machine vision made simple

Steps to Successful Use of Machine Vision
Blister Pack Inspection

By Ben Dawson

Machine vision provides cost and quality benefits by replacing human vision on tasks that are fast, repetitive and require exact measurements. Here are steps to successful use of machine vision for such tasks.

What's the Task?

Machine vision has three general capabilities:

1. Location or search finds the position of the object you are interested in. When machine vision is used for guiding a robot this task is called alignment and when used to follow a moving object it is called tracking.
2. Identification tells you that this is a particular object from a set of possible objects. Location and identification are often combined into one task, because to find an object you have to identify it and to identify it you have to find it! When Optical Character Recognition (OCR) or bar codes are used to identify an object, identification is called reading.
3. Inspection checks that the object has the proper dimensions, meets quality standards, is free of some class of defects, etc.

Knowing these terms will help you specify your task and communicate it to with the vision vendor.

How to Pick a Good Vision Vendor?

Vendor selection is based on the usual criteria of capability, reputation, cost, and ease of integration. Here are two other important requirements:

1. The vendor says they can do your task, but can they? When possible, ask the vendor to demonstrate that they can do your task or provide references from similar tasks.
2. How easy is it to teach the vision system your task? New machine vision processors make teaching easy. You cannot afford months of work to program the vision system.

In most cases, your vision needs will be served by the vendor's distributor or a system integrator. The distributor or system integrator can provide you with the complementary components you will need and can help with the integration. However, a good vision vendor will "be there" for you when you have problems or need help beyond what the distributor or system integrator can provide.

Select and Set-up System Components

The vision vendor supplies the vision processor (a special computer), software, and might supply other components for a vision system – lighting, optics (lenses), cameras, trigger sensors, encoders, etc. You must select and arrange the components to provide the vision processor with an image that clearly shows what you want to locate, identify, or inspect. This can be difficult and often requires help from your vendor, distributor or integrator.

The problem is, what is apparently easy for us to see may be hard for a machine vision system to "see" unless the object's presentation, lighting, and cameras are carefully set up. For example,

when looking for cracks in glass you move the lighting and your head and eyes until you see cracks. If you just aim a camera at the glass, the machine vision system won't "see" the cracks until you carefully arrange the glass, lighting, and camera.

Figure 1, shows a side view of the component set-up for inspecting pills within a blister pack. A "Part in Place" sensor triggers the vision processor to take an image when a pill card in the camera's field of view. Diffuse "cloudy day" lighting is used so the camera can image the pills without being "blinded" by reflections from the plastic blister. The image from the camera is processed by a vision processor, such as ipd's VA40, and a controller rejects defective pill cards.

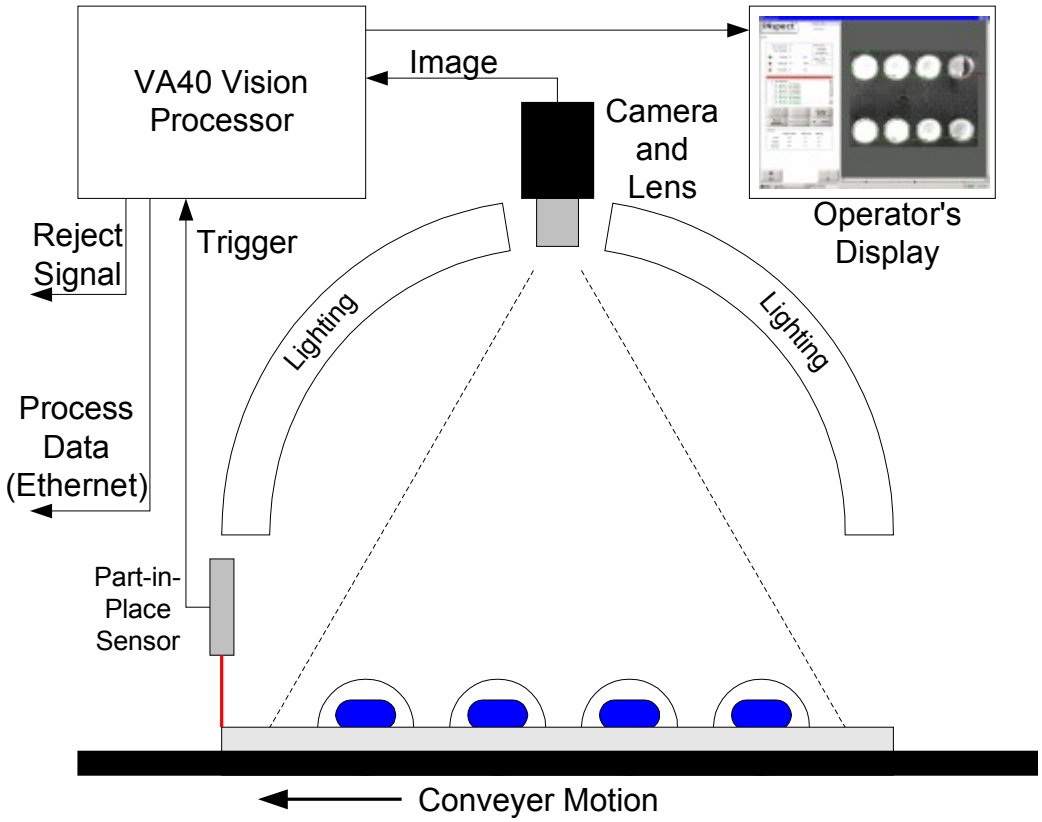

FIGURE 1: Using our general vision task terms: (1.) The pill card location is approximately found by the "Part in Place" sensor, and then exactly found by the vision processor. Once the card position is known, the blister positions are known. (2.) Identification in this example includes the presence or absence of a pill and looking for the right shape and color of the pill to make sure the right product is packaged. You might read some of the text or codes on the pill card to verify the product. (3.) Inspection includes making sure that the pill is within the blister, that the pill is not broken, and perhaps checking for defects or foreign matter.

Teach the Task

When the vision system can "see" the part details you are interested in, you then teach it what to locate, identify, and inspect. Teaching or programming the vision processor can be a major task often requiring the help of an expert machine vision engineer. ipd has made teaching extremely fast and easy by putting years of experience and an easy-to-use user interface in our iNspect™ software that runs on our Vision Appliances, such as the VA40 (see **Figure 2**).

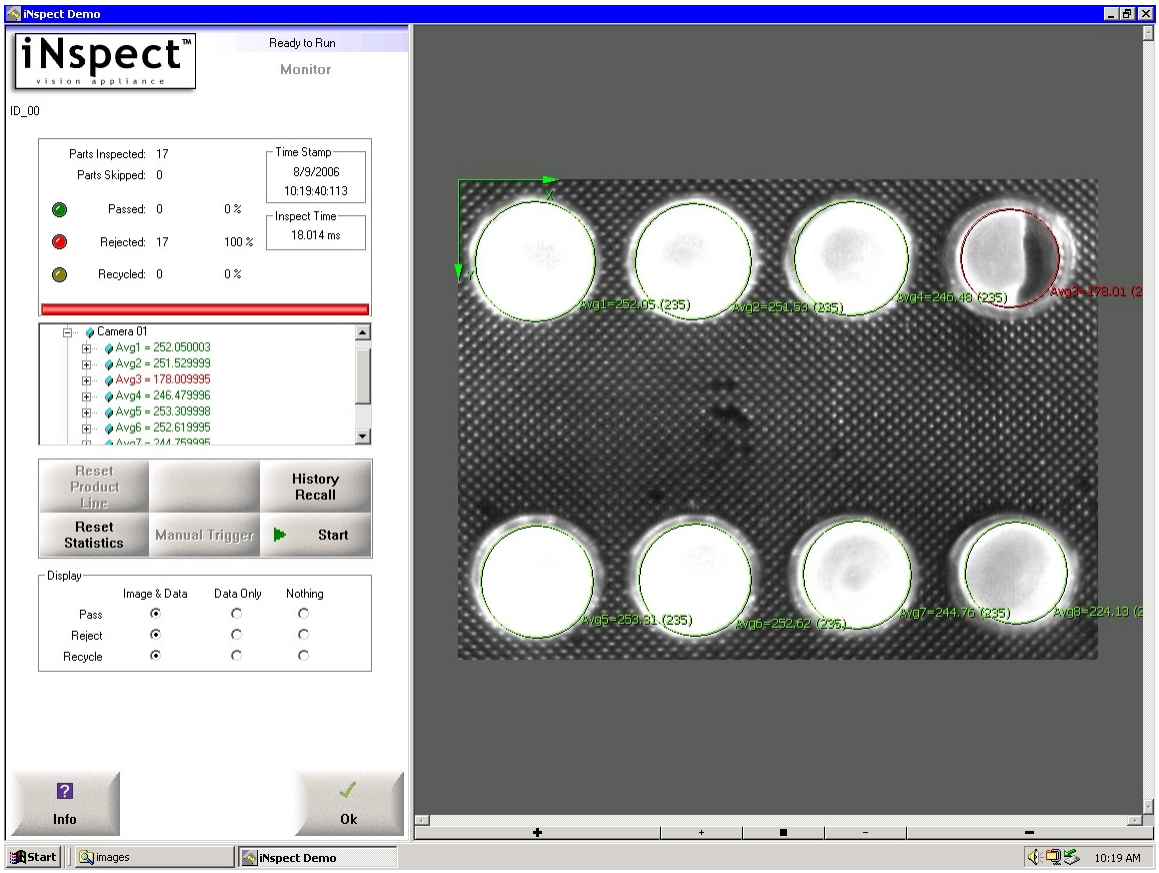

FIGURE 2 – iNspect's monitor screen provides inspection results as well as graphical feedback in an easy to read format.

Start Visioning!

With a good vendor, the proper component set-up, and easy-to-use software for teaching your task, you can be up-and-running with a machine vision system in a matter of days. As you gain experience, you can apply machine vision to more and more challenging tasks.