


# WHITE PAPER: Barcode image scanners - The future of barcode technology



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# Executive summary

Laser barcode reading systems play a vital role in delivering effective warehouse automation.

Everyday businesses across the world benefit from their ability to improve reliability and efficiency.

But like every technology, barcode readers are beginning to be superseded by more advanced equipment.

In recent years machine vision technology has come to the fore, and in the logistics industry image scanners are becoming more and more popular.

This white paper takes a look at image-based barcode scanning, its current functionality, relevant applications and benefits over traditional barcode readers.

# The current state of barcode scanning

Retail distribution centres rely on meticulous stock control processes to ensure optimum productivity and throughput. For many years barcode readers have provided a means to help accurately manage goods in, put away, picking, dispatch and replenishment activities.

A key advantage of laser [barcode scanning technology](#) has always been its simplicity: it's easy to set-up and connect, plus it can read codes fast enough to accommodate high speeds, and support large scanning areas and working ranges. Put simply, barcode readers are pivotal for efficiently managing a warehouse's inventory.

## BENEFITS OF BARCODE READERS

- Reduce human error and significantly increase accuracy rates
- Scan and identify products in milliseconds, allowing optimised throughput
- Use real-time data for detailed, accurate data analysis and empowered decision-making
- Improve workforce productivity by automating parts of their role and removing the need to learn an entire inventory or pricing procedure
- Precisely trace and track every stock item, improving stock control, reducing discrepancies, lowering inventory levels, and ultimately, cutting costs.



However, there are limitations to the technology. Firstly, scanners rely on good quality barcodes. So when print quality drops, or an item gets handled often (e.g totes) and the print fades, or the label gets damaged – this could result in lower read rates.

Secondly, barcode readers need ideal reading conditions; so an unsteady roller conveyor that causes products to vibrate or turn away from scanners could prevent barcodes being read. Finally, there is a limit to the speed that barcode readers can process data and the amount of data they can decipher.

A new generation of image-based readers is set to not only address these limitations, but also support new applications in the world of logistics.



## What is image scanning?

Computers have advanced to the stage that they can now “see” – or, in other words, recognise specific patterns and objects within images. This ability to automatically extract information from digital images is called ‘machine vision’.

Machine vision is much more than simply processing an image. Instead it takes visual data captured by highly advanced camera technology and uses specialised algorithms to extract useful information. This information is then used to guide the actions of industrial equipment.

The concept of machine vision has been adapted to design image-based scanners. These can scan products inline on a conveyor, and based on the data interrogation, either sort the goods, guide their movement around the warehouse, or simply pass or fail them for quality control purposes.

Whilst the technology sounds very similar to traditional laser barcode scanning, the advanced data capture possibilities of image scanners offer a number of key benefits and open up a wealth of new applications.



# The benefits of image scanning

## 2D scanning

One of the biggest differences between laser barcode readers and image scanners is the ability for the latter to not only read linear barcodes, but also 2D symbols, stacked symbologies and optical character recognition (OCR) fonts. Regardless of how the symbols are printed or marked onto products, image scanners can read and process the data – quickly and accurately.

In an era where data is king and industries are constantly looking for ways to process more and more data, 2D symbols offer increased data capacity and could arguably take over from the traditional linear barcode.

Image scanners therefore offer organisations the ability to future-proof their operations.

## Higher read rates

Legible, accurate barcodes have never been more important than they are today. Inconsistencies in quality can lead to process inefficiencies at every stage of the logistics chain. The need for re-labelling, re-scanning or manual data entry costs organisations money, and sub-standard barcodes that slip through quality control can lead to expensive non-compliance penalties from suppliers.

Because image-based readers capture more information about the barcode than laser scanners, this allows them to successfully read codes degraded by damage, orientation or distortion. The analysis software simply reconstructs the missing data using any legible portion of the image.



OCR-A

OCR-B

### **In-line barcode verification and quality control**

Image scanners can not only read barcodes, but also verify them against industry standards, such as ISO/IEC 15416 - the 1D print quality standard, or ISO/IEC 15415 - for 2D symbols. The ability to quality check every barcode prior to them leaving the warehouse can help prevent supplier fines and improve supplier relationships.

Using traditional scanners without verification capabilities can mean that deteriorating barcodes don't get identified until they are unreadable, by which time many defects have already been processed. Because vision scanners are extremely sensitive, they will detect even a slight decline in barcode quality, or non-compliance against ISO standards. By providing alerts prior to a fail, they allow the issue to be rectified proactively.

With an improved inspection process, warehouses can remove errors and improve accuracy, drastically increasing overall efficiency.

### **Continuous improvement**

Image-based scanners also store the data they receive which can later be analysed for determining the root cause of misreads e.g package handling, poor print etc. By reviewing the images of unread packages, operators can implement preventative measures to alleviate the problem going forward.

### **Beyond the barcode - product quality control**

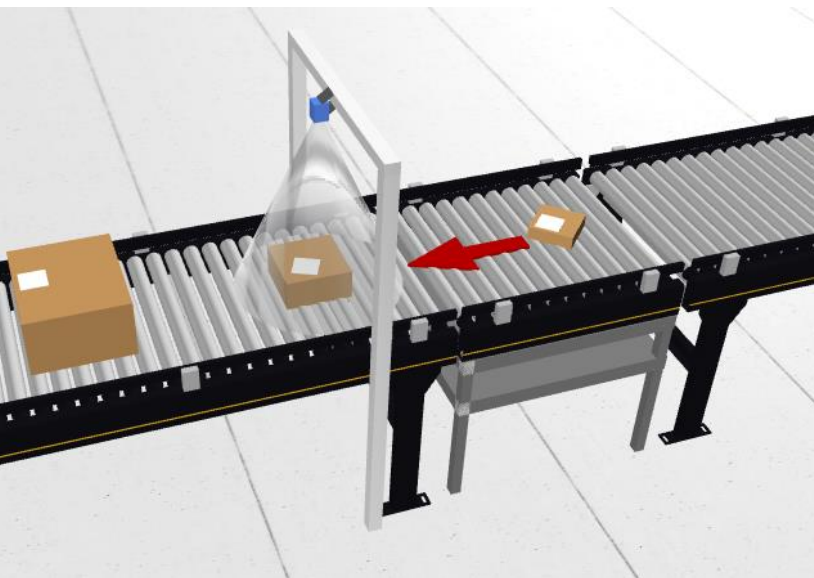
Taking image scanning to the next level, machine vision technology can be used for a wide range of product and packaging inspection applications. Using more advanced camera technology, it excels at carrying out high volume, high speed inspection operations.



Because of its speed, accuracy and repeatability, a machine vision system could easily inspect object details too small for the human eye at a rate of thousands of parts per minute.

Here are a number of applications where the technology can be used:

- Inspecting the colour of products
- Checking the fill level of liquids in bottles
- Detecting product label defects
- Alerting when components are missing
- Ensuring the correct size and measurement of products.



# Image scanning versus barcode readers

Image scanners offer all the benefits of traditional barcode readers, in addition to an important list of added extras:

## 1. Higher read rates

Image scanners offer much higher read rates than laser scanners, increasing throughput and reducing costs.

## 2. Powerful visualisation

Image scanners have much more powerful image visualisation than barcode readers, offering verification and quality control applications.

## 3. Continuous process improvement

By storing the image, the scanners provide access to much more data for continuous process improvement.

## 4. Lower equipment costs

Laser scanners use motors and other mechanical mechanisms to 'move' the laser spot across the code. Because camera-based scanners have no moving parts, they are inherently more robust and therefore offer lower maintenance costs.

## 5. Future proofing

The uptake of 2D barcodes is increasing. Image scanners can easily process this data (unlike laser barcode readers), meaning the logistics industry can keep pace with this future trend.

# Is it right for my operations?

As with any capital equipment purchase, you will no doubt need to investigate the cost versus the benefit of introducing image scanning technology. We recommend considering the following, to assist in your decision-making process:

## 1. Request a site visit by an independent consultant

An independent [warehouse automation consultancy](#) will be able to review your business' operations and identify if/where image scanning technology could be of benefit.



## 2. Work out ROI

Look at the hard data. When working out return on investment (ROI) ask yourself:

- Will image scanners increase read rates? If so, by how many units?
- What impact will the increase in read rates have on your throughput rates?
- Will fewer misreads lead to cost savings? Or a reduction in supplier penalties?



## 3. Consider non-tangible benefits

You may not be able to tangibly measure all the benefits of introducing image scanning technology. For example, lower error rates could improve supplier relations or the ability to take on new product lines.



#### 4. Compare providers and technologies

There is a wealth of barcode reading technology on the market - from entry-level laser readers, to high-end image scanners and an array of technologies in-between.

Use a consultancy to help you compare technologies and suppliers – they'll provide an impartial and objective review of your options.



#### 5. Meet today's and tomorrow's needs

Define what your needs are, both now and in the future. If your demands can easily be met using barcode readers, why pay for more expensive image scanning capabilities? In contrast, if laser barcode readers are struggling to cope with your demands now, future-proof with a more advanced option.



#### 6. System integration

Take time to understand if and how the image scanners will integrate with your other operating systems and equipment. For example, there's no use specifying image scanners to maximise read rates if your conveyors are incapable of delivering the increase in speed.



#### 7. Testing testing

Consider a programme of change where you trial the image scanners and prove the business case prior to rolling-out across your entire operation. Push the technology to its limits, refine how you use it and adapt for optimum efficiency.



## Conclusion

Image-reading scanners give businesses the ability to increase read rates and reduce read errors, whilst also allowing a wider range of barcodes, symbols and characters to be processed. Based on the assumption that even a 1% increase in read rates will dramatically increase throughput, in theory the viability of this state-of-the-art technology cannot be questioned.

However, whilst image scanners are becoming more cost-effective, they do come at a premium price compared to their laser counterparts. And for some businesses which don't have the capital to invest, or may not see the immediate operational and cost benefits, the advanced alternative could currently be a step too far.

With technology advancing at such a rate, the cost of image scanners will no doubt fall, allowing the equipment to become a lot more mainstream in the coming years. It's also a relatively simple process to swap out barcode readers for image scanners, meaning upgrades can be made as soon as the technology becomes more affordable.

In conclusion, if you're considering installing either laser or image-based barcode readers, enlist the help of a specialist [warehouse automation consultancy](#). They will review your operations, give you the pros and cons of both systems and suggest the most cost-effective way to future-proof your business.

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