inspections on each part that are not possible with mechanical tooling such as checking hole diameters, measuring critical dimensions, checking for flash and short moulding and thread presence.

FS Systems are the UK distributor for Vision & Control GmbH and in conjunction with FS Systems products **GenVis** and **RoboVis** the V&C range provides a wide range of products for these applications from lighting and lens, cameras and smart cameras.

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