# The Scary World of Linescan!

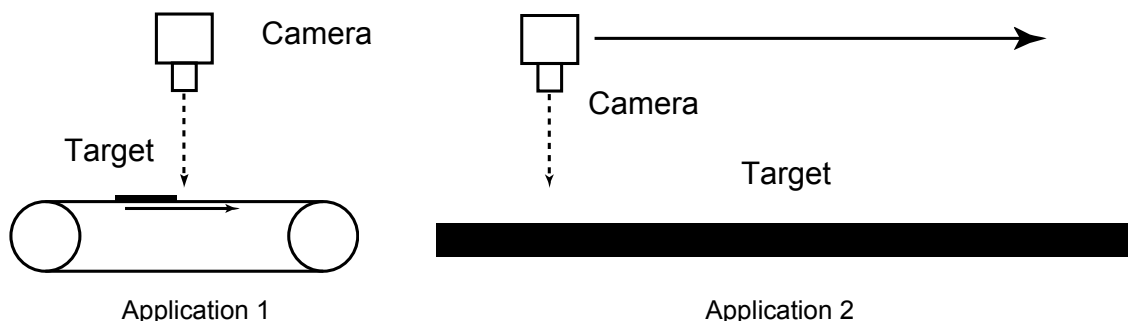## A brief look at linear sensors in machine vision and their potential uses!

The use of linescan technology is often considered to be one of the more esoteric areas of machine vision. It is sometimes considered to be very 'scary' and hard to implement, but the reality is quite different!

Anyone who remembers those odd hand scanner devices, like the one shown here, can easily understand what linescan is all about!

Basically, either the target moves underneath the camera, or you move the camera over the target. Either way, an image is created that can be of potentially infinite length, although it does not need to be.

'Hey, I used to have one of those!'

## A Moving Experience!

Camera

Target

Application 1

Camera

Target

Application 2

In the first example, the target moves under the camera, quite often on a conveyor belt and the camera builds the image line by line. In the second example, the target stays still and the camera is moved over the surface, with the same result.

Here is how it might work in practice:

Application 1: Components pass along a track or conveyor and the camera is positioned above them. A continuous image is captured that can be analysed with software to identify bad or missing components on assemblies etc. The same set-up can be used to examine linear products like paper, continuous metal sheet, fabric, cabling etc.

Application 2: A long component or object that needs to be examined is held still, while the camera passes over the top of it. A long image is then created of a finite length that can be examined using appropriate software. Such applications could include inspecting pre-formed car bumpers for defects or any other long linear component that needs to be checked.

> One point to remember is that once the image is captured, any normal machine vision analysis can then be performed on it. There are no 'special linescan tools' to worry about!

## Rotating Components

Another scenario where linescan can be very useful is when cylindrical objects need to be inspected.



Camera

Target
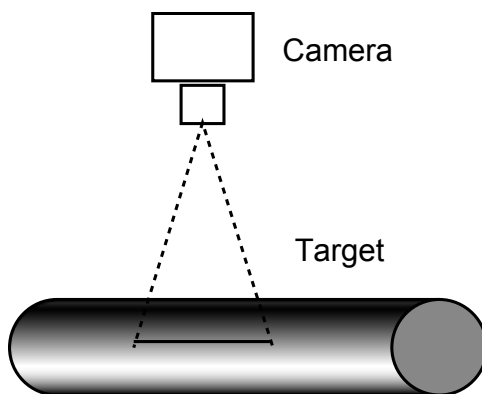
In this situation, there may be information on the rod or cylinder that needs to be read like barcodes or text. This *could* be done with area scan techniques, but the lighting can get very tricky (and often expensive)! By using linescan techniques, the lighting can be greatly simplified, making it cheaper and simpler, particularly if the surface of the component is highly reflective, which is often the case!
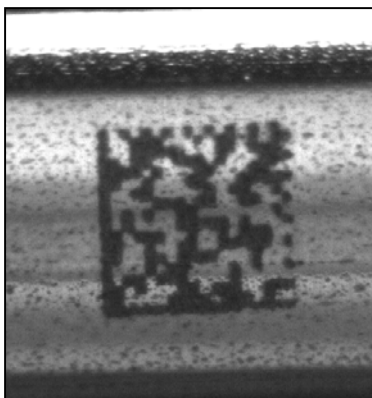


Area Scan Image of a barcode



Linescan Image of a barcode

As the example above shows, a linescan camera can present a much better quality image for vision analysis, reducing the complexity of the task and the lighting.

There are a huge number of situations where this could be useful, but product tracking, component marking, component verification, cylindrical packaging inspection, and cap/ closure inspection are all potential applications where linescan could be used very effectively.

Another scenario where linescan can prove to be a better option that area scan, would be where long and thin components need to be examined. For example, there might be an electrical component that needs to be imaged in high resolution. If you were to use an area scan you will need to 'throw away' most of the image that is captured:
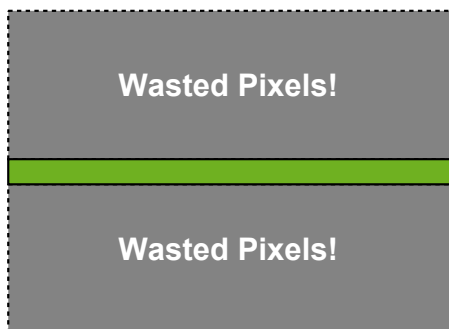


In this example the green section is the component that needs to be examined. With a high resolution area scan camera, most of the image that has been captured - the grey areas - will be discarded. In other words, most of the sensor remains unused!

With a linescan sensor, the component can be imaged in much greater resolution, and all of the linear resolution of the sensor is used.

## Specialist Software - What Specialist Software?

It is a common misconception that if you use linescan, you will need to buy and learn a whole new set of specialist vision software and analysis tools.

This is simply not true!

You can think of linescan as just another technique of getting an image into a computer. Once you have the image, you can use any vision analysis technique to extract the information you need. Most common software packages such as DALSA Coreco's Sapera Processing, IPD's Sherlock, and Stemmer Imaging's Common Vision Blox will happily support linescan 'out of the box'.

## And the Cost?

Surely it will cost much more than a 'normal' machine vision system?

No it won't!

While it is difficult to talk about exact prices, a simple linescan system should cost no more that an equivalent area scan system. There are cameras at every price point, from the basic entry level 512 pixel models up to high end 12K models and even colour models if you need them! And if you want the simplicity of a 'Smart Camera' solution that is also possible with the DVT LS Linescan smart sensor!

# Linescan? – Not Scary at all Really!