TELEDYNE DALSA
A Teledyne Technologies Company

Application Note | Case Study | Technology Primer | **White Paper**

Fast and Easy Package Inspection

The BOA™ from Teledyne DALSA is a tiny (41 mm³ cube) "smart camera" (see Figure 1). This smart camera contains an image sensor – as in a regular digital camera – image processing computers, communications, and machine vision software, all in a package that is IP67 (wash-down) rated and requires no cooling.

Figure 1: The BOA is less than a handful!

To set up a BOA for your inspection task, you connect it to a "client" computer, such as a laptop or a factory-standard HMI (Human-Machine Interface) over a local Ethernet. All the software needed is in the BOA, and it will appear as a web application on your computer. The BOA communicates its results over the Ethernet, using standard factory protocols, or though dedicated I/O lines, say for rapid product sorting. The BOA software has user access administration and data logging for CFR Part 11 compliance.

A version of the BOA was recently introduced with specialized software for reading barcodes (1D and 2D) and text (OCR), such as date and lot codes, on packages. This version is called IDR, where IDR stands for Identification Reader. It is ideal for many image-based identification and verification tasks in pharmaceutical and medical packaging.

A primary design goal for IDR, and other BOA products, is ease-of-use. IDR meets this goal by using a graphical interface that is intuitive and matches your "mental model" of how a barcode or OCR task works. Figure 2 is an example of IDR set up to read barcodes and text on package.

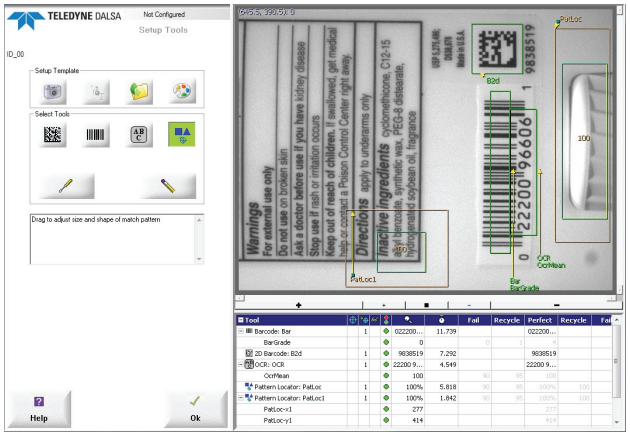

Figure 2: IDR running on the BOA

Buttons, on the left, select "tools" such as an OCR reader (the ABC button). To read a barcode, you would click the 2D or 1D barcode button and select the area to read by adjusting a "read rectangle" on the image (panel at top, right). Tool parameters and processing of the output results is done though the panel on the lower right. There is no need to learn a programming language.

IDR can read and / or verify 2D barcodes such as:
- Data Matrix
- QR Code
- PDF417

Codes can be square or rectangular and grading is supported to AIM DMP, ISO 16022 and ISO 15415.
IDR can read and / or verify 1D barcodes such as:
- Pharmacode
- UPCa, UPCe
- EAN8, EAN13
- Code39, Code93, Code128
- Codabar, BC412, ITF, Postnet, PLANET, and RSS14

IDR's OCR tool can be easily trained to read binary or grayscale text, bright or dark, and fielding (limits on what characters can appear at a location in the text). In addition to reading or verifying the text, a quality score is output. This score can be used to monitor the print quality, and so could warn when a print head is jammed or if the printer is running low on ink.

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A unique IDR feature is the ability to find a pattern in the image and use that pattern's location to adjust the rectangles for barcode and OCR. This is the "Pattern Locator" tool shown in Figure 2. Why would you want to do this? In many cases the package handling machinery can't "show" the text or barcode to the vision system in a tightly controlled location. The text or barcode might appear to bounce around and, if they bounce out of the "read rectangle", will cause a read failure. If you set up a "Pattern Locator" to find part of the label or packaging that does not change (unlike a barcode or OCR), then you can use that as a reference to adjust the location of the "read rectangle". This will greatly reduce or eliminate read failures do to package position shifts. Of course, a barcode or OCR that is partially or completely out of the image will still be a read failure.

Teledyne DALSA iNspect™ software is used for pharmaceutical and medical packaging applications that need more than reading or verifying barcodes and OCR. iNspect includes many additional tools, such as tools for measuring objects in the image, but retains the ease-of-use of the IDR (see Figure 3). The iNspect software runs on the BOA, just as with IDR, and also on much faster and larger computers called "Vision Appliances".

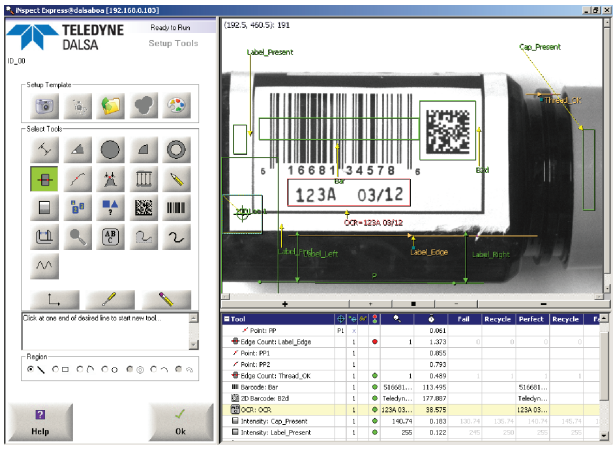

***Figure 3** – iNspect running on the BOA*

As you can see from Figure 3, IDR has a subset of the tools that are in iNspect and both have the same user interface, only iNspect has more tools. iNspect can be used for 2D visual dimensioning of packages, looking for defects in the package or product (if visible), damaged or incorrect product, and checking for flags (fold-overs) or rips in labels. In short, those tasks where reliable, high-speed machine vision is superior to human vision.

So for OCR or OCV (text verification) and barcode reading, IDR provides ease-of-use, a unique "Pattern Locator" capability to compensate for product motion and compliance with quality and manufacturing protocols at a very competitive price. iNspect provides additional capabilities and performance, but with the same interface paradigm with ease of integration and use.

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